The Welfare of Recreational Horses in Victoria: The occurrence of and factors associated with horse welfare

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ABSTRACT

The welfare of recreational horses in Victoria, Australia has become an increasingly important issue, as evident by their high representation in welfare investigations. A substantial proportion of horse welfare problems appear due to recreational horse owner mismanagement, as a result of ignorance rather than intentional abuse. According to the Theory of Planned Behaviour (TPB), a recreational horse owner's attitudes towards horse ownership are likely to influence their behaviour in terms of the implementation of horse husbandry and management practices. Subsequently, these recreational horse owner husbandry and management behaviours may impact on the welfare of the horse. This study examined recreational horse ownership in Victoria and investigated the relationships between horse owner attributes and horse welfare outcomes.

The results of a random telephone survey reported the observed incidence of horse ownership to be 3.5%, suggesting that as many as 176,000 people in Victoria may own recreational horses. Furthermore, on average each recreational horse owner owned four horses, which indicates there could potentially be in excess of 600,000 recreational horses in Victoria. Horse owners typically provided their horses with their daily primary care. Consequently, it was the horse owner who was responsible for the welfare of these horses. Horse owners largely reported the appropriate performance of horse husbandry and management practices and a low incidence of horse injury and illness. However, on average, horse owners spent less than 30 minutes per day interacting with their horses. Furthermore, at least one quarter of horse owners who provided the daily primary care, failed to interact with their horses on a daily basis. These findings suggest that a limited degree of human-horse interaction rather than the inappropriate performance of other horse husbandry and management practices could potentially be the primary source of Victorian horse owner mismanagement.

The observation-based results of on-site inspections provided evidence of relationships between horse owner attributes and horse welfare outcomes. The appropriate performance of horse husbandry and management behaviour by horse owners was associated with positive horse welfare outcomes. Furthermore, a horse owner's appropriate performance of horse husbandry and management behaviour was predicted by favourable beliefs, which underlie horse owner attitudes towards horse husbandry and management behaviour. In addition, knowledge-based background

factors appeared to influence horse owner beliefs about horse owner husbandry and management behaviour. These findings are in accordance with the literature and the TPB (Ajzen, 1985), and indicate the potential to predict a horse owner's husbandry and management behaviour from their attitude towards the behaviour in question.

In addition, a qualitative investigation identified horse owner opinions on the key issues associated with recreational horse ownership in Victoria. Consequently, the results from the three components of the study demonstrate the opportunity to manipulate the human-horse relationship via targeted education and training programs in order to potentially both improve the husbandry and management behaviour of recreational horse owners and reduce the incidence of poor welfare in recreational horses. Further research is, however, required to not only demonstrate the sequential nature of the human-horse relationship and provide evidence of causal relationships, but to determine the effectiveness of education and training programs in improving the welfare of recreational horses.

The results reported in this thesis provide what is believed to be the first comprehensive account of recreational horse ownership. It offers a valuable insight into the human-horse relationship and its possible influence on recreational horse owner behaviour and horse welfare. Horse owners provide the primary care for their horses and consequently are the major determinants of the welfare of these horses. Although the results of this study are particularly relevant to Victoria, they also should be highly relevant to recreational horse ownership elsewhere. As in Australia, these results have implications for recreational horse welfare in any recreational horse population where recreational horse owners provide the primary care for their horses.

DECLARATION

This is to certify that:

(i) the thesis comprises only my original work toward the PhD

(ii) due acknowledgement has been made in the text to all other material used,

(iii) the thesis is less than 100, 000 words in length, exclusive of tables, maps, bibliographies and appendices

(iv) all research reported in this thesis was approved by either the Monash University Human Research Ethics Committee (MUHREC) or the Monash Animal Research Platform Animal Ethics Committees (MARP AECs)

Lauren Margaret Hemsworth

Signed..... Date.....

Publications

The following is a list of publications arising from this thesis:

Abstracts (poster presentation)

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CHAPTER 1
GENERAL INTRODUCTION

1.1 BACKGROUND

This thesis investigates the welfare of recreational horses in Victoria, Australia, examining the occurrence of and factors associated with horse welfare. This chapter provides the background and aims of the study.

1.2 DOMESTICATION OF *EQUUS CABALLUS*

Horses (*Equus caballus*) were domesticated some 6,000 years ago (Goodwin, 2002). Animal domestication in its early stages is believed to have been a largely unintended process on the part of humans in which tame or semi-tame wild animals were gradually brought under increasing levels of human control (Serpell, 1986). From this point, animal domestication was a process by which captive animals adapted to both humans and the environment which they provided (Price, 2002). The relationship between humans and domesticated animals today is generally portrayed as a successful "adaptive strategy" in the evolutionary sense, a kind of symbiosis where both humans and animals have benefited (Serpell, 1986). However, the relative benefits to the partners vary widely across different animal uses.

Equus caballus has been an integral part of the Eurasian and North American human culture since humans first colonised those parts of the world (McLean, 2004). The evolution of the horse began some 65 million years ago, and the earliest evidence of horses being associated with human culture comes from cave paintings made in France and Spain approximately 15,000 years ago when horses were hunted for meat and hides (Goodwin, 2002). Approximately 6000 years ago the earliest evidence for the domestication of the horse begin to appear in the Ukraine, Egypt and western Asia, where equids are believed to have initially been used as pack animals, before being employed to pull sledges and eventually wheeled vehicles (Clutton-Brock, 1992). Soon after domestication, horse riding appears to have begun, sometime around 3,500 BC in the Kazakhstan region of Central Asia (Goodwin, 2002). Archaeological evidence from Derevka, in the Ukraine

also suggests that horses were being ridden at least 500 years before the invention of the wheel (Levine, 1999).

The horse evolved as a plain dwelling preferential grazer that fed on a diet of high fibre and fresh foliage for up to 18 hours a day (Hansen, 1976; Waring, 1983; Putman et al., 1987; Goodwin, 1999, 2002; Harris, 1999). The fossil record provides evidence that early equid species displayed adaptations in their population dynamics and behavioural ecology, which allowed them to exploit new and changing environmental resources (Goodwin, 2002; Waran, 2002). This trait is viewed as a pre-adaptation to domestication (Goodwin, 2002). Domestication saw humans removing horses from the environments in which they had evolved, and managing them under conditions convenient to people (Goodwin, 2002). As the role of the horse in human culture has changed and diversified, the constraints of domestication have restricted many aspects of horse behaviour. In today's society horses' freedom to roam and choose food, shelter and social companions may all be restricted, depending on the purpose for which they are kept (Goodwin, 2002).

While some aspects of domestication, such as the provision of food, shelter, protection from predators and care during illness and injury, have undoubtedly benefited the horse, many of the constraints imposed on the domestic horse conflict with their evolutionary adaptive behaviour (Goodwin, 2002). The adaptive behaviour of the horse has changed very little in the 6000 years of domestication, as indicated by the continued success of feral horse populations around the world and the ease at which domestic horses can assume a feral lifestyle (Goodwin, 2002). However, as noted by Waran (1997), while feral horse populations persist, it cannot be assumed that they do so with optimal welfare, as many feral and free-ranging populations survive in suboptimal environmental conditions.

The domestication of the horse has resulted in a diverse range of uses, expanding from a traditional role in war, haulage and transport, to include a competitive and recreational role, as seen in Australian society today. While the primary role of horses in developing countries remains that of a working animal in transport and agricultural work (Pritchard et al., 2005), in more affluent countries horses are now predominantly used for competitive sports, recreational use and companionship (Leckie, 2001). The diversity of their role in our society has resulted in a

wide range of welfare issues being faced by horses and their owners today. Some of these issues are perceived as welfare problems but have no sound basis, while others have been supported by research.

1.3 THE AUSTRALIAN HORSE INDUSTRY

The Australian equine industry is a multi-sectorial industry that represents a variety of activities that include primary production, sports and recreational interests. The exact size and nature of the horse industry however is difficult to clearly define as a significant number of horse owners and their horses are not identified or registered with any equine group or organization. The challenge involved in contacting horse owners that are not members of any horse clubs or societies is not unique to Australia, with equine industries from countries such as the USA and UK reporting similar difficulties when attempting to locate these types of horse owners. A report compiled by the Rural Industries Research and Development Corporation (RIRDC) in 2001 attempting to outline the Australian horse industry, estimated the Australian horse population to be somewhere in the vicinity of 1.2 million. Of which, approximately 120,000 were believed to be involved in the horse racing industry (Thoroughbred and Standardbred), 300,000 were considered feral, and some 700,000 were recreational horses. The limitations associated with identifying horse owners prevent a more substantive estimate of Australian horse numbers, and realistically the actual figure could be anywhere between 0.9 million to 1.8 million horses.

The RIRDC report suggests that the Australian horse industry contributes in excess of $6.3 billion annually to the GDP, a figure that would be closer to $8 billion if the volunteer contribution was included. Approximately $3.9 of the $6.3 billion is contributed by the Australian Thoroughbred Racing Industry annually with almost $1 billion from wagering alone going to government revenue (Horse R and D Plan, 2006). The report also attempts to detail the horse industry's substantial contribution to the Australian economy by means of a comparison between it and the livestock industries in Australia. The livestock industries contribute approximately $7 billion annually to the Australian economy, and thus with an annual contribution of at least $6.3 billion, the Australian equine industrys high level of economic importance within Australia is apparent.

A report detailing research into the horse industry in Great Britain (Anon, 2004) compared the equine industry in Great Britain with those in Australia, US and Northern Ireland. This report estimated an equine population of approximately 9.6 million in the US which far exceeds that of Great Britain with 600,000-900,000, Australia with 900,000-1.8 million, and Northern Ireland with 29,000. However, when the comparison is made in terms of equine numbers per capita, Australia had somewhere between 4.6-9.2 horses per 100 people, followed by the USA with 2.4, Northern Ireland with 1.7 and Great Britain with 1.0-1.7 horses per 100 people. In 1997, with a population of less than 20 million people, over 250,000 Australians were involved in equestrian sports and recreation (Australian Bureau of Statistics, 1999). Figures and reports such as these indicate the role horses play in Australian society.

The Australian equine industry can be divided into two distinct sectors; one involving the horse racing industry and the other the recreational horse population. This distinction is made evident in the definition provided by the Australian Horse Industry Council (AHIC) when referring to a recreational horse as any horse not currently involved within the horse racing industry (both Thoroughbred and Standardbred racing) (pers. comm., B. Smyth, AHIC). The recreational horse industry can also be further defined according to its competitive and non-competitive nature, where the competitive form involves disciplines such as showing, eventing, dressage, show jumping, endurance riding and polo, and the non-competitive form includes leisure riding and companionship. The two equine sectors in Australia differ markedly in a number of key areas, including horse owner involvement, horse identification and registration, and the horse welfare issues and concerns encountered. However the most significant difference between the two sectors potentially concerns the issue of governing bodies and legislation.

The Australian horse racing industry, while state structured, is regulated by the Australian Racing Board (a national governing body), which implements an extensive legislative framework. The industry is highly regulated according to a clearly defined set of policies. Information pertaining to these controls is readily available to the public. ‘Stewarts’ appointed by the industry ensure compliancy through the enforcement of a strong auditing system of supervision and monitoring. The structured nature of the industry’s management aids in ensuring that horse health and welfare requirements are maintained. As previously stated, the recreational horse population is both diverse and undefined. Unlike the horse racing industry there is no single governing body or

legislative framework regulating recreational horse ownership, management and use in Australia. The industry's sector interests can be organized with a local, regional, state and/or federal focus, depending on the size and scope of the organization. For example, Equestrian Australia (formally Equestrian Federation of Australia) which provides guidance regarding horse sport in Australia is a federation of state branches that is governed by a national body.

In Australia there are hundreds of groups and organizations representing horses and their ownership. These groups appear to vary in terms of scale and scope, with some possessing defined structures while others appear to simply be groupings of people with similar interests. There are a small number of peak equine organizations, which include Equestrian Australia, the Australian Horse Industry Council and the Pony Club Association of Australia, which are each highly structured, nationally managed and possess a membership of other groups and organisations. The nationally managed organizations, including the breed societies and equestrian clubs, also possess strong structures, processes and membership. Groups and organizations that are managed at a state or regional level, such as the Horse Riding Clubs Association of Victoria and Pony Club Victoria, are often affiliated with corresponding national bodies, and therefore maintaining similar structures and processes. The locally managed equine groups tend to be less structured, have a reduced membership and are often specialized for the equine discipline of interest in the area where they are located.

While the equine organizations and groups operating in Australia vary in terms of their structure, protocols and membership criteria, they all, to varying degrees, offer unregulated support and guidance to members regarding the use and management of horses. The Fédération Équestre Internationale (FEI), the international governing body for equestrian sport, provides detailed policies and recommendations concerning the use, management and welfare of recreational horses. Equestrian Australia (EA), a peak national organization possessing widespread affiliation and influence with equine groups and organizations Australia wide, is formally affiliated with the FEI. It has drawn upon the FEI policies as a framework for all of the EA recommendations and guidelines on the use and management of recreational horses in Australia. While such recommendations are not enforceable, they have been adopted by Australian equine groups and organizations. However, the extent to which these recommendations have been adopted and the degree to which they are followed varies considerably.

1.4 THE VICTORIAN HORSE INDUSTRY

In the state of Victoria, Australia, little is known about recreational horse ownership, again believed to be due in part to the lack of a compulsory identification and registration system and the number of horse owners that are not members of any horse clubs, societies or organizations. Despite the limited information, the welfare of horses used for recreational purposes has become an increasingly important issue, as evident by the incidence of horse welfare investigations conducted by the Victorian inspectorate of the Royal Society for the Prevention of Cruelty to Animals (RSPCA). Since 1997, the RSPCA in Victoria has annually investigated more than 1200 cases of welfare concerns regarding recreational horses. This is second only in number to dog welfare investigations (RSPCA Annual Report, 2009/2010; pers. comm., G. Boland, RSPCA Victoria).

The types of welfare problems encountered by Victorian RSPCA inspectors during horse welfare investigations primarily involve general management practices (Pearson, 2004; pers. comm., G. Boland, RSPCA Victoria). For cases where severe cruelty has occurred, prosecution may be sought under the Prevention of Cruelty to Animals Act 1986 by authorized officers appointed under the Act, generally from the RSPCA and the Victorian Department of Primary Industries. The RSPCA reports that approximately 60% of the cases they investigate annually involve the mismanagement of horses where cruelty has not yet occurred, but may do so if the situation continues (Pearson, 2004). While all domestic animals in Victoria are covered by the Prevention of Cruelty to Animals Act 1986, there is no specific provision for the welfare of horses in the Act itself, nor under any other legislation in Victoria. Such legislation does exist in other countries, including Ireland (Control of Horses Act 1996) and England (Riding Establishments Act 1970). In Victoria, the Codes of Practice developed under the Prevention of Cruelty to Animals Act 1986 define the minimum standards acceptable for animal welfare, and there is a number of Codes of Practice that are designed specifically for horses. These codes are designed to provide a guide for horse owners and managers regarding the minimum acceptable standards for horse welfare and management, while at the same time providing a defence against cruelty. The non-enforceable nature of the Codes of Practice requires any offence committed against horses in Victoria to be prosecuted under the general provisions of the Prevention of Cruelty to Animals Act 1986. As a

result, prosecution can only occur if there is a breach of the Act, and it can be demonstrated that cruelty has been committed, particularly as a result of a breach of a Code.

It is widely accepted that recreational horse owners are primarily responsible for the welfare of their horses. Within recreational horse populations around the world, it has been reported that a substantial proportion of the welfare problems that occur are due to owner neglect or mismanagement, as a result of ignorance rather than intentional abuse (Witham et al., 1998; Grandin et al., 1999; Leckie, 2001; Pearson, 2004). The literature suggests that inappropriate management by the horse owner is potentially detrimental to a horse's health and welfare (Atock, 1982; Steward, 1985; Ellis, 1993; Bayley and Maxwell, 1996; Stull, 1996; Houpt and Crowell-Davies, 1997; Witham et al., 1998; Grandin et al., 1999; Perry and Hanlon, 1999; Pearson, 2004). An important factor influencing the management of animals and their subsequent welfare status appears to be the quality of the human-animal relationship. While limited in comparison to that in the livestock industries, the horse literature indicates that horse welfare is potentially influenced by the attributes of the horse owner (Leckie, 2001; Pearson, 2004). These horse owner attributes may include demographics, knowledge, attitudes and behaviour.

In conclusion, the majority of equine welfare concerns observed in recreational horse populations appear to be a result of neglect due to ignorance rather than intentional abuse, by the horse owner or primary carer. Despite the high representation of recreational horses in welfare investigations, limited information is available concerning the factors associated with recreational horse welfare in Victoria. Limited literature supports a relationship between horse owner attributes and horse welfare outcomes, and indicates that inappropriate management by the horse owner is potentially detrimental to a horse's health and welfare. Consequently the human-horse relationship warrants further investigation, and the relationships between horse owner attributes, horse owner behaviour and horse welfare outcomes in the Victorian recreational horse population need to be examined.

1.5 AIMS OF THE RESEARCH

The aim of this research was to investigate the welfare of recreational horses in Victoria, and in particular to examine the relationships between horse owner attributes and horse welfare outcomes. This research consisted of three main studies.

i. To investigate recreational horse ownership and the recreational horse population in Victoria, by specifically:
    a. investigating the incidence of recreational horse ownership in Victoria,
    b. developing a profile of the recreational horse population and the ownership associated with it, and
    c. characterizing recreational horse owners by comparing demographic differences between horse owners and non-horse owners in Victoria.
ii. To investigate the human-horse relationship by examining the relationships between;
    a. the husbandry and management behaviour of recreational horse owners and horse welfare outcomes,
    b. recreational horse owner attitudes towards horses, horse husbandry and management, and horse ownership, and the husbandry and the management behaviour of recreational horse owners, and
    c. recreational horse owner background factors and recreational horse owner attitudes towards horses, horse husbandry and management, and horse ownership.
iii. To investigate recreational horse owner viewpoints on horse ownership in Victoria, specifically investigating:
    a. recreational horse owner views about the welfare issues and concerns in the Victorian recreational horse population, why they arise and possible measures required to manage and prevent them.
    b. recreational horse owner views regarding possible systems of registration and identification of recreational horses in Victoria, as well as the regulatory framework that may be appropriate for recreational horses.

The outcomes of this research into recreational horse ownership in Victoria, and the relationship between human-horse interactions and horse welfare outcomes will be used to make recommendations concerning the development and implementation of education programs,

legislation and policy aimed at reducing horse welfare concerns by promoting appropriate horse husbandry and management practices.

1.6 OUTLINE OF THE THESIS

The following chapter (Chapter 2) provides an overview of the literature relevant to the current research, with a focus on the human-animal relationship and its implications for animal welfare, and primary reference to recreational horses. The chapter initially affords a review of the concept of animal welfare, the different assessment approaches, and the assessment of animal welfare in the field. This is followed by a discussion of the key aspects of the human-animal relationship, and the association between human attributes and animal welfare outcomes.

Chapter 3 outlines the methodological development of the random telephone survey, the on-site inspection protocol, and the qualitative interview process. Chapter 4 describes the investigation into recreational horse ownership in Victoria, Australia. This component of the study involved the employment of a random telephone survey to determine the incidence of recreational horse ownership in Victoria, and the factors associated with this ownership. These factors included horse owner attributes (background factors, attitudes and behaviour), horse demographics, horse husbandry and management practices, and human-horse interactions.

The investigation into the influence of the human-horse relationship on the welfare of recreational horses in Victoria is presented in Chapter 5. This observation-based component of the study collected data during on-site inspections with Victorian horse owners and their horses, using an attitude questionnaire and an inspection of horses and horse management and husbandry practices. It aimed to examine the relationships between horse owner attributes, and investigate the antecedents of horse owner husbandry and management behaviour and the ensuing relationship with horse welfare outcomes.

A qualitative investigation into horse owners' viewpoints on the key issues associated with recreational horse ownership in Victoria is reported in Chapter 6. This final component of the

study was conducted using a qualitative interview, consisting of four main topic areas; participants' involvement with recreational horse ownership in Victoria, participants' views on the recreational horse industry and ownership today, participants' views on welfare issues and concerns in recreational horses in Victoria, and participants' views on registration and identification of Victorian recreational horses. Chapter 7 summarises the research results and discusses the possible implications for recreational horses and horse owners in Victoria, the development and implementation of horse registration, education, policy and legislation, and future equine research.

CHAPTER 2
LITERATURE REVIEW

Recreational horse owners are responsible for the welfare of their horses. The following review of the literature will discuss the human-animal relationship, an important determinant of animal welfare, with primary reference to recreational horses. The initial section of the review focuses on the concept of animal welfare and the different approaches to assessing an animal's welfare in the field. The remaining sections discuss the key aspects of the human-animal relationship and its implications for a range of animal species, with particular attention paid to the potential relationships between human attributes and animal welfare.

2.1 THE CONCEPT OF ANIMAL WELFARE

Animal welfare is a highly emotive subject. Furthermore, it is often a controversial one due primarily to its subjective nature. Within the general community a range of views on the subject appear to exist, resulting in marked and often extreme attitudes on animal welfare (Hemsworth and Coleman, 2010). Most people accept that humans have a moral obligation towards domestic animals and believe that they should not be subjected to unnecessary pain or severe discomfort (Fraser and Broom, 1990; Coleman, 2008). During the last 40 years, interest in animal welfare has rapidly increased in Western society and a number of key publications, such as Harrison (1964) and Singer (1975) have been responsible for bringing the topic of animal welfare to public attention. As a result many Western countries employ a variety of mechanisms to protect the welfare of domestic animals (Barnett and Hemsworth, 2009). Animal welfare legislation is often varied and can take on an array of forms, ranging from the protection of animals from cruelty, to the stipulation of mandatory standards. In addition, many countries have introduced Codes of Practice and while these codes generally rely on voluntary compliance, they have at times been incorporated into legislation (Hemsworth and Coleman, 2010). Although widespread pressure for the development and implementation of animal welfare legislation and regulation exists, the problem often lies in defining what constitutes good welfare for animals.

In order to investigate the welfare of recreational horses it is necessary to define what is meant by the term welfare. Once welfare has been defined it becomes possible to develop an appropriate method of measuring it. Animal welfare is a term that has arisen to express ethical concerns about the quality of life experienced by animals (Tannenbaum, 1991; Fraser, 1995; Duncan and Fraser, 1997; Fraser and Weary, 2004). It is a complex construct that combines both subjective and objective aspects of an animal's quality of life. There are many challenging aspects of animal welfare, none more so than the definition and measurement of such an abstract concept (Fraser, 1995; Scott et al., 2001). The widespread use of the term welfare within a range of scientific disciplines, philosophy and the general community has resulted in considerable variation in the different definitions afforded to animal welfare (Hemsworth and Coleman, 2010). Even within science considerable uncertainty surrounds the concept of animal welfare (Fraser, 2003; Sandoe et al., 2004), and consequently, the methodology employed to assess the welfare of animals.

Animal welfare may be considered a combination of subjective and objective aspects of an animal's conditions in life, including health and disease, behaviour, and husbandry and management (Duncan and Fraser, 1997; Scott et al., 2001). Over the years, many methods of defining welfare have been developed and these vary considerably in approach and effectiveness (Duncan and Fraser, 1997; Hemsworth and Coleman, 2010). Despite these past attempts, the study of animal welfare today continues to struggle with two persistent and interrelated problems; how to define animal welfare and how to determine which measures should be used to evaluate it (Moberg and Mench, 2000; Hemsworth and Coleman, 2010). Debate within the scientific community has lead to the emergence of three distinct concepts of animal welfare and the measures which should be used in its assessment (Hemsworth and Coleman, 2010). The welfare of animals is evaluated on the basis of (i) how well the animal is performing from a biological functioning perspective; (ii) affective states, including suffering, pain and other emotions and feelings; and (iii) the expression of normal or natural behaviours (i.e. the nature of the species approach).

2.1.1 The biological functioning approach to animal welfare assessment

The rationale underpinning the biological functioning approach to the assessment of animal welfare is that inadequate adaptation will generate welfare concerns for the animal. This approach is largely based upon the definition proposed by Broom (1986) whereby the 'welfare of an

individual is its state as regards its attempts to cope with its environment'. The 'state as regards its attempts to cope' refers to how much has to be done in order to cope with the environment and the extent to which coping attempts are succeeding (Broom and Johnson, 1993). An animal's attempt to cope can be determined using specific quantifiable criteria, which include behavioural responses, the functioning of body repair systems, immunological defences and physiological stress responses. The biological cost of these responses can adversely affect an animal's fitness, that is, its ability to grow, reproduce and remain healthy (Barnett et al., 2001). Therefore, the risks to an animal's welfare by an environmental challenge can be assessed on two levels, firstly, the magnitude of the behavioural and physiological responses (attempts to cope) and secondly, the biological cost of these responses (the costs of coping and of failing to cope) (Fraser and Broom, 1997). The behavioural and physiological responses include the stress responses, while the biological cost includes adverse affects on the animal's ability to grow, reproduce and remain healthy (Broom, 1998).

The 172 member countries of the World Organisation for Animal Health (OIE) recently endorsed a definition of animal welfare similar to that provided by Broom (1986). The OIE (2008) animal welfare mandate states that 'Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment. Therefore, a key precept in this concept is that animals use a range of behavioural and physiological responses to assist them in coping with environmental conditions, and while biological regulation in response to environmental change is constantly occurring, adaptation is not always possible. When homeostasis (i.e. constancy of the internal environment which varies only within tolerable limits) is not achieved, damage, disease or even death may result (Broom and Johnson, 1993). Thus, a failure to adapt is likely to result in the impairment of biological functioning (a range of long-lasting behavioural and neuroendocrine responses) and the generation of poor animal welfare.

Using the concept of biological functioning, a broad examination of the behavioural, physiological, health and fitness responses of animals to the condition of interest (i.e. under study) can be undertaken to assess the biological functioning of the animal (Hemsworth and Coleman, 2010). That is, the risks to the welfare of an animal imposed by the condition of interest can be assessed at two levels: (1) the magnitude of the behavioural and physiological responses; and (2) the biological cost of these responses. These behavioural and physiological responses include abnormal behaviours, such as stereotypies and redirected behaviours, and the stress response, while the biological cost includes adverse effects on the animal's ability to grow, reproduce and remain healthy and injury-free. Biological functionality indicators provide indirect indications of how the animal is coping with its environment. This approach to welfare assessment has been used by scientists to examine the effects of housing, husbandry and handling (Mellor and Stafford, 2000; Hemsworth and Coleman, 2010).

A common criticism of the biological functioning concept is that fundamental requirements do not adequately include emotions or feelings (Dawkins, 1990; Duncan, 1996; Sandoe et al., 1996; Hemsworth and Coleman, 2010). This argument would only be applicable if emotions were independent of other biological processes, which appears unlikely as the mental state of an animal is considered to be an integral component of its biological state (Dantzer and Mormede, 1983). Emotional responses are formed in the limbic system. This system projects to numerous parts of the brain, some of which include those involved in the initiation and maintenance of the stress response, potentially providing an explanation for why emotional insults activate a stress response (Kaltas and Chrousos, 2007). Emotions form part of the body's regulatory system, which when combined with a range of learning processes enable animals to both avoid potentially harmful situations and to identify potentially beneficial situations (Cabanac, 1979). In addition, emotions are made up of several components which include cognitive processes, the associated sensation of emotion and the visceral and behavioural responses (Dantzer, 1988). Thus, an animal's behavioural and physiological responses to a challenge are expected to be influenced by their emotions (Hemsworth and Coleman, 2010).

2.1.2 The affective state approach to animal welfare assessment

This approach defines animal welfare in terms of emotions. Consequently, it emphasises the absence of negative emotions including fear and frustration, and the presence of positive

emotions such as comfort and pleasure (Duncan and Dawkins, 1983; Duncan and Mench, 1993; Duncan and Fraser, 1997; Duncan, 2004, 2005; Boissy et al., 2007). Harrison (1964) emphasised the suffering of animals when criticising the intensive nature of animal agriculture. The general view is that emotions arise through a discrepancy or conflict between the state of the world and the expectations of the individual. Additionally, the similar description of emotions in both animal behaviour and psychology literature links visceral arousal and cognitive processes (Bolles, 1981; Dantzer, 1988). A discrepancy or interruption of an individual's expectations or intended actions results in the associated experience of emotion or feeling (positive or negative), depending on the individuals cognitive evaluation of the discrepancy or conflict between the state of the world and their expectations. This emotion is then associated with undifferentiated visceral arousal and behavioural responses (Hemsworth and Coleman, 2010).

Animal behaviourists generally believe that animals are restricted to a few basic emotions, including anger, fear, joy and happiness (Bolles, 1981), predicated on the perception that animals are likely to only require emotions that concern certain survival problems, for which there is some strong evolutionary benefit. Duncan (2004) has argued that animal welfare ultimately concerns an animal's feelings or emotions. Although all living organisms have certain requirements which must be met in order to survive, grow and reproduce and avoid symptoms of atrophy, ill-health, stress and death, higher organisms (vertebrates and higher invertebrates) have evolved subjective affective states that provide a more flexible means for encouraging the behaviour required to satisfy the organisms needs. Dawkins (1977) has suggested that subjective feelings evolved because animals that possessed them were fitter than those that did not. She also argued that feelings evolved as a means of protecting the primary needs of animals in a manner more flexible than reflexes (Dawkins, 1980). Fraser and Duncan (1998) propose that negative feelings are associated with an immediate threat, while positive feelings stimulate behaviour when long term benefit rather than immediate need results from the behavioural performance.

Animal emotions have been considered inaccessible to scientific investigation because of the perception that they may be antromorphised or ambiguous concepts outside the realm of scientific inquiry (Panksepp, 1998). In addition, emotions are often poorly defined, impossible to measure directly and difficult to measure indirectly. Duncan (2005) has suggested that these challenges are partially responsible for the resistance mounted by critics of the affective state concept. The

literature documents the difficulties encountered when examining emotions as though they were objective states of bodily arousal (Cacioppo et al., 1993). The indirect assessment of emotions often involves some form of preference testing, where the animal is 'asked' what it feels about the conditions under which it is kept and the procedures to which it is subjected (Duncan, 2005). The preference test was developed by Barry Hughes and Marian Dawkins, through their work with poultry (Dawkins, 1976, 1977, 1978; Hughes, 1975, 1977; Hughes and Black, 1973). Preference tests provide the opportunity for an animal to satisfy both its physiological and psychological needs. They allow an animal to choose between certain aspects of its environment, and it is assumed that the animal will make a choice that is based on how it feels and what is in the best interests of its welfare (Fraser and Matthews, 1997; Duncan, 2005). Two schools of thought exist with regard to the rationale behind the use of animal preference tests to study animal welfare; the first implies that an animal's preferences are influenced by the animal's emotions, which are key determinants of its welfare (Duncan and Petherick, 1991; Duncan, 2004), while the second assumes than an animal's preferences are indicators of important biological requirements and therefore optimize an animal's fitness (Broom and Johnson, 1993). Both views encompass Duncan's (2004) notion that higher organisms evolved feelings to motivate behaviour in order for the organism to survive, grow and reproduce.

The simplest form of preference study involves providing the animal with a choice of two situations in which the resource is varied (Hemsworth and Coleman, 2010). Preference testing has also been employed to measure both the animal's choice for and avoidance of environments or options (Hutson, 1981; Rushen, 1986; Pollard et al., 1994). The influence of previous experience on an animal's preference and the conflict between short-term and long-term welfare requires consideration (Duncan, 1978; Duncan, 2005). While the consistent selection of one resource over others indicates an animal's relative preference, it has been argued that in addition to ascertaining what an animal prefers, the strength of the preference also needs to be understood (Dawkins, 1983; Matthews and Ladewig, 1994; Duncan, 2005). To determine the strength of an animal's preference, experiments have incorporated motivational tests involving varying levels of cost (e.g. work effort, time and relinquishing a desirable resource) associated with gaining access to a resource or avoiding aversive stimulation (Duncan, 2005; Hemsworth and Coleman, 2010).

There has been considerable scientific debate regarding conceptual and methodological difficulties associated with preference studies (Dawkins, 1977; Duncan, 1978). Fraser and Matthews (1997) report three issues which could potentially limit the use of preference tests to measure animal welfare. The first concerns the use of inappropriate preference tests which fail to adequately reflect the animal's true preference. The second issue involves the use of preference tests which lack the measurement of the animal's strength of preference or avoidance of the resource, and its motivation to perform a specific behaviour in order to obtain its preference. The final issue regards a lack of relationship between the animal's preference and their welfare, which may result from the preference options being outside the animal's sensory, cognitive and affective capacity or if the choice is between short- and long-term benefits.

In conclusion, as with biological functioning, clarifying the conceptual association between animal preferences and animal welfare remains a challenge for many scientists. The individual's concept of animal welfare clearly underscores the methodology employed to ascertain animal welfare. As a result, it is suggested that preference research should be integrated with other measures used in animal welfare research. Furthermore, while studies of the strength of preference may provide compelling evidence that preference or the performance of a particular behaviour is of importance to the animal, additional evidence such as the occurrence of abnormal behaviour, stress physiology and health measures, will provide a more comprehensive assessment of animal welfare (Widowski and Hemsworth, 2008).

2.1.3 The nature of the species approach to animal welfare assessment

The principle underlying the nature of species concept is that animals should be kept in natural environments and allowed to behave in a natural manner. Of the three animal welfare concepts, the natural behaviour approach possesses the least scientific credibility. This is likely due to a lack of definition regarding both the term 'natural' and the type of welfare risks associated with a failure to provide 'natural' conditions (Hemsworth and Coleman, 2010). The notion that animals should be able to perform their full behavioural repertoire was common in early animal welfare research, as still evident today through the promotion of welfare-friendly production systems. Thorpe (1965) argued that an animal's inability to perform all the behavioural patterns exhibited by their free-living counterparts would result in the animal suffering.

A number of limitations are associated with this approach to the measure of animal welfare (Hemsworth and Coleman, 2010). The difficulty involved with attributing actual suffering, a subjective state, with the prevention of certain behaviour or the absence of expected behavioural expression is widely agreed upon (Dawkins, 2003). In addition, some free-living behaviours often represent an animal's attempts to survive adverse conditions and therefore some of the natural behaviours may be considered adaptations to cope with extreme adverse situations (Dawkins, 1980). Consequently, the lack of expression of this type of natural behaviour may not result in the animal experiencing suffering. Furthermore, Martel (2002) provides the following view on free-living animals, 'Animals in the wild lead lives of compulsion and necessity within an unforgiving social hierarchy in an environment where the supply of fear is high and the supply of food low and where territory must constantly be defended and parasites forever endured' (pg. 19-25). While the general idea that animal welfare may be improved through respecting nature is appealing, the concept of nature requires definition before it can provide direction in animal welfare assessment. The challenge associated with defining a natural environment is highlighted by an example provided by Dawkins (1980) which suggests that the sea is no longer an essential part of a seagull's nature despite their evolution to live in close association with it. In the past 30 years, seagulls have changed their habits and now choose to live in artificial environments created by humans; they nest on buildings, roost on playing fields and forage in garbage dumps. Thus, it is difficult to determine whether the natural environment of the seagull is that in which it evolved or that which it now chooses to inhabit. Furthermore, the natural behaviours of an animal which are considered desirable or undesirable with respect to welfare require both definition and rationale for their inclusion or exclusion in an animal's natural behavioural repertoire (Hemsworth and Coleman, 2010). To date this has not occurred.

The various animal welfare principles have resulted in the employment of multiple criteria or methodologies for the assessment of animal welfare. With regard to short term welfare issues involving acute stress, such as those commonly associated with painful husbandry procedures, there is considerable agreement on the need to assess animal welfare from a biological functioning perspective (Mellor et al., 2000). However, for longer term issues, such as those involved with housing, disagreement over the appropriate welfare concept and assessment criteria often results in debates regarding animal welfare and the varying interpretations (Fraser, 2008; Barnett and Hemsworth, 2009). Despite the scientific uncertainty associated with the animal welfare concepts, the rigour of the research should not be questioned (Hemsworth and Coleman,

2010). In addition, several commonalities in rationale exist between the different principles (Barnett and Hemsworth, 2009). Thus, until agreement on the most appropriate methodology or methodologies for animal welfare assessment can be broadly met, all three approaches should guide current animal welfare research methodology (Hemsworth and Coleman, 2010).

2.2 THE ASSESSMENT OF ANIMAL WELFARE

Welfare is a complex construct, combining both subjective and objective aspects of an animal's quality of life (Smulders et al., 2006). Although a general industry acknowledgement of the complexity of the problem exists, and there is a consensus that multiple measures are required, there remains a lack of agreement on which combination of measures should be used and how discrepancies between them should be resolved (Mason and Mendle, 1993; Broom, 1996; Duncan and Fraser, 1997; Dawkins, 2001, 2003). Animal welfare is a multidimensional concept, therefore any assessment must include both resource/environment-based and animal-based (the emotional and physical state) measures (Fraser, 1995; Broom, 1998; Barnett and Hemsworth, 2003). Research in the field of animal welfare is moving away from small scale laboratory trials and into areas where concern for animals is greatest, that is, zoos, farms and laboratories. Animal welfare research is becoming more focused and genuinely applied, making it more applicable to the billions of animals worldwide for which there is growing public concern (Dawkins, 2003). The recent focus for animal welfare research worldwide has been the development of methods for assessing welfare in situ.

2.2.1 Animal welfare assessment methods employed by enforcement bodies

In 1965, the UK government established the Brambell committee to examine the welfare of animals kept under intensive husbandry conditions, which resulted in the statement that came to be known as the Brambell Five Freedoms (Brambell, 1965). This report was expanded and developed by the Farm Animal Welfare Council (FAWC) and the UK government's advisory body on farm animal welfare, to produce the Five Freedoms. A set of guidelines that often form the basis of current codes of recommendation for the welfare of all species of livestock, and was designed to safeguard both the physiological and behavioural needs of animals (Fitzpatrick et al., 2006). The Five Freedoms specifies that an animal should have; (i) Freedom from hunger and thirst; (ii) Freedom from discomfort; (iii) Freedom from pain, injury or disease; (iv) Freedom to

express normal behaviour; and (v) Freedom from fear and distress (Fraser and Broom 1997). Today animal welfare enforcement bodies around the world, including the RSPCA in Australia, use the Five Freedoms to assess animal welfare because it allows them to make an immediate assessment, based largely on observations of an animal's external appearance, behaviour and environment.

There is, however a number of challenges associated with the aforementioned approaches to animal welfare assessment. Attempting to define an animal's normal or natural state can be difficult considering most animals today have had some form of human interaction and have therefore either been directly or indirectly influenced by this human contact (Broom and Johnson, 1993). It is also important to note that both the Five Freedoms and Nature of the Species approaches fail to define normal or natural states, or the risks to welfare if these conditions are not met (Pearson, 2004). A further challenge involves the assignment of a degree to the different Freedom guideline, such as freedom from hunger or thirst, or from pain or hunger. Fraser and Broom (1997) have stated that no animal can be completely free from hunger, pain, thirst and discomfort at all times. In fact exposure to these experiences is vital for animals because it enables them to recognize the appropriate safety and survival requirements (Broom and Johnson, 1993).

The challenging nature of animal welfare assessment which has just been discussed indicates the difficulties encountered by those attempting to assess animal welfare in the field and reinforces the importance of continued research into the development of valid and reliable on-site animal welfare assessment tools.

2.2.2 On-site animal welfare assessment

The on-site animal welfare assessment/monitoring scheme has become an important tool for the effective management of intensively farmed animals within the different livestock industries. In recent years public interest in livestock welfare has increased, with consumers expressing particular concern about the effect of intensive farming on animal welfare (Bonde et al., 2001; Fraser, 2001; Levy, 2004). With the welfare of domestic animals high on both the political and societal agendas, an increase in pressure has shifted the scientific focus to the development of a

scientifically based on-farm welfare assessment tool, able to be implemented across a wide range of domestic animal species (Winckler et al., 2003).

Although the assessment of animal welfare at a farm or on-site level remains an on-going challenge for animal welfare scientists, a large body of literature concerning the different assessment approaches already exists (Bartussek 2001; Bracke et al., 2001; Sørensen et al., 2001; Botreau et al., 2007; Knierim and Winckler, 2009). The majority of the early literature concerned animal welfare assessment in experimental conditions, however the more recent research has involved the application of animal welfare assessment in an on-farm setting (Broom, 1991; Rushen and de Passillé, 1992; Dawkins, 2004; Main et al., 2007; Knierim and Winckler, 2009). The success of any animal welfare assessment scheme, regardless of the animal species, relies on the validity, reliability and sensitivity of the measurement tool. A practical and robust tool needs to be based on relatively simple observations and records relating to the husbandry, management, environment and welfare of the animal to ensure that data can be collected efficiently during a single assessment (Smulders et al., 2006). Although simple, such protocols combining several aspects should provide a detailed and valid picture of the welfare status of any domestic animal. Given the large number of welfare parameters available and the variety of livestock species, the evaluation and monitoring of animal welfare at a farm level is a complex undertaking (Hubbard et al., 2007).

Animal welfare is a multidimensional concept, and consequently, any assessment procedure requires indicators that are able to evaluate all the component dimensions (Mason and Mendl, 1993; Fraser, 2003; Botreau et al., 2007). Approaches for assessing animal welfare at a farm or on-site level are generally based on a range of welfare parameters. In principle, these parameters can be divided into two categories or types of measures; the risk factors which involve environmental and management components which are generally either owner generated or naturally occurring in the animal's environment, and the welfare indicators which are animal-based.

Risk factors are generally regarded as input measures, and describe features of the environment and management which may be considered prerequisites for an animal's welfare (Mollenhorst et

al., 2005). These measures assess factors which have the potential to pose a risk to an animal's welfare and may be owner/carer generated or naturally occurring in the animal's environment. The environmental/resource measures can include type and size of stall/paddock, feeding and drinking facilities, space allowance, flooring, quality of litter and access to pasture (Johnsen et al., 2003; Winckler et al., 2003; Bonde, 2004). Assessment is generally uncomplicated because environmental parameters are relatively easy and quick to record, require little expertise, and usually have a high inter and intra-observer repeatability. The management measures may include human-animal interaction, feeding schedules, handling routine, housing situation, condition checks, and husbandry practices such as worming/drenching, hoof care and vaccinations. Once again assessment is generally uncomplicated, repeatable and involves obtaining information regarding a standardized set of management-based questions from the person providing the animal with its primary care.

Welfare indicators may be considered as output measures which record animals' reactions to specific environments. Animal-based parameters involve behaviour, health and physiology (Johnsen, et al., 2003; Winckler et al., 2003), and may include levels of stress hormones, aggression, fear and abnormal behaviours, preferences, symptoms of acute disease, injury and mortality. These parameters generally constitute measures of poor welfare. Although there has yet to be any validated animal-based measures of good welfare, positive affective state research has begun examining the use of play behaviour, affiliative behaviour and vocalisations as indicators for on-site assessment schemes (Boissy et al., 2007). Assessment of animal-based parameters occurs during interaction with both the animal and the owner/primary carer, and generally requires a degree of expertise. Furthermore, measuring animal-based parameters often requires significant time and resources, and the interpretation of results can prove challenging (Johnsen, et al., 2001; Winckler et al., 2003). Consequently, animal-based measures typically have a lower inter- and intra-observer repeatability than the environmental/resource and management measures. These difficulties have, until recent years, limited attempts to create an operational animal welfare assessment protocol which relies primarily on animal-related parameters (Capdeville and Veisser, 2001; Winckler et al, 2003).

Animal-based parameters provide a direct measurement of the animal's welfare, and while environmental parameters will offer information regarding potential or current welfare risks, they

fail to directly register the state of the animal (Johnsen et al., 2001; Winckler et al., 2003). The benefit gained from directly measuring an animal's state may however be negated by the validity, reliability and feasibility challenges associated with the measurement of animal-based parameters, which are generally greater than those associated with environmental/resource parameters (Knierim and Winckler, 2010). Therefore, it is commonly accepted that both environmental/resource and animal-based parameters are important welfare assessment indices, and a valid assessment of animal welfare is obtained when both types of parameters are used in combination (Johnsen et al., 2001).

Many of the early on-farm welfare assessment and monitoring schemes developed for livestock welfare are largely based on environmental/resource and production-based parameters. However, the validity of such assessment and monitoring schemes is disputable due to the poor understanding of the relationship between the parameters and animal welfare (Knierim and Winckler, 2010). These early schemes include the animal welfare index TGL35I in Austria (Bartussek, 2001) and the related TGI200 in Germany (Sundrum, 2001), the ethical account in Denmark (Sorenson et al., 2001), the Freedom Food Scheme (Main et al., 2003), and the Bristol Welfare Assurance Program (Leeb et al., 2004) in the United Kingdom, a decision support system for overall welfare assessment of sows in the Netherlands (Bracke et al., 2002), and preliminary welfare assessment schemes for dairy cattle in France (Capdeville and Veissier, 2001) and Italy (Tosi et al., 2001).

In recent years, the assessment and monitoring of animal welfare has shifted from the conventional approach of evaluating the environment and resources required to ensure good welfare, and instead focused on the application of animal-based measures of welfare (Knierim and Winckler, 2010). An example of this new direction in animal welfare assessment at a farm or on-site level is the European Union Welfare Quality® project. A primary aim of the research was to develop a standardised multi-criterion on-farm animal welfare monitoring system employing predominantly animal-based measures of welfare, which are both scientifically sound and feasible (Blokhuis et al., 2003). The Welfare Quality® assessment incorporates numerous welfare measures focused essentially on animals, and to a lesser extent, on environment/resources or animal management. A substantial amount of data is obtained during the assessment, which then requires interpretation in terms of welfare and integration to produce an overall evaluation at

farm/on-site level. This overall evaluation is based on a formal model (Botreau et al., 2007) allowing the Welfare Quality® assessment to be applied routinely and consistently across livestock species. The evaluation model is described by Botreau et al. (2007), and consists of four main principles necessary for good animal welfare (Good feeding, Good housing, Good health, and Appropriate behaviour) and 12 key animal welfare criteria (see Table 1). These principles and criteria were identified through reviews of the scientific literature, pilot studies and focus groups (Miele, 2009). A definitive set of animal, environment/resource and management-based parameters were developed. Data collected during the assessment are used to check farm compliance with the 12 welfare criteria. The scores obtained are then collated to assess farm compliance with the four main welfare principles. These principle scores are then used to conclude on an overall evaluation (Botreau et al., 2009). The model is intended for several purposes; (i) to provide an evaluation of the welfare status of the animal and identify the aspects requiring attention; (ii) to provide a better understanding of the welfare implications of the housing/farming systems and husbandry and management practices; (iii) to certify farms on welfare grounds, by implementing the assessment system on farms to be certified or by certifying the system and the practices employed on these farms, and (iv) to facilitate informed decision by stakeholders, including consumers (Botreau et al., 2009; Hubbard and Scott, 2011). The Welfare Quality® assessment concerning pig production is described in Table 1.

Table 1 The welfare principles and criteria defined by the Welfare Quality® project and the on-farm measures used to satisfy these criteria with regard to pig production (Hubbard and Scott, 2011)

Principles	**Welfare criteria**	**Sow/piglet**	**On-farm measures**
Good feeding	1. Absence of prolonged hunger	Sows	Body condition score
			Feeding management
		Piglets	Age at weaning
	2. Absence of prolonged thirst	Sows and piglets	Water supply (number of drinkers, hygiene of drinkers)
Good housing	3.Comfort around resting	Sows and piglets	Absence of manure on the body
		Sows	Bursitis, shoulder sores
	4. Thermal comfort	Sows and piglets	Percentage of animals shivering
			Percentage of animals panting
			Degree of social thermoregulation (huddling)
			Environmental temperature
	5. Ease of movement	Sows	Total pen space and stocking density
			Presence and size of stalls

			Presence and size of farrowing crates
Good health	6. Absence of injuries	Sows and piglets	Lameness assessment
		Sows	Wounds on the body Vulval lesions
	7. Absence of disease	Sows and piglets	Respiratory problems (coughing, sneezing, pumping) Enteric problems (rectal prolapse, scouring, constipation) Health management strategy Management of sick animals Criteria for euthanasia Hygiene/cleansing routine
		Sows	Reproductive problems (metritis, mastitis, uterine prolapse) Skin conditions Ruptures and hernias Localised infections
		Piglets	Neurological problems (muscle tremors, paddling of limbs) Splay leg
	8. Absence of pain induced by management procedures	Sows	Mutilations (nose-ringing, tail docking)
		Piglets	Mutilations (teeth clipping, castration, tail docking)
Appropriate behaviour	9. Expression of social behaviours	Sows	Positive social behaviours (sniffing, nosing, licking) Negative social behaviours (aggression, biting)
	10. Expression of other behaviours	Sows and piglets	Provision of environmental enrichment
		Sows	Stereotyped behaviour Exploratory behaviour Qualitative behaviour assessment
	11. Good human-animal relationship	Sows	Fear of/withdrawal from humans

Thus, an effective on-site animal welfare assessment and monitoring scheme needs to include both animal- and environment/resource-based welfare parameters which, through past research, have been shown to be valid, reliable and feasible. On-farm welfare monitoring systems also need to provide a standard method of converting welfare-related measures into information that is able to be easily understood by the consumer. Effectively, allowing for the appropriate modifications based on species specific management practices, an on-farm welfare assessment tool should be applicable to all livestock species, including recreational horses (c.f. Section 3.3.2).

2.2.2.1 On-site animal welfare assessment parameters

When evaluating animal welfare on-site, the assessment parameters need to be selected for their welfare relevance, information value, and applicability for on-farm studies (Rousing et al., 2001; Bonde, 2004; Knierim and Winckler, 2010). They need to be sensitive to changes or fluctuations in management routines over time, and be able to describe welfare problems and their causes (Bonde, 2004). A high inter and intra-observer repeatability is also required. Considerable research has been conducted to investigate animal welfare methodology and welfare indicators, and while it has again predominantly involved the livestock species, there is some limited literature available which concerns recreational horses. The relevant research pertaining to both the livestock species and recreational horses is discussed in the forthcoming sections.

2.2.2.2 Animal-based welfare parameters

Welfare refers to a characteristic of the animal rather than something that is given to it (Broom, 1996) and, as a result animal-based welfare indicators provide a direct assessment of the state of the animal. This type of indicator ought to be of a physiological, behavioural and health nature. To date there have yet to be any animal-based indicators of positive affects validated (Boissy et al., 2007). Physiological measures, such as hormone levels (e.g.. cortisol and IgA), can be difficult to employ in on-site conditions due to their expense and the need for animal handling, which may result in animals experiencing stress responses that could potentially confound results (Capdeville and Veissier, 2001). In addition, these measures may be unreliable for individual animals as 'normal' often falls within a wide range. As a result, the animal-based parameters included in on-site welfare assessments generally only involve animal health and behavioural measures (Capdeville and Veissier, 2001; Knierim and Winckler, 2010).

Animal health

Animal health is one of the most readily applied measures of animal welfare (Mench and Mason, 1997). Injury and disease are regarded as important welfare indicators because they are both generally associated with negative experiences such as pain, discomfort and distress (Rousing et al., 2001). The prevalence and intensity of certain health and injury problems in animals, determined on the basis of observations and discussions with animal owners and primary carers, are relevant health indicators for on-farm welfare assessment methods. Animal health

measurements provide specific and practical information, which aids the observer in determining how the animal is managed and its current health and welfare status (Rousing et al., 2001). Animal health measures can be indicative of current and potential welfare concerns, as well as providing information regarding the management and husbandry practices employed by the animals' owner or primary carer, and the response of the owner or primary carer to animal health challenges.

Body condition scoring (BCS) is used as an animal health indicator in the welfare assessment of animals such as cattle, buffalo, horses, pigs and sheep (Winckler et al., 2003; Pearson, 2004; Christie et al., 2006; Hemsworth and Coleman, 2010). It provides a means to estimate the energy balance, body composition and body stores in place of live weight change (De Rosa et al., 2005). It is important to consider BCS as an indicator of potential welfare concern as a high or low BCS does not necessarily suggest that the animal is not healthy. Rather that it is at risk of experiencing a welfare issue due to potential health problems associated with its high or low body condition. The inclusion of BCS in on-farm welfare assessment has been strongly supported in systems for both cattle and buffalo (Campanile et al, 1998; De Rosa et al., 2005), due particularly to the ease to which a multi-point scoring system can be applied and its ability to detect welfare-relevant malnutrition, under-nutrition and over-nutrition (Winckler et al., 2003). Malnutrition and under-nutrition observed in thin animals has been associated with reduced welfare, while over-condition and obesity is often associated with reduced levels of fertility and poor health and welfare outcomes (Campanile et al., 1998). The BCS may provide an indication of metabolic disorders, joint conditions, immune competency, sub-optimal management, and chronic coping difficulties (Bonde, 2004).

Poor body condition, which was determined using BCS, is frequently seen in recreational horse populations (Witham et al., 1998; Grandin et al., 1999; Perry and Hanlon, 1999; Leckie, 2001; Pearson, 2004; Christie et al., 2006). A study conducted by Witham (et al. 1998) in California, USA investigating neglect and abuse in horses, reported that of the 3242 cases, 2177 involved equine malnutrition. The study by Leckie (2001) into the equine population in the UK found that the cases most frequently encountered by field officers from the International League for the Protection of Horses (ILPH) were situations involving undernourished horses. Pearson (2004) looked at horse ownership and management in Victoria, Australia, and found the problem most

frequently encountered by inspectors from the RSPCA was poor body condition, and most cases were classed as moderately severe. Pearson (2004) suggested that poor body condition is a result of inappropriate management, and may be caused by insufficient provision of appropriate food, inadequate internal parasite control or a combination of the two. Research from the livestock industries suggests that poor body condition may indicate that an animal is suffering and may be an indicator of the animal's general physical and mental wellbeing (Hemsworth and Coleman, 2010).

Christie et al. (2006) investigated the effects of management factors on BCS in non-racing horses on Prince Edward Island (PEI). BCS was found to generally be high among the PEI horse population. They reported that a high BCS was somewhat difficult to interpret in terms of welfare concern, as horses with high BCS may be clinically healthy, however their future welfare could be at risk due to an increased probability of health problems, such as laminitis, increased joint problems, the possibility of thermo-regulating difficulties and a greater recovery time after exercise. Welfare concerns relating to a horse's body condition are frequently encountered in recreational horse populations, and therefore the inclusion of a welfare indicator able to measure a horse's BCS in any on-site animal welfare inspection tool is important. Furthermore, BCS is a relevant horse welfare indicator due to the ease at which the scoring system can be applied and its ability to detect relevant malnutrition, under-nutrition and over-nutrition. It is important however when applying BCS to be aware that it may be considered an indicator of both potential and current welfare concerns in recreational horses.

Lameness is considered a major welfare problem in livestock with the potential to induce pain and discomfort for extended periods of time (Winckler et al., 2001), and consequently has been included as an animal health indicator in welfare assessment (Bonde, 2004). A restriction in an animal's freedom of movement may limit the performance of social and feeding behaviour, and increase the risk of further injury through falling (Bonde, 2004). A systematic inspection of the animal is required and, in order to ensure that a consistent, repeatable and reproducible evaluation is achieved, an accurate and tested scoring system must be applied (Bonde, 2004). Several practical lameness scoring schemes have been developed for cattle which are used to assess different gaits (Sprecher et al., 1997; Breuer et al., 2000; Winkler and Willen, 2001). In general, each animal is assigned a score from a four- (Breuer et al., 2000) to a nine-point scale (Manson

and Leaver, 1988) according to gait-related behaviour patterns such as short striding, limping, head bobbing, difficulty putting weight on a limb or difficulty in turning when walking on a hard floor (Winckler et al., 2003). Several different factors may result in the expression of different gait related behaviour patterns, and these include unbalanced nutrition, flooring, social behaviour and related time spent standing (Galindo et al., 2000; Winkler and Willen, 2001). To date a lameness score has not been used as a welfare indicator in recreational horses, however the simple and practical nature of current scoring schemes would allow with only slight modifications a horse's soundness of gait to be assessed.

Hoof condition has been considered as a general indicator of overall care and management in animals such as cattle, horses, buffalo and pigs (Rousing et al., 2001). Overgrown or deformed hooves may also indicate current welfare concerns due to foot disorders or injuries which are capable of causing pain and potential changes in leg conformation (Bonde, 2004). The evaluation of hoof condition through visual inspection often requires the animal to be handled and restrained. As a result, hoof condition is more commonly employed in animals which are easier to handle such as horses rather than cattle and pigs. Hoof condition has been commonly examined in recreational horses, and poor hoof condition is frequently reported as an observed welfare concern (Grandin et al., 1999; Perry and Hanlon, 1999; Leckie, 2001; McGee et al., 2001; Pearson, 2004). Laminitis, an inflammatory condition of the hoof with serious horse health consequences, has also been frequently encountered during investigations into recreational horse welfare (Leckie, 2001; Pearson, 2004). While it may not measure a current welfare problem, hoof condition scoring in recreational horses provides a general indication of the overall care and management provided by the horse owner or primary carer. The high frequency of poor hoof condition observed in recreational horse populations and the potential health problems that may result from this state make hoof condition scoring an important component of an on-site horse welfare assessment tool. Additionally, the applicable and repeatable nature of the hoof condition score supports its use as a welfare indicator for potential welfare concerns in recreational horses.

Skin lesions, injuries and swellings reflect the impact of the surrounding environment on an animals' body (Ekesbo, 1984). Such injuries will vary in severity, treatment required and the duration of time that the concern persists. The severity and the length of time the animal has the injury are often dependant on the stockperson's or owner's response to the problem. An injury

score during an on-site welfare assessment will therefore provide information on current welfare concerns, the housing environment, and the management and husbandry practices employed by the stockperson or owner. If an injury is present, the stockperson's or owner's response, in terms of treatment provision needs to be measured. Injury scoring systems have been proposed for injuries in cattle and pigs (Wechsler et al., 2000; Bonde, 2004; Leeb et al., 2004). These injury scoring systems generally record the type and degree of injury, and the body area where the condition occurred. Clinical diseases typically involve pain and discomfort however the welfare implications will vary according to the intensity and duration of the disease condition (Bonde, 2004). A disturbance in the general health and condition of the animal generally indicates a potential welfare risk. The incidence of clinical disease and the treatment are important in the assessment of animal welfare, and are obtained through information from herd health data, veterinary records and clinical observations (Bonde, 2004). To date, injury and disease scoring has not been used in recreational horses, however the scoring schemes currently employed with cattle and pigs would appear with minor modifications be easily applied.

Animal behaviour

Behaviour in animal species is the other most commonly applied measure of welfare (Mench and Mason, 1997). An important question with regard to the relationship between behaviour and animal welfare is whether or not animals have independent behavioural needs or requirements (Rousing et al., 2001). Behavioural restriction or deprivation is believed to cause animals to suffer (Petherick and Rushen, 1997). Accordingly, the performance of certain behaviours appears to be beneficial to the animal and provides some form of reward (Simonsen, 1996). Behavioural measurements and tests are included in on-site welfare assessments and interpreted according to our knowledge of normal behaviour patterns, i.e. behaviour normally displayed to achieve functional goals (Rousing et al., 2001). Through this method, behavioural measurements and tests can reveal whether animals are adapted to their environment and management system, or whether they are showing signs of stress (Rousing et al., 2001).

While behaviour in animals is readily assessed as a measure of welfare, there appears to be a limited range of validated and reliable on-site behavioural measures capable of assessing poor welfare. Abnormal behaviour, such as stereotypic behaviour or injurious behaviour, is generally

agreed to have a high validity as an indicator of poor welfare. There are several different measures that could potentially be used to monitor abnormal behaviour, such as the number of animals performing the behaviour, or the amount of time an animal spends performing the behaviour. However, on-site it is difficult to apply these measures reliably and without disturbing the animal's performance of the behaviour.

Stereotypies are repetitive, unvarying and apparently functionless behaviour patterns commonly believed to indicate animal welfare concerns (Lawrence and Rushen, 1993; Appleby, 1999; Mason and Latham, 2004). They are generally thought to result from the frustration caused when environmental constraints prevent an animal from exhibiting highly motivated behaviours (Broom and Kennedy, 1993). It has been suggested by some authors that any level of stereotypy indicates poor welfare (Broom and Johnson, 1993; Laidlow, 2001), that increasing levels of stereotypy indicate decreasing levels of welfare (Fox, 1984; Dawkins, 1990; Broom and Johnson, 1993), and that welfare is unacceptable if stereotypies occur in more than five percent of a population (Wiepkema et al., 1983), or for more than ten percent of an animal's time (Broom, 1983, 1991). Further complicating the relationship between stereotypic behaviour and poor welfare is the possibility that the individual expressions of stereotypy may in fact be a type of coping mechanism and therefore be associated with improvements in welfare (Mason and Latham, 2004). In addition, not all stereotypies are sensitive indicators of current stress or frustration, and may in fact be expressions of past welfare challenges rather than indicators of the present (Mason, 1991).

Stereotypic behaviour is generally measured by obtaining stereotypic scores through observation. The stereotypic scores can relate to the number of animals in the housing system performing stereotypic behaviour, or the amount of time an animal spends performing the behaviour. There is however a number of challenges associated with both obtaining and interpreting on-site stereotypic scores. On-site stereotypic scores are difficult to obtain reliably and without disruption to the animal's behaviour. Once a stereotypic score has been obtained, interpreting the results can be challenging due to the complicated relationship between stereotypic behaviour and welfare. The persistent nature of stereotypies makes it difficult to equate their performance with challenges in the current environment rather than a previous one. Furthermore the individual expression of stereotypy does not alone indicate poor welfare because it may represent a form of

coping mechanism and therefore be associated with improvements in welfare. Thus the difficulties encountered measuring stereotypic behaviour and defining the relationship between stereotypes and poor welfare ensure that simple stereotypy scores should never be used as the sole index of welfare (Mason and Latham, 2004).

As with the livestock species, the expression of stereotypic behaviour in horses has received considerable attention and its potential as an indicator in horse welfare assessment is being investigated. The stereotypic behaviours commonly seen in horses (McGreevy et al., 1995; Cooper and Mason, 1998; Nicol, 1998) are rarely, if ever, reported in free-ranging feral horses (Cooper and Albentosa, 2005). Stereotypies are often referred to by horse owners as stable vices, implying that the horse is somehow at fault. However, research suggests that these activities relate to the horse's attempt to adapt to the conditions under which they are managed and may be indicative of specific environmental deficiencies (Cooper and Albentosa, 2005). As previously discussed, stereotypies are believed to result from the frustration caused when environmental constraints prevent an animal from exhibiting highly motivated behaviour, such as social interaction or foraging (Broom and Kennedy, 1993; Spruijt et al., 2001; Mills, 2003; Broom and Zanella, 2004). Epidemiological and experimental studies have demonstrated how the management of horses can influence their behaviour and their well-being (Wickens and Heleski, 2010)

Equine stereotypies include wind sucking, crib-biting, weaving, fence or box walking, and pawing. Significant research has been performed examining the factors affecting the occurrence of stereotypic behaviour in horses (McGreevy et al., 1995; Luescher et al., 1998; Waters et al., 2002; Bacchman et al., 2003; Wickens and Heleski, 2010). Factors found to be associated with stereotypies include aspects of management, such as time spent in the stable (McGreevy et al., 1995; Luescher et al., 1998; Bacchman et al., 2003), exercise (McGreevy et al., 1995; Luescher et al., 1998), bedding type (Luescher et al., 1998), and weaning methods (Waters et al., 2002). Some other factors included aspects of the horses themselves, such as breed (Bacchman et al., 2003) and behaviour of the dam (Waters et al., 2002). While these studies provided valuable information, the data were only collected from owners who were members of an equine organization or had registered stables, and were therefore not derived from a sufficiently large random representative sample of the equine population.

A horse's welfare is believed to be at risk if stereotypic behaviours are displayed for a large amount of time or if it appears to substitute for behavioural responses in a way that impairs adaptation to the environment (Broom and Kennedy, 1993). Fraser and Broom (1990) found that some equine locomotory stereotypies may result in weight loss, while Kiley-Worthington (1983) showed crib biting causes tooth wear and may result in the ingestion of splinters. The study by Christie (et al. 2006) used stereotypic behaviour as a welfare indicator when investigating the management and welfare of non-racing horses on Prince Edward Island. They reported stereotypic behaviour, defined as an index of mental welfare and satisfaction of the horse's nature, to be an appropriate and readily assessable index, that when used in conjunction with other welfare indices, could form part of a broader equine welfare assessment scheme (Christie et al., 2006). The study used a random sample of horse owners and had a high response rate, so it was therefore considered to be representative of the equine population in question. Despite the considerable examination stereotypic behaviour in horses has received, the difficulties associated with both measuring the behaviour and defining the relationship between stereotypes and poor welfare restricts its use as a welfare indicator in on-site welfare assessments and studies such as the current one.

A significant body of research within the livestock industries has demonstrated the effect human-animal interactions have on the behaviour, productivity and subsequent welfare of animals (Rushen et al., 1999; Breuer et al., 2000; Hemsworth et al., 2000, 2002, 2009; Lensink et al, 2001; Waiblinger et al., 2002; Hemsworth and Coleman, 2010). An animal's reactions to human interaction can be measured experimentally by using behavioural tests (Hemsworth et al., 2000; Waiblinger at al., 2003). Tests measuring an animal's reactions to humans are generally grouped into three main categories; (i) reactions to a stationary human, (ii) reactions to a moving human, and (iii) responses to actual handling. The reliability and repeatability of behavioural tests are high (Bonde, 2004; Waiblinger et al., 2006). The physical and social environment can strongly influence the outcome of the test. That is, animals' reactions to the test human may be confounded by a number of factors, including; (i) either fear induced flight or behavioural inhibition elicited by enforced novel stimuli, (ii) distraction of attention by the novel stimuli, (iii) memory of handling associated with the test location, and (iv) human contact incurred in moving the animal from its housing to the test arena (de Passille et al., 1996; Jago et al., 1999; Rushen et

al., 1999). All these factors need to be taken into consideration when measuring an animal's behaviour in response to human interaction.

Behavioural tests such as avoidance, approach and startle tests measure an animal's level of fear towards humans which provides a reflection of the nature of the human-animal relationship (Bonde, 2004; Waiblinger et al., 2006). Fear is a negative emotion and as such is often included in assessments and recommendations of animal welfare. It is arguably the most frequently investigated emotion in domestic animals (Forkman et al., 2007), and a fear of humans represents a welfare problem because the animal may be negatively affected by reoccurring contact with humans (Bonde, 2004). Tests measuring an animal's response to human interaction have been validated in a range of species including cattle (Hemsworth et al., 1987, 1989, 1996, 2000, 2002; Boivin et al., 1992, 1998; Knierem and Waran, 1993; de Passille et al., 1996; Waiblinger and Menke, 1999; Lensink et al., 2000, 2001; Krohn, et al., 2001, 2003; Rushen et al., 2001; Breuer et al., 2003 Waiblinger et al., 2003), sheep (Le Neindre et al., 1993; Boivin et al., 1997, 2000, 2001, 2002; Goddard et al., 2000; Lankin and Bouissou, 2001), pigs (Hemsworth et al., 1981, 1986, 1987, 1989, 1990, 1996, 1999; Gonyou et al., 1986; Hemsworth and Barnett, 1992; Wemelsfelder et al., 2000, 2001; Marchant et al., 2001, 2003; Janczak et al., 2003), poultry (Jones, 1985, 1993, 1995, 1996; Barnett and Hemsworth, 1989; Barnett et al., 1992, 1993; ; Hemsworth et al., 1993; Hemsworth and Coleman, 2010), foxes (Pedersen and Jeppersen, 1990; Pedersen, 1992; 1993, 1994; Korhonen and Niemela, 1996; Korhonen et al., 2000; Pedersen et al., 2002), and horses (Jezierski et al., 1999; Visser et al., 2001, 2002; Hausberger and Muller, 2002; Søndergaard and Halekoh, 2003; Lansade et al., 2004).

The aforementioned behaviours displayed when animals are ill, injured, or restricted, such as, change in gait and in-activity, may also be used as indicators of poor welfare through qualitative behaviour assessment. Bonde (2004) reported that poor body condition, leg disorders and injuries, unsuitable flooring, and restriction in freedom of movement may all lead to a deviation in an animal's normal sitting and lying-down behaviour sequence. Jongman et al. (2005) used behavioural measures such as change in gait, inactivity, and lying behaviour when examining the welfare risks associated with the use of an alternative collection procedure for urine (PMU) in pregnant mares. In addition, sitting and lying behaviour have also been employed in animal welfare assessments in cattle and sheep.

Whilst the discussed literature supports the relationship between animal welfare and behavioural responses, the persistent nature of stereotypies and the challenges associated with applying behavioural tests outside of experimental conditions, indicate that while valid, the use of behavioural responses as indicators of animal welfare needs to be applied with caution.

2.2.2.3 Environment/resource-based welfare parameters

The welfare of animals may be affected by both the environment they live in, as well as the practices under which they are managed. The environment and management conditions imposed on the animal may fail to meet the physiological and behavioural needs of the animal, and in turn impact upon their health and welfare (Bonde, 2004; Wickens and Heleski, 2010). Environment/resource and management factors, imposed on the animal by the owner, can be considered risk factors or indicators of potential animal welfare concerns. Including those risk factor measures pertaining to descriptions of the animal's environment and the management practices involved in a welfare assessment provides information regarding the potential for welfare problems and any potential causal factors. Surveying the environment, management and handling of the animal, as well as conducting interviews with the people responsible for the animals appear to be applicable and repeatable methods of measurement of risk factors.

Environmental factors

The majority of research concerning the impact of environmental factors on an animal's welfare has involved livestock species. Environmental factors which have been found to affect the health and welfare of livestock include space allowance, flooring, pen and paddock fittings, ventilation and hygiene (Johnsen et al., 2001; Winckler et al., 2003; Bonde, 2004).

The space allowance afforded to an animal is a relevant welfare risk indicator. If an animal experiences spatial restriction and is prevented from performing desired or necessary behaviours its welfare may be affected. The area per animal must adequately meet the needs of the animal or risk frustration or discomfort being experienced (Bonde, 2004). Measurements of pen/paddock dimensions are easily repeatable, and can be supported by behavioural observations of an

animal's posture and housing area usage. Poor flooring has the potential to cause injury and discomfort, and is therefore an important component of welfare assessment. A description of flooring materials and construction is reliable in terms of repeatability and reproducibility, and can be further supported by observations of sitting, lying and posture change behaviour and clinical observations of skin and leg condition (Bonde, 2004).

The equipment and fittings in an animal's pen or paddock have the potential to cause the animal pain and discomfort if incorrectly sited, constructed, maintained or functioning. Pen and paddock equipment and fittings can be reliably measured and described, and supported by clinical observations of body condition (Bonde, 2004). Appropriate ventilation aids an animal's welfare by maintaining the optimal temperature and reducing the amount of dust particles, infectious microbes, and noxious gases in the environment. Ventilation systems are able to be described, and room temperature and air quality can be measured. Additional measurements of cleanliness, lying behaviour and pen usage are able to be recorded for support (Bonde, 2004).

Management of resources

The welfare of any animal is significantly influenced by the manner in which its resources requirements are managed (Hemsworth and Coleman, 2010), both in terms of the husbandry and management practices employed and the stockperson's or owner's response to the animal. The management parameters which may affect an animal's health and welfare include feed and feeding procedure, water availability and water quality, health and husbandry practices, surveillance, housing and grouping strategies, injury and illness treatment and disease control protocols.

An animal's welfare may be influenced by the amount and quality of feed it receives, as well as the feeding procedures themselves, therefore feed type and feeding procedures are relevant risk factors. Generally, reliable information regarding feed and feeding procedures can be obtained from stockpeople, and feed quality is easily observed (Bonde, 2004). Supportive information can be collected through behavioural, health and environmental observations. Water quantity and quality appear to be appropriate risk factors because a sufficient quantity and quality of water are

important to an animal's welfare; however requirements vary depending on the animal's age and physiological state (Bonde, 2004). Assessment of water quality may be reliable, but somewhat difficult in on-farm locations. The surveillance of animals and their environment is an important component of animal welfare. However as a risk factor in on-site welfare assessment it is difficult to directly measure and assess, and is therefore reliant on information obtained from stockpeople. Group size and grouping strategies play an important role in the welfare of animals, in terms of space and access to feed, and aggression and competition, and may therefore be appropriate welfare indicators. Group size can be obtained through observation and information regarding grouping strategies can be collected from the stockperson.

2.3 WELFARE PROBLEMS IN RECREATIONAL HORSES

Horse owners are primarily responsible for the welfare of their horses. The majority of studies discussed in this chapter have attributed the horse's welfare condition to owner neglect or abuse, generally as a result of ignorance (Witham et al., 1998; Grandin et al., 1999; Leckie, 2001; Pearson, 2004). Equine welfare inspectors also reportedly believe that the majority of horse welfare problems they investigate are caused by neglect, rather than intentional abuse, by owners keeping horses for recreational purposes (pers. comm., G. Boland, RSPCA Victoria; Leckie, 2001; Pearson, 2004). The limited literature suggests that neglect or inappropriate management by the owner has the potential to reduce a horse's welfare. Inappropriate management can include the inadequate provision of feed, provision of unsuitable feed, inadequate hoof care, inadequate parasite control, failure to seek appropriate veterinary attention for illness or injury, inadequate care of teeth, inappropriate housing and insufficient exercise (Atock, 1982; Steward, 1985; Ellis, 1993; Bayley and Maxwell, 1996; Stull, 1996; Houpt and Crowell-Davies, 1997; Witham et al., 1998; Grandin et al., 1999; Perry and Hanlon, 1999; Pearson, 2004). If the responsibility for a horse's welfare lies primarily with its owner and mismanagement by the horse owner is the most common cause of welfare concerns, then horse owner attributes would appear to have the potential to impact significantly on a horse's welfare.

2.3.1 The effects of management practices on horse welfare

As discussed in Section 1.2, horses today are managed in conditions that differ markedly from those in which they evolved (Cooper and Albentosa, 2005). In its current environment, many of

the challenges the horse once faced as a herd-forming, grazing herbivore have been removed. While current management techniques might have removed the biological need to perform evolutionary behavioural responses, the psychological need to respond to such factors may still exist (Cooper and Albentosa, 2005). If these underlying mechanisms persist in domestic horses, they could possibly result in the expression of behavioural responses not seen in the natural environment and which are difficult to explain in terms of functional benefit (Cooper and Albentosa, 2005; Wickens and Heleski, 2010), including apathy and unresponsiveness, hyper-responsiveness and stereotypic behaviour. It has been suggested that these responses may be indicative of an animal's failure to cope with an inappropriate environment, or that these behaviours are in fact a function of adaptation (Cooper and Albentosa, 2005).

Management practices are reported to have the greatest effect on the development of stereotypic behaviours in stabled horses (Houpt and McDonnell, 1993; Simpson, 1998; Heleski et al., 2002; Wicken et al., 2010) and changes to management techniques that allow horses to perform actions within their behavioural repertoire may lead to a reduction in aberrant behaviour (Winskil et al., 1996; Waran and Henderson, 1998; Cooper et al., 2000). Physiological and behavioural studies into the causes and effects of stereotypic behaviour suggest that inappropriate diet and lack of social contact are the primary cause of stereotypy, and that the prevention of the behaviours *per se* without addressing their underlying causes can lead to distress (Cooper and Albentosa, 2005; Wicken et al., 2010). A number of studies have reported success at decreasing stereotypies in horses by manipulating diet (Gillham et al., 1994; Johnson et al., 1998), levels of exercise (Krzak et al., 1991) and levels of social contact (Cooper et al., 2000), however the expression of stereotypic behaviour was never completely removed in any of the studies.

Compared to their wild counterparts, the diversity of behaviours observed in domestic horses has been drastically altered due to the confining nature of the management system (Flannigan and Stookey, 2002). While the equine industry at times may disregard the evolutionary biological needs of the horse, there is a growing awareness that the way in which horses are managed may be suboptimal and result in challenges to horses' health and welfare. Time budget analysis (behaviour) of feral and pasture-kept horses has uncovered the important role intra-specific social contact, exercise and lengthy grazing times play in maintaining a horse's welfare (Cromwell-Davis et al., 1985; Houpt et al., 1986; van Dierendonck et al., 1996; Heleski et al., 2002).

Forage restriction

Horses housed under extensive or pastured conditions obtain their nutritive requirements through selective grazing on a variety of forages for up to 16 hours per day, rarely fasting voluntarily for more than four hours (Fraser and Broom, 1990). In contrast, horses managed under intensive conditions such as those seen in stable and small paddock environments have restricted access to forage, which impacts on both their foraging behaviour and their welfare (Thorne et al., 2005). In stabled conditions the horse is entirely dependent on humans for the timing, selection and delivery of their diet (Fraser, 1974). Infrequent meals based on energy dense, high concentrate diets with limited forage and little variation are most commonly fed to intensely managed horses due to their convenience (Goodwin et al., 2005; Thorne et al., 2005). Consequently, the behaviour of the intensively managed horse is often very different to that observed among their free ranging counterparts (Davidson, 1999). As dietary restrictions increase horses will spend less time foraging and more time standing (Kiley-Worthington, 1997), because with limited forage available and the reduced time required to process concentrated feeds, feeding can not occupy a comparable amount of time as grazing when pastured (Thorne et al., 2005). This has a number of implications for the physical and mental health of the horse (Thorne et al., 2005).

The rapid digestion associated with a concentrated meal has been shown to cause distinct physiological disturbances when compared with grazing or steady state feeding conditions (Clark et al., 1990; Rowe et al., 1994; Willard et al., 1997; Johnson et al., 1998; Pagan et al., 1999; Zeyner et al., 2004). These physiological disturbances are believed to contribute to the incidence of digestive disorders in intensely managed horses (Clarke et al., 1990; Ralston, 1992). Low-forage (and fibre) diets have been associated with the development of gastric ulcers (Andrews and Nadeau, 1999), and the consumption of alternative forms of roughage such as straw bedding has been implicated in the development of impaction colic (Higgins and Wright, 1998). Cohen et al. (1999) and Goncalves et al. (2002) both reported an association between colic in horses and the feeding of low quality roughage. The adult teeth of horses grow continuously throughout their life, gradually being ground down through chewing fibrous, silica-containing forage and kernels of hard grain. Concentrated feeds do not produce as much tooth wear as grasses, and therefore can result in the development of sharp edges and hooks on horses' teeth. This can cause horses to drop feed, receive lacerations within the mouth, experience pain and may eventually lead to the

loss of body condition (Dixon, 2000). The study by O'Neill et al. (2010) reported that a high forage/fibre diet common to horses housed on pasture resulted in fewer dental abnormalities than the low forage/fibre diet generally associated with a stabled lifestyle.

The role of feeding practices, particularly the provision of low forage diets, in the development of stereotypic behaviour and reduced welfare has been discussed in Section 2.2.2.2. Food restriction has been reported as a major cause of stereotypic behaviour in tethered sows (Appleby and Lawrence, 1987) and broiler breeders (Lawrence and Terlouw, 1993), while diet and feeding methods have been linked to the occurrence of stereotypies in stabled horses (Broom and Kennedy, 1993; Marsden, 1993; McGreevy et al., 1995; Wickens and Heleski, 2010). Pre-feeding stereotypies, such as weaving, peak in expression prior to the provision of concentrates (Henderson et al., 1997), while oral stereotypies, such as licking or grasping fittings, chewing and teeth grinding, are thought of as post feeding behaviour (Gillham et al., 1994; McGreevy et al., 1995), possibly representing the perseverance of foraging motivation following a short concentrated feed (McGreevy and Nicol, 1998). There are a number of lines of evidence linking stereotypic behaviour in horses with the feeding of concentrates (Cooper and Mason, 1998; Nicol., 1999). A diet consisting of high energy low-fibre concentrated feed, and lacking in fibre forage has been associated with a higher incidence of stereotypic activities in both epidemiological (McGreevy et al., 1995; Nicol, 1999) and experimental studies (Gillham et al., 1994; Johnson et al., 1998). Secondly, the initiation of bouts of stereotypic behaviour have been associated with feeding time (Cooper and McGreevy, 2002), and finally, the development of stereotypy has been linked with the provision of concentrates to foals around the time of weaning (Waters et al., 2002).

For many owners, providing horses with free access to pasture and allowing them to perform associated behaviour (Davidson, 2002) is not possible, resulting in the need to implement alternative means to enhancing their horses' restrictive environment. Foraging enrichment for stabled horses appears to have the potential to promote more natural feeding behaviour (Thorne et al., 2005). Houpt et al. (2001) found that straight stall confined mares provided with *ad libitum* forage were not stressed and did not develop stereotypic behaviour. These findings are supported by McGreevy et al. (1995) and Flannigan and Stookey (1998) who both reported that the incidence of stereotypies was lower in stabled horses with access to forage than horses that were

stabled without forage provision. Winskill et al. (1996) found stabled horses given the opportunity to use a foraging device engaged in a time budget similar to that observed in pastured horses. Foraging behaviour comparable to that of horses on pasture was reported by Goodwin et al. (2002) when stabled horses were provided with multiple forages in short-term trials. Nicol et al. (2005) reported significant effects of diet on responses of weanling horses during times of stress or challenge. Foals fed a high forage diet appeared less distressed immediately after weaning and calmer and more inquisitive during temperament tests, compared to foals fed a diet with a low forage component.

A study by Thorne et al. (2005) found that the behavioural effects observed during short-term trials when stabled horses were fed a multiple forage diet persisted when applied over a longer time period. A multiple forage diet appeared to provide a means of enriching the stabled horse's environment by offering variety and enabling patch foraging behaviour to occur (Thorne et al, 2005). Results suggest that a multiple forage diet encouraged the performance of foraging behaviour, while reducing the performance of behaviours indicative of a search for alternative resources. The multiple forage diet was also reported to reduce stereotypy performance and ulceration (Thorne et al., 2005) associated with fasting and episodic feeding (Murray and Eichorn, 1996; Cuddeford, 1999). A recent study by Elia et al. (2010) investigating the impact of a low roughage diet on horse welfare, examined horses motivation for hay (roughage) when fed a low roughage diet. The findings indicate that horses fed a low roughage/fibre diet displayed a greater motivation (measured by the horse pressing a panel in order to receive a food reward) for hay than those horses receiving a diet of high roughage/fibre content.

Research indicates that intensively managed horses, experiencing forage restriction in terms of length of time spent foraging and the type of forage available, may experience compromised health, behaviour and welfare. The provision of a multiple forage diet reportedly encourages foraging behaviour and as a result has the potential to lessen digestive disturbance and the expression of stereotypies in horses. Consequently, a multiple forage diet may potentially reduce health, behaviour and welfare concerns in intensively managed horses.

Social restriction

The intensive management methods imposed on horses today offer a different experience from the environment from which they evolved as social animals spending most of their time in close contact with conspecifics (Budiansky, 1997; Christensen et al., 2002; Rivera et al., 2002). Free-range horses have a structured social environment (Kirkpatrick and Francis, 1994) where a solitary lifestyle is rarely observed (Tyler, 1972; Klingel, 1975; Feist and McCullough, 1976; Waring, 1983; Boyd and Houpt, 1994; Kaseda et al., 1995; Khalil and Kaseda, 1997). Traditionally, horses managed under intensive conditions are singly housed for ease of management, limiting their opportunities for social contact with other horses (Mills and Clarke, 2002). Mendl and Paul (1991) reported an inadequate social environment may impair behavioural development in social species and therefore the behavioural deprivation experienced by stabled horses may be detrimental to their welfare (Rivera et al., 2002).

The social conditions that a horse is exposed to may affect its ability to respond to challenging situations, thereby altering its behaviour, physiology and compromising its welfare (Rivera et al., 2002). A study by Irrgang and Gerken (2010) reported that Arabian stallions with permanent free social contact displayed more desirable behaviour than those horses with restricted social contact. Luescher et al. (1991) reports a lack of social contact to be a serious stressor in horses, where if normal social behaviour is prevented this behaviour may be redirected towards less suitable objects. Epidemiological studies have suggested that social isolation affects the incidence of stereotypic behaviour in stabled horses (McGreevy et al., 1995; Redbo et al., 1998). An extensive survey of horses in Switzerland reported a 2.5% higher incidence of stereotypies in singly housed versus group housed horses (Bachmann and Stauffacher, 1998). Visser et al. (2008) reported that sudden isolated stabling is stressful to young horses, resulting in a high prevalence of stereotypies and abnormal behaviours. As in other species, Visser et al. (2008) also found that social stress may reduce the adrenocortical response to a corticotropin-releasing factor (CRF) challenge.

Weaving, a relatively common locomotory stereotypy, known to affect a horse's health and performance (Ralston, 1982; Fraser and Broom, 1990; Winskil et al., 1995), may be a response to the confinement experienced in a stable, and the frustrated motivation of horses attempting to reinstate social contact (Nicol, 1999). Both epidemiological and empirical studies of stereotypies

report that enhancing a horse's social environment reduces the incidence of stereotypic behaviour (Cooper and Albentosa, 2005). The close social contact may explain the low incidence of stereotypic behaviour in stall tied horses (Houpt and Ogilvie-Graham, 2002) and in the pregnant mare urine industry (Flannigan and Stookey, 2002) where horses have a greater opportunity for social interaction with their neighbours than singly paddock-housed or socially isolated stabled horses (Cooper and McGreevy, 2002).

Providing horses with social housing is not always a convenient or practical option due to the risk of infection, undesirable social interactions, or simply the cost of maintaining additional horses (Cooper and Albentosa, 2005), and alternative options are required. A simple alternative may be stable mirrors, which were found to have a similar effect to social contact in both short (Mills and Davenport, 2002) and long-term (McAfee et al., 2002) studies. When investigating stable design, McGreevy et al. (1995) found that stable designs which allowed visual contact between horses were associated with a lower level of stereotypic behaviour than stables without visual contact. An empirical study, which allowed horses with a reliable history of weaving close visual and tactile contact with neighbouring horses, significantly reduced weaving and nodding relative to conventional stables (Cooper et al., 2000). Increasing the visual horizon also significantly reduced established patterns of stereotypic behaviour.

In summary, an inappropriate social environment often associated with intensive horse management may alter behavioural expression and potentially compromise a horse's health and welfare. Enhancing a horse's social environment through visual and tactile contact may limit such compromise.

Space and movement restriction

The domestic horse evolved roaming the open plains in excess of 80 km per day (Waran, 1997). Despite current management conditions, which often limit a horse's exercise and movement opportunities, they remain adapted to a life of free-roaming and grazing for up to 16 hours per day (Crowell-Davis et al., 1985; Budiansky, 1997). Under intensive management conditions, compensation for the loss of activity is required otherwise the welfare of the horse may be at risk

(Zeeb and Schnitzer, 1997). Hogan et al. (1988) suggest the lack of opportunity to move and graze provides stabled horses with excess time and unspent energy which may be redirected into unwanted expression such as stereotypies. The limited exercise often associated with the stabled environment may contribute to the development of stereotypic behaviour in horses (McGreevy et al., 1995; Cooper and Mason, 1998; Nicol, 1999; Heleski et al., 2002), which may be linked with reduced welfare as previously discussed.

A study by Rivera et al. (2002), investigating the differences in response to training of paddock-housed and stable-housed horses, reported that horses housed on pasture adapted more easily to training than stabled horses. The author suggests that these findings may have been due to the daily challenges experienced by horses that are kept in paddocks (Rivera et al., 2002). Housing weanlings in stable environments was found to alter their behaviour qualitatively and quantitatively when compared to weanlings housed in a paddock (Heleski et al., 2002). There were significantly different time budgets between the two groups, with the paddock-housed weanlings displaying a time budget similar to that of a wild horse. Paddock-housed weanlings showed a strong motivation to graze and be near conspecifics, while stall-housed weanlings spent significantly more time engaging in aberrant behaviours such as pawing, bucking/rearing bouts, and licking, chewing and kicking the stall walls. The study concluded that due to the opportunity to display strongly preferred behaviours and the freedom from aberrant behaviour, paddock-reared weanlings had more optimal welfare than stabled weanlings.

The enforced immobility that horses experience when stabled may also cause physical problems. If a horse is unable to obtain sufficient exercise, its tendons, ligaments and joints may lose elasticity and become more susceptible to injury (Zeeb and Snitzer, 1997; van Weeren et al., 2010). In a pastured environment horses are constantly moving throughout the day, while stabled horses spend a considerable proportion of the day immobile which is often followed by periods of challenging athletic activity (Waran, 1997). This sudden contrast in muscular activity may lead to physical complications (McLean, 1973). Heleski et al. (2002) reported that the comparative lack of weight bearing time performed by stabled weanlings contributed to lower bone density than observed in paddock-housed weanlings. van Weeren et al. (2010) investigated the importance of exercise during musculoskeletal development in horses. They reported that biomechanical loading in the early juvenile phase is critical in the development of the musculoskeletal system,

and that limited exercise appears to retard normal development which can not be rectified as the horse ages. To ensure the adequate conditioning of the musculoskeletal system, foals need to have an exercise load equivalent to that which they would experience when exercising freely at pasture (van Weeren et al., 2010). Confined housing may constitute a biological challenge to the horse's normal mechanisms of health regulation, particularly with respect to the respiratory tract's self cleaning mechanism (Waran, 1997). The enclosed nature of the stable environment restricts air circulation around the horse and its immediate environment, resulting in aerial substances accumulating (Waran, 1997). Studies have shown a greater level of upper and lower airway inflammation in stabled horses, which subsides when the horse is on pasture (Jackson et al, 2000; Waran, 1997).

Horses appear to possess an inherent aversion to the isolation and confinement associated with many of the current housing systems (Mills and Nankervis, 1999). Schatzman (1998) found that horses provided with free access to a paddock and box stall with straw bedding, hay and water, chose to remain outside during the Swiss winter as long as grass was available. Management techniques which restrict a horse's movement may psychologically and physically stress the horse, which if managed incorrectly can compromise welfare (Waran, 1997). While pastured housing may not be accessible or feasible for all horse owners, it is important to provide horses with an enriched environment which includes daily exercise (Rivera et al., 2002).

The often intensive nature of current management practices has the potential to restrict a horse's motivation to feed, roam, and socially interact. As a result, horses may experience psychological and physical stress, and in turn, compromised health and welfare. Although a less restrictive environment is not always an option for horse owners, literature suggests that measures such as multiple forage diets, social enhancement and increased exercise may potentially reduce the influence of environmental restriction on a horse's health and welfare. Clearly, further research is required to increase our understanding of the relationship between management practices and horse health and welfare.

2.3.2 Horse owner attributes

A horse's welfare is primarily the responsibility of its owner (Steward, 1985; MacCormack and Bruce, 1991; Ellis, 1993; Haynes, 1995; Witham et al., 1998; Endenburg, 1999; Leckie, 2001; Pearson, 2004), and therefore it is important to characterise the relationship between horse owner attributes and horse welfare. Limited research suggests that the underlying reasons why a horse owner neglects or mismanages a horse may include the owner's commitment to horse ownership, their demographics including income, age and education, their knowledge about horse husbandry and management and their attitude towards horses (Pearson, 2004). The RSPCA (Victoria, Australia) inspectorate suggests the factors which may result in horse owners neglecting their horses include economic constraints, lack of knowledge about horse management and insufficient commitment to horse ownership (pers. comm., D. Hughes, RSPCA Victoria).

A study by Leckie (2001) reported that the International League for the Protection of Horses (ILPH) field officers found horse owner ignorance was the main factor associated with the welfare problems they observed in horses in the United Kingdom. The majority of owners with horse welfare problems were not affiliated with any club or association, suggesting a lack of knowledge about equine care is more likely to occur if neither the horse nor owner is a member of any equine organization (Leckie, 2001). Loss of interest by the owner and financial constraints were also reported as possible causes of horse welfare problems (Leckie, 2001).

Pearson (2004), using horse owner questionnaires and direct horse observations, investigated the attributes that distinguished horse owners that had been investigated by RSPCA with or without horse welfare problems and horse owners that were members of adult riding clubs. The attributes common to owners of horses with reduced welfare were a lack of commitment, the beliefs that horses made good companion animals and are difficult to manage, a lower education and residing in metropolitan Melbourne or outer-fringes (Pearson, 2004). The vast majority of owners of horses with welfare problems were not members of any horse clubs or organizations and generally used their horses solely for recreation or companionship purposes. Anecdotally, similar observations have been reported by RSPCA inspectors (Pearson, 2004; pers. comm., D. Hughes, RSPCA Victoria). Membership of an equine club or organisation is generally believed to provide a horse owner with regular access to information and advice relating to horse care and management (Leckie, 2001; Pearson, 2004). The marked differences between owners of horses

with welfare problems and those that were members of adult riding clubs would suggest that club membership may reduce the risk of horse welfare problems occurring.

Leckie (2001) and Pearson (2004) both reported that owners of horses with welfare problems tended to have low levels of education and income. Financial constraints may influence an owner's motivation and commitment as well as the manner in which they manage their horse. Jones (1983) and Pearson (2004) found that owners of horses with welfare problems were more likely to be male than female, and that females were more likely to be members of adult riding clubs than males. Residing in metropolitan or fringe areas of the state often results in the horse being housed away from the owner's primary residence, which may limit regular supervision and monitoring and therefore provide a possible explanation for the high representation of owners of horses with welfare problems in these areas (Pearson, 2004).

Pearson (2004) found that owners of horses with welfare problems had less knowledge regarding horse management practices, and did not actively seek to improve their knowledge via means that they know are available to them. If a horse owner lacks sufficient knowledge and commitment to attend to the horse in the required manner, it is likely that the horse's welfare will be at risk. While these owners were aware of the opportunities to gain access to information and assistance to improve the manner in which they manage their horses, they declined for reasons which included time and financial constraints, lack of interest and the belief that further commitment or involvement is not required (Pearson, 2004).

It has been suggested that the welfare of the horse may depend on the horse owner's attitude towards horses and horse management (Ellis, 1999; Endenburg, 1999). Pearson (2004) reported that owners of horses with welfare problems possessed positive attitudes towards horses and the belief that horses make good companion animals. The belief that horses make good companion animals may lead to the development of unrealistic attitudes towards horse management and ownership, and as a result horse owners may manage their horses in a manner similar to other companion animals such as dogs and cats. This type of management would fail to satisfy the management requirements of the horse and subsequently increase the risk to welfare. Positive horse owner attitudes towards horses would be expected to result in positive rather than the

observed negative horse welfare outcomes. The reported relationship is in direct conflict with expectations and may indicate that relationships between horse owner attitudes and horse welfare outcomes appear complex and further investigation is clearly required. Substantial human-animal relationship literature from the livestock industries indicates that the attitude of stockpeople influences their intention towards their animals, which in turn affects their behaviour toward their animals and subsequently the welfare and productivity of the animals (Hemsworth and Coleman, 2010). Therefore, it is reasonable to assume that a similar human-horse relationship may exist and consequently, the potential relationships between horse owner attributes and horse welfare need to be examined further. The literature pertaining to the human-animal relationship and the impact of human-animal interactions on animal welfare, in both livestock and horses will now be discussed.

2.4 THE HUMAN-ANIMAL RELATIONSHIP AND THE IMPACT OF HUMAN-ANIMAL INTERACTIONS ON ANIMAL WELFARE

The human-animal relationship may be conceptualised in terms of inter-individual relationships, where the quality and frequency of interactions between the two individuals, as well as the context in which they occur, determine the quality of the relationship. Derived from the views of Hinde (1976) whereby inter-individual relationships in primates are based on the history of regular interactions between two individuals, Estep and Hetts (1992) assert that human-animal relationships may also be regarded in a similar manner and that these relationships may be examined by studying each partner's perception of the relationship. Each individual partner's perception of the relationship allows it to interpret and predict future interactions. Therefore, the concept of the relationship exists not only for each partner of the relationship but also for an external observer (Aureli and Schaffner, 2002), enabling the relationship to be investigated. In order to investigate the nature of the human-animal relationship and to determine the influence of human-animal interactions on the relationship, those interactions that have significance for both the human and the animal need to be characterised. Handling studies and observations on human-animal interactions in the livestock industries have indicated that the history of interactions between humans and animals leads to the development of a stimulus-specific response of animals to humans. An animal may associate humans with rewarding and adversive events that occur at the time of human-animal interactions, and thus develop conditioned responses to humans. Similarly,

humans' direct and indirect experiences with animals are influential determinants of their attitudes and behaviour towards animals (Hemsworth and Coleman, 2010).

Human-animal relationships are established from a series of interactions between animals and humans, which may be tactile, visual, olfactory, gustatory and auditory, and the nature of these interactions may be positive, neutral or negative (Hinde, 1976; Estep and Hetts, 1992). The nature of human-animal interactions appears reliant on human, animal and environmental factors (Raussi, 2003). Furthermore, it is the nature and the frequency of these interactions that markedly determine the quality of the human-animal relationship (Hemsworth and Coleman, 2010). The quality of this relationship is able to be measured from both the human and animal perspectives; via the assessment of human attitudes towards animals and human-animal interactions and the subsequent behaviour, and an animal's behavioural and physiological responses to humans.

The quality of the human-animal relationship from the animal's perspective can be assessed by measuring the behavioural and physiological responses of the animal to humans (Hemsworth and Coleman, 2010). In the pork, dairy, veal and poultry industries, the quality of the human-animal relationship has been shown to affect animal welfare and productivity (Hemsworth et al., 1989; Breuer et al., 2000; Lensink et al., 2001; Hemsworth, 2003; Edwards, 2009). The majority of this research has focussed on the relationship between aversive human interactions and fear responses in animals, due to their implications for animal productivity and welfare (Hemsworth and Coleman, 2010). Fear is generally considered an undesirable emotional state in both humans and animals (Jones and Waddington, 1993) and research has shown that animals that are both fearful of humans and in regular contact with humans are likely to be stressed (Hemsworth and Coleman, 2010). However, because the relationship develops from the history of interaction with humans, the animal's perception is likely to be influenced by both negative and positive emotional states generated by interaction with humans. As reported by both Boivin et al. (2003) and Waiblinger et al. (2006), the range of emotional states generated through human interaction, is likely to determine the strength of the human-animal relationship, which in turn may vary from negative through neutral to positive. A negative emotional state has been suggested to result in a fear of humans causing stress and therefore impairing the welfare of the animal. Conversely, positive emotional states may provide some protection from unfamiliar handling practices or situations or even painful husbandry procedures (Hemsworth and Coleman, 2010).

There is a considerable body of research demonstrating that human-animal interactions can have substantial effects on the behaviour, physiology, welfare and productivity of commercial farm animals (Waiblinger et al., 2006; Hemsworth et al., 2009). For example, there is evidence for significant inter-relationships between the attitude and behaviour of the stock person and the behaviour, welfare and productivity of farm animals. Such evidence implies an opportunity to improve animal welfare and productivity by improving these human-animal interactions. While many of the interactions may appear mild and harmless to the animals, research has shown that the frequent use of some routine behaviours by stockpeople can result in farm animals becoming fearful of humans (Hemsworth and Coleman, 2010). It is these high levels of fear, that via stress responses appear to markedly limit the welfare and productivity of farm animals. Although productivity is not relevant to human-horse interactions, it is useful to briefly review this research.

Using the behavioural response of the animal to an experimenter in order to assess the animal's fear of humans, a number of field studies have reported negative inter-farm correlations between fear of humans and productivity in the dairy industry (Rushen et al., 1999; Breuer et al., 2000; Hemsworth et al., 2000), egg industry (Gross and Siegel, 1979, 1980; Barnett et al., 1992, 1994; Jones, 1993), meat chicken industry (Hemsworth et al., 1994; Cransberg et al., 2000), and the pig industry (Hemsworth et al., 1981, 1986, 1987, 1996; Gonyou et al., 1986; Hemsworth and Barnett, 1991). These negative correlations indicate that high levels of fear of humans may be a major factor limiting the productivity of livestock in these industries. The findings of these field studies have been supported by handling studies. Handling studies in experimental settings, involving a range of livestock species, indicate poor handling can adversely affect animal welfare, via fear of humans and stress (Gross and Siegel, 1979, 1980; Hemsworth et al., 1981; 1986; 1987, 1996; Barnett et al., 1983; Gonyou et al., 1986; Hemsworth and Barnett, 1986; 1991; Rushen et al., 1999; Breuer et al., 2000, 2003; Pedersen et al., 2002). Furthermore, these affects of handling on stress also have implications for animal health and productivity (Hemsworth et al., 2009).

The aforementioned field and handling studies indicate that the positive or negative nature of a human interaction for the animal is determined by the behaviour of the human, and the emotional response of the animal to this interaction. This research suggests that human behaviour influences the stress physiology and productivity of farm animals, and thus the behaviour of humans is an important factor in the impact of human-animal interactions on animal welfare (Hemsworth and Coleman, 2010). The human component of the human-animal relationship consists of both behavioural and psychological aspects. Factors reportedly important to human interaction with animals include human attitudes, behaviour, gender, previous experiences and culture (Raussi, 2003). Furthermore, Hemsworth and Coleman (2010) report that the way in which a stockperson behaves whilst working is influenced by a large number of factors, including social pressure, working environment, motivation, technical skills and knowledge, and job satisfaction. However the most robust influence on human behaviour is the attitude the person possesses towards performing the behaviour in question (Fishbein and Ajzen, 1975; Ajzen, 1985). This attitude-behaviour relationship, which suggests that the attitude of a person towards interacting with their animals influences the subsequent behaviour of the person towards the animals, has been successfully demonstrated in a number of livestock industries (Hemsworth et al., 1989, 1994, 2000, 2002; Breuer et al., 2000; Lensink et al., 2000; Waiblinger et al., 2002; Coleman et al., 2003). Because human attitudes are the main dispositional factors affecting volitional human behaviour, opportunities are likely to exist to manipulate human-animal interactions in order to improve animal welfare, by improving the attitudes and behaviour of humans towards animals (Hemsworth and Coleman, 2010). Although the literature involving the livestock industries is considerable, there has been limited investigation of the attitude-behaviour relationship in human interactions with horses and other companion animals.

Human-animal interactions can have substantial effects on the behaviour, physiology, welfare and performance of animals, as demonstrated by the extensive research involving human-animal interactions in the livestock industries. The limited literature concerning human-animal interactions in recreational horse ownership will now be discussed.

2.4.1 The impact of human-animal interactions on the welfare of horses

Human-horse interactions have had a long and varied history that has been dependant on human needs (Hausberger et al., 2007). Clutton-Brock (1992) suggests the close association between

humans and horses is due to the horse's speed and strength, and their ability to pull or carry loads. Perhaps however, the greatest impact on the human-horse relationship has been the horse's ability to carry a human on its back (Clutton-Brock, 1992). Humans interact with horses in many different ways, and with such a wide range of interactions the scope of potential relationships between humans and horses is perhaps greater than for any other species (Robinson, 1999). Contrary to many other domestic ungulates kept mainly for meat production, milk production, or wool production, horses acquired a somewhat varied status, which has resulted in them becoming a source of leisure, sport or companionship for some, or a tool in agriculture and transport for others (Endenburg, 1999). This range of uses corresponds to the diversity of people with whom horses interact, including professional and non-professional riders, breeders, caretakers, farmers, trainers, farriers, veterinarians, therapists, etc (Hausberger et al., 2007). These interactions between humans and horses can be viewed in a spectrum from the short occasional interactions such as those between farriers and horses, to the long-term bonds that develop between owners and their horses. It has been reported that human-horse interactions have the potential to impact upon the welfare of both the horse and its owner (Hausberger et al., 2007).

The interactions between humans and horses appear to be unique. While sharing a number of similarities with both human-livestock and human-companion animal interactions, they also possess a number of key differences. Horse-riding involves a form of exploitation different to confining an animal in a cage or pen. The training of horses in-hand and under-saddle, involves gaining complete control over the animal's mobility and locomotory responses (McLean and McGreevy, 2010). The use of horses, in principle, does not differ substantially from humans' use of other animals for food, fibre, transport and entertainment (Midgley, 1983; Regan, 1983; McLean and McGreevy, 2010). However, equitation does sometimes involve the novel motivation, for some people, of the use of the animal in the pursuit of 'triumph', a particularly human psychological satisfaction (McLean and McGreevy, 2010). While not suggesting that there is anything ethically wrong with training and riding horses, McLean and McGreevy (2010) stipulate the moral responsibility that humans have to treat the domestic horse with regard for its optimal welfare.

As with the previously described human-animal relationship, an important aspect of the human-horse relationship appears to be the development and maintenance of a strong positive

relationship. Studies have shown that deficits in the management conditions (i.e. housing, feeding and social contact) and the handling practices employed by the horse owner may result in relational problems between humans and horses (Hausberger et al., 2007). Many of the practices that are associated with the management of horses, including vaccination, hoof care, and the provision of medicine and transport, may be perceived by the horse as an aversive interaction with humans, which can result in the animal experiencing an increased fear response (Hausberger et al., 2007). Furthermore, interactions involving negative elements may also be associated with some forms of training and riding practices. McGreevy (2007) reports that inappropriate training practices may result in the horse displaying conflict behaviours which jeopardise not only the safety of the human but also may compromise the welfare of the horse. According to Hinde's (1979) theory, whereby the human-animal relationship is based on past interactions, human-horse interactions of a negative nature have the potential to result in horses expressing long-lasting undesirable reactions to human interaction.

Whilst horses are involved in recreation, leisure, sport and agriculture, the number of horses being kept as companion animals is reportedly on the increase (Waran, 2002). Horse owners purportedly love, care and take comfort from the presence of their horses in much the same manner as they do from other companion animals (Keaveney, 2007). The similarities between the human-horse and human-companion animal relationships appear to involve the themes of friendship (Hirschmann, 1994), companionship and caring (Holbrook et al., 2001), emotional support and solace (Hirschmann, 1994), and comfort (Holbrook et al., 2001). Similar to companion animal owners, horse owners report mutually evolving relationships with their horses that involve deeper levels of communication and understanding over time (Keaveney, 2007). Despite being viewed by many as companion animals, key differences exist between horses and other animals kept in this capacity. These differences include the physical size and strength of horses, the housing of horses, the horse's social structure, degree of integration of the horse into the lifestyle of the owner and the unique nature of the human-horse relationship that is not necessarily life-long. For instance, while companion animals such as cats and dogs often live with or are in close contact with their owners, the management and husbandry requirements of the horse result in a physical and time separation from their owners due to their housing outside of the primary residence. Furthermore, the horse is a herd animal, and while a human may become part of the social hierarchy of other companion animals they will never be one of the herd. In addition, unlike the majority of other companion animals, horses are often not kept for life as they

are generally sold when they are no longer suitable for the owner (Keaveney, 2007). However, despite these factors which have the potential to limit the close interaction often found between human's and their companion animals, the human-horse bond appears very similar to that formed between humans and other companion animals.

There appears to be two clear ways in which the interactions between humans and horses differ from other human-companion animal interactions. The first involves the significant size difference between humans and horses, which brings with it an element of danger to the interaction that is rarely present with other companion animals such as dogs and cats (Brandt, 2004). The other important distinction is the high level of body to body contact between humans and horses when they engage in interactions. While humans certainly connect their bodies with their companion animals when interacting, they do not ride them and require them to do complicated physical and mental tasks while astride their backs (Brandt, 2004). Keaveney (2007) suggests that the two key themes involved in the human-horse relationship are the horse being used for recreational riding and a working relationship between the human and the horse. Horse riding involves a goal-directed communication between humans and horses through touch, which adds a level of physicality, intimacy and intensity unique from anything experienced with other companion animals. The second theme involves the idea that the human-horse relationship is a working one, whereby the owner and the horse work together in partnership to achieve their goal (Keaveney, 2007).

Although there has been an increase in scientific interest in human-horse interactions (Robinson, 1999), very little sound data are available. An explanation for this may be the difficulty associated with undertaking this type of research due to the varied background of experience with humans that horses bring into the research situation, which may affect their responses (Crowell-Davis, 1992). In terms of human-animal interactions, most scientific studies focus on how the animal perceives humans as a positive, neutral and negative stimulus as the result of previous interactions (Waiblinger et al., 2006). A number of authors have used different methods in an attempt to assess the human-horse relationship. These have included observer ratings to evaluate the general way horses behave towards humans in their domestic environments (Le Scolan et al., 1997; Visser et al., 2003), behavioural tests and measures to assess reactions of horses to humans (Mal and McCall, 1996; Houpt and Kusunose, 2000; Visser et al., 2001, 2003; Hausberger and

Muller, 2002; Seaman et al., 2002; Sondergaard and Halekoh, 2003; Sondergaard and Ladwig, 2004; Henry et al., 2005; Lansade and Bouissou, 2005; Nicol et al., 2005; Pritchard et al., 2005) and physiological measures such as heart rate (Visser et al., 2002) and cortisol levels (Rivera et al., 2002) in response to humans. The vast majority of the human-horse interaction research has focused on horses of a young age (Hausberger, 2007), possibly to control for the past history. These studies have reported that both the time and type of contact a horse receives from a person plays an important role in the human-horse relationship.

Although literature examining the human-horse relationship is available, there is only limited research investigating a sequential relationship between horse owner attributes, human-horse interactions and horse welfare, similar to that demonstrated in a number of livestock species. A small number of studies have reported that the welfare of horses may depend on the horse owner's attitude (Endenburg, 1999; Ellis, 1999; Pearson, 2004). Human attitudes towards animals and the potential relationships with animal welfare are explored next.

2.5 HUMAN ATTITUDES TOWARDS ANIMALS

Human attitudes to animals are a matter of central concern to the field of animal welfare (Serpell, 2004). At an individual level it is known that negative attitudes to animals are associated with less humane behaviour towards them, and vice versa (Hemsworth, 2003). At the level of society, changes in peoples' attitudes and opinions are usually the driving force behind improvements in animal-related legislation and public policy (Kirkwood and Hubrecht, 2001). Furthermore no amount of scientific evidence will ever be sufficient to bring about improvements in animal welfare unless the evidence speaks to and resonates with public attitudes and values (Serpell, 2004). Understanding the origins of such attitudes and values is therefore of fundamental importance in animal welfare (Serpell, 2004). It has been suggested that the welfare of the horse depends on the horse owner's attitude towards it (Ellis, 1999; Endenburg, 1999). Although literature examining the attitudes of owners of neglected horses is not available, and studies on the attitudes of owners of well managed and cared for horses are not common, there is a large body of research concerning the attitudes of people towards other types of animals.

2.5.1 Relationship between beliefs, attitudes and observed behaviours

Horse owners are primarily responsible for their horse's welfare, and literature from the field of psychology reveals the important dispositional factor in predicting human behaviour is attitude towards the behaviour (Hemsworth and Coleman, 2010). Eagly and Chaiken (1993) describe attitude as a 'psychological tendency that is expressed by evaluating a particular entity with some degree of favour of disfavour'. The three main features of this definition are the idea that attitudes are directed at an object or a target; the idea that attitude is a tendency or disposition; and that attitudes express some positive or negative evaluation (Hemsworth and Coleman, 2010). Historically, psychologists have defined three components to attitudes: cognition, affect and conation (Allport, 1935), which appear to independently contribute to an individuals' attitude towards an object (Eagly and Chaiken, 1993). Due to their inability to be directly observed, attitudes must be inferred from measurable responses. Although the assessment of human attitudes will be discussed further in Section 3.3, essentially an individual's responses to a series of attitude statements in a questionnaire can be used to infer an underlying attitude. These statements are usually designed to measure one or more of the three components of attitude, the person's belief about the object (cognition), their emotional response to the object (affect) and their behavioural tendency towards the object (conation) (Hemsworth and Coleman, 2010).

Past research has demonstrated a sequential relationship between the attitudes and behaviour of humans and subsequent animal behaviour and welfare (Hemsworth et al., 1989, 1993; Hemsworth and Coleman, 2010). The theoretical underpinning of this research is the Theory of Reasoned Action (Ajzen and Fishbein, 1980), which proposes that where an individual has volitional control over their behaviours, behavioural intent can be predicted by a linear combination of attitude towards behaviour and normative beliefs (the persons perception of social pressure to perform the behaviour) about the behaviour (Coleman et al., 2003).

The Theory of Reasoned Action

Fishbein and Ajzen (1975) developed The Theory of Reasoned Action (TRA) in order to explain the causal antecedents of volitional behaviour, and the theory has since proven to be highly predictive of wilful human behavioural intention. According to the theory, the primary cause of human behaviour is a person's intention to perform the behaviour in question, and people will

behave as they intend to unless external forces prevent them from doing so (Ajzen, 1985; Ajzen, 1991). The external forces are associated with the level of volitional control that a person has over their behaviour, that is, whether or not they can perform a certain behaviour at will. With regard to the recreational horse population, horse owners' behaviour is primarily under volitional control and therefore their behaviour is predominantly determined by their intentions. Intention to perform a behaviour is determined by two factors; an individual's attitude towards performing a particular behaviour, and the subjective norms that exist in regard to the behaviour in question (Ajzen, 1998). The linear relationship between human attitudes, subjective norms, intentions and human behaviour is described in Figure 1.

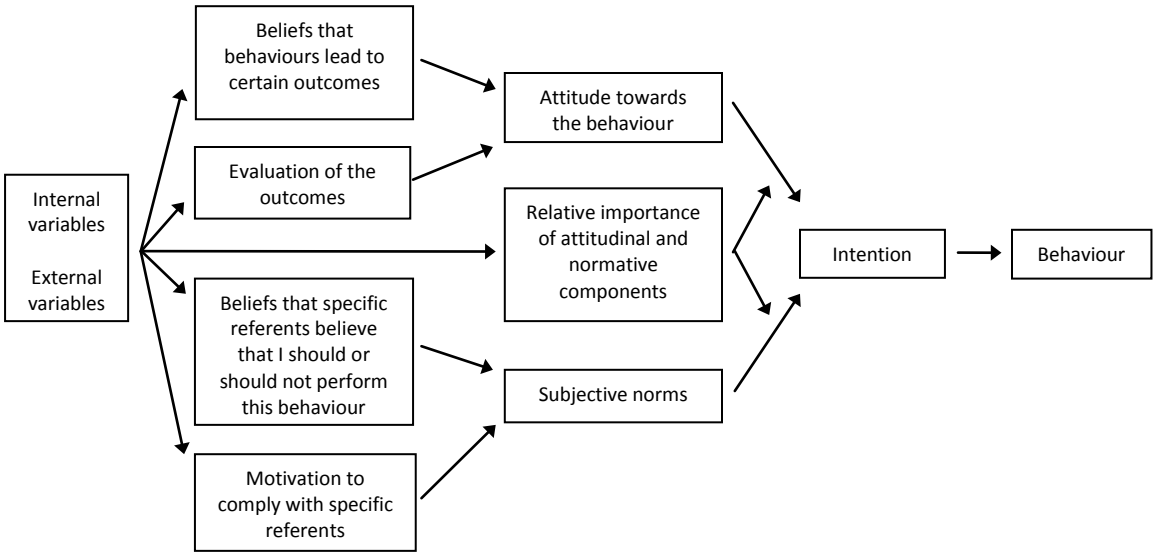


Figure 1 The Theory of Reasoned Action, adapted from Rehman (et al. 2007)

The formation and maintenance of attitudes

An attitude is evaluative and used to assess an object or behaviour in a positive or negative light. The nature of this evaluation can be overt, covert, cognitive, affective or behavioural (Eagly and Chaiken, 1993). Subjective norms are the perceived social pressures a person experiences to perform or not perform certain behaviour (Ajzen, 1985, Schifter and Ajzen, 1985, Ajzen, 1991). The beliefs a person possesses determine both attitudes and subjective norms. Attitudinal beliefs are formed by associating objects or behaviours with particular attributes that a person views positively or negatively. Normative beliefs concern an individual's perception of society's approval or disapproval regarding the particular object or behaviour (Ajzen, 1985). Therefore, the

attitude towards a behaviour that an individual holds is based on beliefs about the outcome of the behaviour, and a subjective evaluation concerning whether that outcome is favoured or unfavoured by society (Ajzen, 1985; Ajzen, 1991). Generally an individual will possess a positive attitude towards behaviours with a favourable outcome, and negative attitudes towards behaviours with unfavourable outcomes.

Ajzen (1985) suggests that behavioural attitudes are better predictors of behaviour than general attitudes. The subjective norms concerning a particular behaviour are based on the normative beliefs held by the individual. These normative beliefs relate to a combination of the degree of social pressure the individual feels performing a particular behaviour, and how important the opinion of others is to the individual (Ajzen, 1985). An individual will tend to feel a greater social pressure to perform behaviours that are favoured by those whose opinions they value or respect, weighted with their motivation to comply with the opinions. Behavioural attitudes and subjective norms are thus developed from the beliefs held by an individual, and are used to guide the formation and strength of behavioural intentions (Ajzen, 1985).

The antecedents of attitudes and subjective norms are the beliefs an individual holds regarding the outcome of a particular behaviour, and the social pressure to perform the behaviour in question. These salient beliefs are formed from the information an individual has regarding themselves and the world surrounding them, which may have been learned through personal experiences and interactions with other people and sources including television, radio and the internet (Ajzen, 1985; Hemsworth and Coleman, 2010). Salient beliefs can change over time. As individuals gain new information and experiences relevant to their salient beliefs their attitudes may change. With regard to behavioural beliefs, if an individual performs a particular behaviour and the outcome is unexpected, the individual's beliefs concerning the behaviour will begin to change as he or she becomes more aware of the actual behavioural outcome. The individual will then make an assessment involving the positive or negative nature of the outcome and the subjective norms, to determine whether the behaviour in question will continue to be performed (Ajzen, 1985). A feedback mechanism also occurs, whereby if the actual outcome is the same as the expected outcome, an individual's behavioural beliefs will be maintained, and there will be no change in attitude (Kelman, 1974).

The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB), an extension of the Theory of Reasoned Action (TRA), attempts to explain and predict behaviour which is not under complete volitional control (Ajzen, 1985; Schifter and Ajzen, 1985). While attitude towards a behaviour and normative beliefs are retained, the element of perceived behavioural control is added to the model. Perceived behavioural control refers to the perceived ease or difficulty that an individual foresees regarding the performance of the behaviour in question, and implies that past experiences and anticipated obstacles are included in the individual's evaluation. That is, an individual's intention is translated into action (Coleman et al., 2003). The revision to the theory arose in order to account for the potential of perceived external factors to interfer with behavioural intent and subsequent behavioural expression. The greater the opportunities available to the individual and the fewer impediments anticipated, then the greater the individual's perceived behavioural control of the behaviour. As with the TRA, the more favourable the subjective norm and attitude toward the behaviour, the stronger the individual's intention to perform the action will be (Coleman et al., 2003). The TPB does not directly deal with the degree of control an individual has over the situation, rather how perceived control affects achievement of behavioural goals (Coleman et al., 2003). Coleman et al. (2003) suggests that in most instances, the performance of an action depends not only on motivation, but on adequate control over the action in question. The relationship between human attitudes, subjective norms, perceived behavioural control, intentions and human behaviour is described in Figure 2.

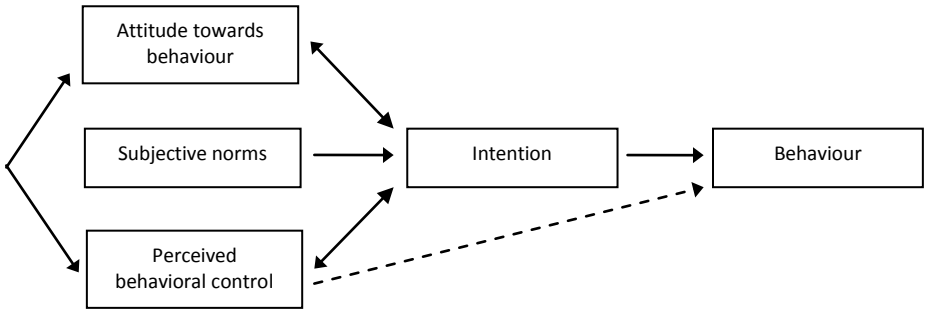


Figure 2 The Theory of Planned Behaviour (Ajzen, 1985)

The research concerning human attitudes towards livestock, companion animals and horses will now be examined.

2.5.2 Human attitudes towards livestock

Although the reported relationship between stockperson behaviour and productivity may not be relevant to non-production animals such as recreational horses, the relationship between human behaviour and animal welfare is. Therefore, the following review of the relevant literature will only discuss the results concerning animal welfare rather than animal production. There are substantial published data which strongly support the interrelationships between human attitude and behaviour, and animal behaviour, performance and welfare (Hemsworth et al., 1981, 1986, 1987, 1989; Gonyou et al., 1986; Hemsworth and Barnett, 1991; Lensink et al., 2000, 2001; Waiblinger et al., 2002; Edwards, 2009). While some emphasis has been placed on stockperson personality variables including introversion/extroversion and neuroticism in this research (Seabrook, 1972), the strongest predictor of stockperson behaviour has been shown to be stockperson attitudes (Coleman et al., 2000). Coleman et al. (2003) reported that negative attitudes are associated with negative behaviours, which is consistent with findings that attitudes are a good predictor of human-animal interactions in a variety of contexts including pig breeding units (Hemsworth et al., 1989; Coleman et al., 1998), dairy units (Breuer et al., 2000; Hemsworth et al., 2000; Waiblinger et al., 2002) and vealer growing units (Lensink et al., 2001).

A substantial number of studies have focused on the attitude and behaviour of stockpeople in order to identify the main factors affecting an animal's fear of humans (Hemsworth and Coleman, 2010). These studies have reported significant sequential relationships in the dairy, pig and poultry industries between the stockperson's attitude and behaviour animals and the fear of humans by livestock (Hemsworth et al., 1989, 2000; Coleman et al., 1998; Breuer et al., 2000; Waiblinger et al., 2002; Edwards, 2009). In these cases positive attitudes to the use of petting and the use of verbal and physical effort to handle cows and pigs were negatively correlated with the use of negative tactile interactions such as slaps, pushes and hits, which in turn were positively associated with the fear of humans by the animals. Hemsworth and Coleman (2010) report that the most pertinent attitudes involved with predicting behaviour are those that specifically assess attitudes towards relevant behaviours.

The sequential relationships reported between stockperson attitudes, stockperson behaviour, and animal welfare in the pig and dairy industries indicates the opportunity to improve the welfare of production animals by modifying the attitudes and behaviour of stockpeople (Hemsworth, 2003). Furthermore, intervention studies aimed at improving stockperson attitudes and behaviour have demonstrated the opportunity to improve the welfare of farm animals by changing the attitudes and behaviour of stockpeople (Hemsworth et al., 1994, 2002; Coleman et al., 2000). These findings imply that similar results may be possible with human-animal relationships involving animals other than the livestock species. Thus, if a recreational horse owner's attitude towards horse husbandry and management practices determines the manner in which they manage their horses, the welfare concerns observed in recreational horses may potentially be reduced by modifying the attitude and subsequent behaviour of recreational horse owners.

2.5.3 Human attitudes towards companion animals

Historically, human attitudes towards companion animals have varied, although generally they have tended to become more positive and humane over time (Serpell, 1986; Ritvo, 1988; Podberscek, 1997). While owner attitudes towards their companion animals commonly appear to be positive, there is a degree of acceptance of the disposability of companion animals in western society (Podberscek, 1997). Podberscek (1997) reports that in countries such as the UK, Scotland and the United States the main reasons for euthanasia of companion animals are behaviour problems, followed by convenience, such as the owner going on holiday or moving house.

Human attitudes and behaviour towards companion animals are reportedly influenced by a number of factors, such as culture and religious persuasion (Bowd and Bowd, 1989; Kellert, 1994; Pifer et al., 1994; Schenk et al., 1994; Laurent, 1995), demographics including age, income and education level (Kellert, 1980; Kellert and Berry, 1981; Gallup and Beckstead, 1988; Bowd and Bowd, 1989; Driscoll, 1992), gender (Gallup and Beckstead, 1988; Furnham and Pinder, 1990; Herzog et al., 1991; Broida et al., 1993; Wells and Hepper, 1995), past experience with companion animals (Driscoll, 1992; Furnham and Hayes, 1993; Paul and Serpell, 1993; Taylor and Signal, 2005), and the physical and behavioural attributes of the animal (Burghardt and Herzog, 1989; Driscoll, 1992). While the majority of these factors are unable to be modified, human attitudes towards animals remain amenable to change which is often bought about through

personal experience, education, literature, and the influence of outside sources (Podberscek, 1997).

Although there is significant literature on the relationship between human attitudes and the welfare of animals in the livestock industries, there has been little research conducted on the relationship between human attitudes with respect to companion animals and their welfare. This area appears to have been poorly researched, with research tending to have been focused on human attachment to companion animals rather than human attitudes towards companion animals and their management. The literature available on human attitudes towards companion animals primarily focuses on dogs and cats in general (Ottney and Cain, 1983; Quigley et al., 1983; Jones and Beck, 1984; Lescun, 1990; MacCallum, 1993; McHarg, 1995; Podberscek, 1997), the two most popular animals kept for companionship today. Some research is also available on the assessment of the attitudes towards a number of companion animal welfare related issues such as neutering (Blackshaw and Day, 1994), tail docking (Noonan et al., 1994) and de-clawing (Landsberg, 1991).

People who own dogs and/or cats perceive relationships with companion animals with greater positive and emotional feelings than people who do not own companion animals (Quigley et al., 1983). Voith et al. (1985) reported that dog owners were more likely than cat owners to take their companion animals with them when running errands or taking a trip, while cat owners were more likely to allow their companion animals on the furniture. However, both dog and cat owners were equally likely to view their companion animals as part of the family, talk to and share food with them, and believe that their companion animals understood their owner's moods (Voith et al., 1985). Similar findings were reflected in McHarg's (1995) survey of companion animal owners, where it was reported that a substantial percentage of owners felt very close to their companion animals in the same way that they feel very close to their family, and found it comforting to be with their pets during times of difficulty. It was reported by Lescun (1990) that cruelty to domestic animals was considered a major concern by the community, ahead of issues such as home interest rates, traffic issues, native animal and forest protection, crime and stray cats and dogs. Bjerke et al. (1998) looked at attitudes towards companion animals in general, compared with those towards non-domestic animals, and reported that companion animals were perceived as prettier, less dangerous, more interesting and more useful.

The human attitude literature concerning companion animals primarily concerns an owner's general attitude towards their dogs and cats. The research suggests that owner's attitudes regarding their companion animals are generally positive and influenced by a range of factors including demographics, culture and religion, past experience with companion animals, and an animal's physical and behavioural attributes. Although the majority of these factors are not able to be modified, reports indicate that personal experience, education and influencing sources are able to result in changes to human attitudes towards companion animals. Furthermore, the relationship between human attitudes with respect to companion animals and their welfare requires investigation.

2.5.4 Human attitudes towards horses

Although the literature on human attitudes towards animals has focused on the effect of human attitudes on companion animals (Quigley et al., 1983; Voith et al., 1985; MacCallum, 1993; McHarg, 1995; Podberscek, 1997) and the effect of the stockperson's attitude and behaviour on livestock (Hemsworth and Coleman, 2010), there is very limited research on human attitudes towards horses. Horses have acquired a somewhat mixed status, situated somewhere between livestock and companion animals, which has resulted in them being used for recreation, sport, companionship, agriculture and transport (c.f. Section 2.4.1). The number of horse owners claiming to own horses for companionship reasons appears to have increased and, as a result, there are similarities between the attitudes of humans to companion animals and horse owners' attitudes towards horses. These similarities are evident when investigating the role of animals within a family, where studies have reported that both horses (Jones, 1983) and companion animals such as cats and dogs (Ottney and Cain, 1983), are considered by their owners to be part of the family. However, there may also be substantial differences between the attitudes of companion animal owners and the attitudes of people who own horses, possibly due to the significant differences between horses and other companion animals. One possible reason may be the frequency of close contact with the owner, where companion animals tend to have more frequent and physically closer interactions with owners than horses often do. Pearson (2004) reports that the frequency of close contact with the owner may increase the opportunity for the owner to gain benefit from the relationship, which subsequently may result in the owner's attitude towards their animal becoming more positive.

The traditional companion animals, such as cats and dogs, tend to be smaller animals that are capable of sharing a house with their owner and require very different management practices compared to horses. Horses generally require greater management and financial input than other companion animals, and are often used for competition and recreational purposes in addition to companionship. Considering these differences, it would appear likely that attitudes of owners of companion animals may differ from that of owners of horses, particularly if the horse was kept for reasons other than companionship. However, it is reasonable to assume that the attitudes of horse owners who keep horses primarily for recreation and companionship may closely reflect that of companion animal owners. It is therefore important to be aware that the level of management and financial costs, which in some cases may be unexpected, may adversely impact upon the attitudes of recreational horse owners and in turn impact on their horse's welfare (Pearson, 2004).

Past research investigating the effect of gender on human attitudes to horses has reported varied findings. Some of the findings have supported the general perception that horses are more popular with girls than with boys (Jones, 1983; Brown, 1984; Jones and Beck, 1984; Herzog et al., 1991; Clegg, 1996; Bjerke et al., 1998), while others have found no significant gender difference in regard to attitudes to horses (Wells and Hepper, 1995). Jones (1983) reported that there were more girls than boys participating in pony clubs and while the differences were not statistically significant, boys cared less for their horses than girls did. The majority of pony club members considered their horses to be a friend and talked to their horses accordingly (Jones, 1983). A study by Bjerke (et al. 1998) found that approximately forty percent of children voted the horse as their favourite animal. When asked which animals they would prefer to save from extinction, children chose the dog first followed by the horse. This study and that by Jones and Beck (1984) reported that the attitudes of the horse owners who were members of horse clubs were generally positive towards horses.

Studies by Ellis (1999) and Endenburg (1999) have both suggested that horse welfare may depend on the horse owner's attitude towards horses and horse management. The study conducted by Pearson (2004) reports that the main factor differentiating owners of horses with welfare

problems from owners of horses with no welfare problems appears to be a lack of commitment to horse ownership. As discussed earlier (c.f. Section 2.3), owners of horses with welfare problems possessed a number of key beliefs which included the belief that horses made good companion animals, that little commitment was required in horse ownership and that horses were difficult to care for. Pearson (2004) also found that owners who were members of horse clubs believed that horses did not make good companion animals. A possible explanation for the relationship found between these horse owner beliefs and horse welfare problems is that these owners may have treated their horses in a manner similar to other companion animals which may require both less knowledge and financial input, and may not have understood the commitment required to adequately manage a horse on a daily basis. Pearson (2004) found that approximately three out of four owners with horse welfare concerns were not members of any horse clubs, and many did not frequently read horse literature. It is therefore reasonable to assume that they did not receive advice about appropriate horse management. The reported findings of Ellis (1999), Endenburg (1999) and Pearson (2004) appear to imply an association between horse owner attitudes and behaviour, and a subsequent impact on horse welfare.

The area of human attitudes towards horses has been largely uninvestigated. However, the literature pertaining to the human-animal relationship and the impact of human-animal interactions on animal welfare in livestock, the findings of a limited number of studies linking horse owner attitudes with horse welfare outcomes, and the absence of any substantive research into the relationship between horse owner attitudes and the welfare of recreational horses indicates the clear need for further investigation in this area.

2.6 CONCLUSIONS

Horse welfare is primarily the responsibility of the horse owner, and industry reports indicate the welfare of horses is determined predominantly by the horse owner's performance of husbandry and management practices. Literature suggests that the important dispositional factor in predicting human behaviour is attitude towards the behaviour (Hemsworth and Coleman, 2010). A substantial body of research has demonstrated a sequential relationship between the attitudes and behaviour of humans and subsequent animal behaviour and welfare in a number of livestock industries (Hemsworth et al., 1989; 1993; Hemsworth and Coleman, 2010). This area of research

has been largely un-investigated in recreational horses. Although the majority of human attitude research concerning horses has focused on human attitudes regarding horses as companion animals, the limited literature examining relationships between human attitudes and horse welfare indicates that further investigation is warranted. The sequential human-animal relationship, demonstrated and modified in a number of livestock industries has yet to be properly explored in recreational horse ownership. With an estimated population of 1.2 million horses in Australia alone, the quality of the human-horse relationship in the recreational horse population has the potential to impact on the welfare of a vast number of horses. Further research is therefore warranted to investigate the sequential relationships between horse owner attributes, including horse owner attitudes and behaviour, and the subsequent association with the welfare of recreational horses. Understanding the nature of the association between horse owner attributes within the resultant impact on human-horse interactions would provide the opportunity to improve the quality of the human-horse relationship and thus the welfare of recreational horses. As shown in the livestock industries, understanding the key attitudes which underpin human behaviour provides the opportunity, through targeted education, training and policy, to improve the key human-animal interactions and thus improve the human-animal relationship and subsequent animal welfare. The research reported in this thesis explores the human-horse relationship, by addressing the following research aims:

i. To investigate the incidence of recreational horse ownership in Victoria, and examine the factors associated with this ownership.

ii. To investigate the antecedents of horse owner husbandry and management behaviour, and the ensuing relationship with horse welfare outcomes in Victoria, and

iii. To examine horse owner viewpoints on recreational horse ownership in Victoria, and the key associated issues.

CHAPTER 3
METHODOLOGY

3.1 OVERVIEW

This chapter outlines the development of the methodology underlying the three components of the study; the random telephone survey, the on-site inspection protocol, and the qualitative interview process. The rationale for a separate methodology chapter was to allow a clear definition of how the participant pool was recruited, the series of data collections that occurred, the sequential nature of the data collection, and to reduce the size of the result chapters.

3.2 METHODOLOGICAL DEVELOPMENT OF THE RANDOM TELEPHONE SURVEY

3.2.1 Rationale behind the random telephone survey

Despite the widely distributed nature of the Australian horse industry, our knowledge of recreational horse ownership remains limited. The apparent lack of information on this type of horse ownership extends to Victoria, where very little is known about the Victorian recreational horse population. The lack of knowledge appears primarily due to the absence of a compulsory horse registration system and the difficulty associated with contacting recreational horse owners that are not members of any horse clubs or societies.

A random telephone survey was developed to collect information from recreational horse owners in relation to a range of variables including horse owner attributes, horse husbandry and management practices and horse demographic details, in order to construct a profile of recreational horse ownership in Victoria. Research has shown telephone surveys to be an accurate and repeatable method of obtaining information from horse owners concerning equine health and management data (Reeves et al., 1996; Kaneene et al., 1997). Furthermore, telephone surveys are often preferred to web-based surveys because of their lower susceptibility to bias resulting from potential limited web access outside urban areas and a possible education or age bias in computer

use. The use of telephone questionnaires and surveys to collect health and management data has not been limited to horses, with a considerable amount of literature available supporting their use to successfully obtain information from animal owners in both livestock (Chauvin et al., 2002; Thomson et al., 2008) and companion animals such as dogs (Salmon and Salmon, 1983, Voith et al., 1992; Jagoe and Serpell, 1996; Serpell, 1996; Kobelt et al., 2003) and cats (Marinelli et al., 2001, Adamelli et al., 2005). The difficulty associated with contacting recreational horse owners that are not members of horse clubs or societies has been reported and, as a result, the majority of equine research has been conducted using members of such equine organisations. Horse clubs and societies provide information and support to recreational horse owners that may improve the way in which they manage their horses. It has been reported that the vast majority of horse owners with horses experiencing welfare concerns are not members of these clubs or societies (Leckie, 2001; Pearson, 2004). As a result, any investigation into the recreational horse population in Victoria ought to involve random participant recruitment to ensure the sample obtained is representative of the population. Thus a random telephone survey was chosen to investigate recreational horse ownership in Victoria.

3.2.2 The development of the random telephone questionnaire

Questionnaire guidelines and development

Established survey guidelines, involving item wording and structure, previously developed to create rigorous and accurate surveys (Knowles, 1975; Sudman and Bradburn, 1982; Shimizu, 1988; Shipsides, 1988; Parker, 1992; Fink, 1995; Jackson & Furnham, 2000; Zikmund, 2003; Bradburn et al., 2004; Dillman, 2007) were used as a framework for developing the structure and content of the random telephone survey questionnaire. The features required for an effective survey include the appropriate use of item wording and item structure. In regard to item wording, the use of clear and concise language, accurate spelling and grammar, and succinct and specific statements for all questions and instructions is advised. Item structure generally concerns the format of question responses, and the structuring of the questionnaire. Closed-ended questions are usually recommended. While open-ended questions are appropriate in some contexts, it is recommended that they are used sparingly and only when needed. In comparison to closed-ended questions, open-ended questions often require respondents to have a higher degree of communication skill in order to respond and require a greater degree of statistical analysis from the researcher. Open-ended questions are also time-consuming, and may result in a higher refusal rate or incomplete answering of the questionnaire. It is important for closed-ended questions that

all reasonable response alternatives are available, and include a neutral option such as 'I don't know'. The use of leading questions which imply certain answers, and loaded questions which are emotionally charged or suggest a socially desirable answer, need to be avoided. Questions addressing more than one issue at once should also be avoided. With regard to structuring the questionnaire, the grouping of items and questions according to topic and organised in a logical order will allow the respondent to focus and organize their thoughts to respond accordingly. The placement of easy, brief or non-threatening questions at the beginning of the questionnaire will encourage participation, while more involved, sensitive or objectionable questions can be placed towards the end of the survey. The salient or memorable nature of the topic will determine the timeframe of the question. The length of the questionnaire is also an important consideration, and it should be as concise as possible while still obtaining the information sought.

Clear and concise instructions are vital in order to ensure that accurate data are collected by the survey (Iarossi 2006). A clear distinction between instructions and questions is also required (Bourque and Fielder, 1995). General information concerning how the questions should be answered should be placed at the beginning of the questionnaire, while specific instructions pertaining to individual questions ought to be located as close to the particular question as possible (Sudman and Bradburn, 1982). A respondent's needs should guide the design of any survey instrument (Bradburn, Sudman and Wansink 2004). A well-formatted survey instrument not only makes it easier for respondents to understand and complete (Bradburn, Sudman and Wansink 2004), but should also reduce measurement error as respondents will be more likely to follow the flow of the survey and correctly comprehend the questions (Dillman 2007).

The random telephone questionnaire

The first step in developing the random telephone questionnaire was to acquire a thorough understanding of the construct to be measured. The starting point was an extensive review of the relevant literature, with a focus on horse ownership, horse husbandry and management, horse welfare, and human-horse interactions. The literature review was followed by discussions with the project steering committee, to establish the topics of investigation and the variables to be collected by the questionnaire. The steering committee was formed to offer advice and support to the researcher during the study, and comprised of a range of industry personnel whose backgrounds included the horse, livestock and companion animal industries. Information

regarding recreational horse ownership in Victoria is limited (cf. Section 1.4), as a result the collection of an extensive range of demographic data concerning horse owners and their horses was considered important in order to obtain a greater understanding of the population under investigation. Recreational horses are highly represented in animal welfare investigations in Victoria (cf. Section 1.4). Although information regarding the underlying causes of horse welfare concerns is limited, the majority of welfare problems observed in Victorian horses are believed to be due primarily to inappropriate management by the horse owner, as a result of ignorance rather than intentional abuse. These reports are corroborated by the limited literature which reports that inappropriate management by the horse owner has the potential to be detrimental to a horse's health and welfare (cf. Section 1.4). Furthermore, it appears that a horse's welfare may be most significantly influenced by the attributes of the horse owner. Thus, data concerning horse owner attitudes, horse owner husbandry and management practices, and horse owner behaviour are required. In addition, data involving horse owners' past and current human-horse interactions are also deemed of interest.

In order to refine the questionnaire, it was initially piloted with the project's steering committee and a convenient sample of members of the public (n=22), where both horse owners and non-horse owners were represented. The feedback provided from the pilot survey was used to produce the current version of the random telephone questionnaire. A copy of the random telephone questionnaire is located in Appendix 1. The questionnaire comprises seven sections and consists of 123 questions. The seven sections of the questionnaire are as follows:

Section A: Determining whether candidate will participate: This section of the questionnaire determined whether respondents were horse owners or non-horse owners. The type of participant (horse owner or non-horse owner) subsequently determined which sections of the questionnaire were completed. Horse owners completed sections A-G, while non-horse owners completed sections A and G only.

Section B: Questions about your horse(s): This section of the questionnaire collected demographic information about the participant's horses. If the participant owned more than one horse they completed the questionnaire for the horse they had most contact with (Horse 1) and the horse that they had the least contact with (Horse 2)

Section C: Questions about the environment of your horse(s): This section of the questionnaire concerned the horse's environment and the way in which the participant housed their horses.

Section D: Questions about the interactions between yourself and your horse(s): This section of the questionnaire examined the different types of interactions that occur between the participant and their horses.

Section E: Questions on the health of your horse(s): This section of the questionnaire assessed the health of the horses and the equine husbandry and management practices employed by the participant

Section F: Personal opinion regarding general statements about horses: This section of the questionnaire investigated participants' attitudes to horses and different horse management and husbandry practices.

Section G: Questions about the survey candidate (demographics): The final section of the questionnaire obtained the participant's demographic details.

Section A of the questionnaire established whether the candidate would participate in the study. Once the respondent was willing to participate, the introductory questions determined the participant's classification (described in Section 3.2.3) and the relevant sections of the questionnaire to be completed. Section B of the questionnaire collected demographic details of the recreational horses owned by participants. When developing an appropriate method for sampling the horses owned by participants in the study, two important factors had to be accounted for; a) horse owners may own more than one horse, and b) horse owners may employ different uses and management techniques for each of their horses. Industry personnel suggest that over half of all recreational horse owners own more than one horse (pers. comm., D. Hughes, RSPCA Victoria; Dr B. Smyth, AHIC). The diversity in the use of recreational horses in Victoria today is known to result in the implementation of a range of different types of management strategies within the horse population. In fact, variation may exist between the use and management of different horses owned by the same horse owner. In order to ensure that both the ownership of more than one horse and the potential differences in horse management practices were accounted for, participants who owned more than one horse provided information relevant to two horses: horse 1 (H1): the horse the participant had the most daily contact/interaction with, and horse 2 (H2): the horse the participant had the least daily contact/interaction with. Although it was not

possible to sample all of a participant's horses, due to both time and financial constraints, it was anticipated that by sampling H1 and H2, the full range of management practices employed in Victoria would be appraised.

The horse husbandry and management practices investigated in Sections C, D, E and F of the questionnaire were based on guidelines provided by the best practice procedures outlined in the Codes of Practice pertaining to the welfare of recreational horses (Prevention of Cruelty to Animals Act 1986). The attitude questions in Section F were adapted from questionnaires employed by Breuer et al. (2000) and Waiblinger et al. (2000) to examine human-animal interaction in the dairy industry. The questions were modified to include general statements about horses and horse welfare, questions about horse health, husbandry, management and welfare, and human-horse interaction. Participant responses were assessed on a seven-point Likert scale, where responses ranged from 'strongly agree' to 'strongly disagree'. Questions were both positive and negative in nature. A high score indicated a low level of agreement with the attitude statement, and subsequently a lower score implied a higher level of agreement with the statement. Section F of the questionnaire consisted of forty attitude questions. The data were reduced to a more manageable subset of six composite attitude subscales using principle component analysis (PCA). The reduction of the attitude variables and the calculation of the composite attitude subscales will now be described.

The calculation of attitude subscales

Principle component analysis (PCA) is a statistical technique which is applied to a single set of variables to determine which ones are able to form coherent subsets that are relatively independent of one another (Tabachnick and Fidell, 1996). Variables that are correlated with one another but largely independent of other subsets of variables are combined into components. Components are thought to reflect underlying processes that have created the correlations among variables. Essentially a component is a dimension or construct which represents a condensed statement of the relationship between the set of variables (Royce, 1963). Rotation techniques are applied to components to assist in the interpretation of the component structure. Varimax rotation, an orthogonal rotation method, is commonly applied to survey data. This form of rotation maximises the variance of the loadings within components across variables and as a result enhances simple structure. These rotated components are often refered to as factors. In simple

structure solutions, several variables correlate highly with each factor and only one factor correlates highly with each variable (Tabachnick and Fidell, 1996). An alternative rotation scheme is oblique rotation which generally produces two correlated factors. The complex structure and correlated nature of the oblique factor solution results in challenges with interpretation and consequently this form of rotation is less commonly used. Variables that load on more than one factor or have loadings less than 0.32 on all factors should be removed. The usual threshold for factor loading is 0.32 (Tabachnick and Fidell, 1996) which indicates that 9% of the variance is accounted for by the factor (Kline, 1993). In general, loadings greater than 0.71 are considered excellent, loadings between 0.63 and 0.70 are very good, and loadings between 0.55 and 0.62 are considered good (Comrey and Lee, 1992). Once the factor structure is finalised, the factors are able to be examined to determine how much variance is accounted for by each factor. The reliability of a test reflects the extent to which individual differences to scores are attributed to actual differences in the characteristics being measured and the extent to which they are attributable to chance error (Anastasi and Urbina, 1997). The reliability of the factors produced by a PCA can be determined by assessing internal consistency, which is based on the consistency of responses to all items of the test, and assesses the content and heterogeneity of the characteristics that are sampled. For each factor in the final factor solution, internal consistency can be determined using Cronbach's coefficient alpha. Ideally, this coefficient should be above 0.70 (Anastasi and Urbina, 1997) however in factors that contain a small number of variables, a coefficient below 0.7 may be acceptable as it does not necessarily represent a lack of correlation, simply a small number of factor items.

The section of the random telephone questionnaire concerning recreational horse owner attitudes collected data for 40 attitude variables. In order to reduced the data to a more manageable size, rather than perform any comprehensive statistical analysis, a PCA was employed. Initially, a PCA was conducted using all 40 attitude variables however, the large number of variables proved too many for a single PCA to handle. As a result the attitude data were reduced into three sections, each section containing variables of similar theme. A correlation matrix was run for each section to confirm the variables of similar theme were related, and significant correlations in each of the subscales supported the use of PCA. The three attitude sections were general attitudes towards horses, horse husbandry and management, and the human-horse relationship.

Principle component analysis was conducted on each of the three sections. An examination of the scree plots indicated the potential factor solution for each section (Tabachnick and Fidell, 1996). In order to determine the most appropriate representation of the data, one, two, and three factor solutions were examined with varimax rotation, for each of the attitude sections. Tables 2-4 provide the factor solutions, the rotation method, the subjective labelling of each subscale (factor) based on semantic content and the Cronbach's coefficient alpha, for each subscale. Although the majority of the Cronbach coefficient alpha values calculated for the factors were below 0.7, they do not necessarily suggest a lack of reliability due to the small number of variables in each factor. Factor Two from the human-horse relationship subscale has a small Cronbach's coefficient alpha of 0.40, however the two variables in the factor are still correlated ($r=0.25$, $p<0.01$). From the 40 variables measured in the attitude questionnaire, 25 variables were reduced into the three sections, which created 6 factors. The remaining 15 variables which were unable to be included in the principle component analysis, and are to be treated as individual attitude variables in future analyses are listed in Appendix 5.

Table 2 General attitudes toward horses section; 3 factor solution with varimax rotation.

General attitudes towards horses	Cronbach's coefficient alpha	Number of items in factor	Factor interpretations
Factor One – Positive statements about horses	0.58	4	The items in Factor One reflected positive attitude statements about recreational horses. Items in this factor addressed the characteristics recreational horses possess that may be attractive to a horse owner
Factor Two – Negative statements about horses	0.62	3	The items in Factor Two reflected negative attitude statements about recreational horses. Item content concerned negative characteristics of recreational horses and their handling
Factor Three – Horses require resource provision	0.65	3	The items in Factor Three reflected attitude statements about the substantial resources required by recreational horses. Items involved the significant costs incurred by owners during recreational horse ownership, in terms of time, care and money

Table 3 Horse husbandry and management section; 1 factor solution with varimax rotation.

Horse husbandry and management	Cronbach's coefficient alpha	Number of items in factor	Factor interpretations
Factor One – General horse husbandry and management	0.71	10	The items in Factor One reflected the horse husbandry and management practices required by recreational horses. Items in this factor addressed the importance of recreational horse owners implementing appropriate horse husbandry and management practices

Table 4 Human-horse relationship section; 2 factor solution with oblique rotation.

Human-horse relationship	Cronbach's coefficient alpha	Number of items in factor	Factor interpretations
Factor One – The importance of the recreational horse to the horse owner	0.74	3	The items in Factor One reflected the positive aspects of the human-horse relationship. Items in this factor addressed the importance of the human-horse relationship to the recreational horse owner, and the benefits an owner may experience from their relationship with their horse
Factor Two – Recreational horse welfare is not the responsibility of the horse owner	0.40	2	The items in Factor Two reflect the issue of who is responsible for recreational horse welfare. Item content concern the view that recreational horse owners are not responsible for their horses welfare

The principle component analyses of the three sections resulted in 25 attitude variables being reduced to six factors. Each factor was then computed using factor scores to create a single

composite attitude variable (subscale). Descriptions of the six attitude subscales are found in Table 5.

Table 5 Description of the six attitude subscales created from the Section F attitude variables using principle component analysis

Attitude subscale	Description of attitude subscale
Positive (+VE) statements about horses	The attitude subscale reflects positive recreational horse owner attitude towards horses
Negative (-VE) statements about horses	The attitude subscale reflects negative recreational horse owner attitude towards horses
Horses require resource provision	The attitude subscale involves recreational horse owners attitudes regarding the cost associated with the resource provision required from recreational horse ownership
General horse husbandry and management	The attitude subscale concerns recreational horse owner attitudes regarding the importance of carrying out appropriate horse husbandry and management practices
The importance of the horse to the horse owner	The attitude subscale reflects recreational horse owner attitudes concerning the importance of the human-horse relationship to the recreational horse owner, and the benefits gained from human-horse relationship
Horse welfare is not the responsibility of the horse owner	The attitude subscale involves recreational horse owners attitude towards the view that they are not responsible for their horses welfare

3.2.3 Criteria for participant inclusion

The criteria for inclusion in the study are given in Table 6. As the intention of this research was to investigate recreational horse ownership in Victoria, all other forms of horse ownership such as those involving the Thoroughbred and Standardbred horse racing industries were excluded. The random telephone questionnaire collected data from both recreational horse owners and non-horse owners in order to determine whether demographic variables differentiated the two types of participants. The lower age limit for participation was decreased from 18 years to 12 years of age

for horse owners as it was recognized that the person providing the primary care for a horse may not be one of the adults in the household.

Table 6 Criteria for participant selection

Group	Selection Criteria
Recreational horse owner	• participant owns at least one recreational horse • horse is used for recreational purposes, i.e. not currently involved in the horse racing industry (racing or breeding) • participant is 12 years and over in age • willing to complete the questionnaire
Non-horse owner	• participant does not own or provide the primary care for any recreational horses • participant is 18 years or over in age • willing to complete the questionnaire

3.2.4 The random telephone survey

Ethics approval for the random telephone survey was sought and obtained (CF07/0303 – 2007/0103) from the Monash University Human Research Ethics Committee (MUHREC). The survey was conducted by the professional pollster company I-View. Participant contact details were obtained from a public domain source (the telephone book). Potential participants were contacted by telephone and were read a plain language statement which informed them of the manner in which their contact details had been obtained, of the research being undertaken and what participation in the research project would entail. If those people contacted gave their consent to participate, the telephone questionnaire was administered. Participant classifications are detailed in Table 7. Recreational horse owners were classified as horse owners that provide their horse with its daily primary care (horse owner/primary carer) and horse owners that did not provide their horse with its daily primary care (horse owner/non-primary carer). Non-horse owners were divided into non-horse owners that do not provide a horse with primary care (non-horse owner/non-primary carer) and non-horse owners who provide a horse with its daily primary care (non-horse owner/primary carer). Participants' classification determined which sections of the questionnaire concerned them, and participants completed the relevant sections of the questionnaire according to their classification. Upon completion of the questionnaire, horse owning participants were reminded that the survey they had just completed was the first

component of an ongoing PhD project investigating the welfare of recreational horses in Victoria. The participants were then asked whether they would be interested in having the researcher contact them to explain the research being conducted and to see whether they would be interested in further participation. If willing their contact details were collected and forwarded to the researcher.

Those participants under 18 years of age were asked to provide contact details. A parental consent form and explanatory statement were sent with a postage paid return addressed envelope to the participant's parent or guardian for completion by and return. Once consent had been obtained, potential participants were re-contacted by I-View and the questionnaire was administered.

Table 7 A description of the four participant classifications and their relevant selection criteria

Participant classification	Selection Criteria
Recreational horse owner/primary carer	• participant owns at least one recreational horse • participant provides their horse with its daily primary care • horse is used for recreational purposes, i.e. not currently involved in the horse racing industry (racing or breeding) • participant is 12 years and over in age • willing to complete the questionnaire
Recreational horse owner/non-primary carer	• participant owns at least one recreational horse • participant does not provide their horse with its daily primary care • horse is used for recreational purposes, i.e. not currently involved in the horse racing industry (racing or breeding) • participant is 18 years and over in age • willing to complete the questionnaire
Non-horse owner	• participant does not own or provide the primary care for any recreational horses • participant is 18 years or over in age • willing to complete the questionnaire
Non-horse owner/primary carer	• participant does not own a recreational horse, however does provide the primary care at least one recreational horses • participant provides someone else's horse with its daily primary care • horse is used for recreational purposes, i.e. not currently involved in the horse racing industry (racing or breeding) • participant is 18 years or over in age • willing to complete the questionnaire

3.3 METHODOLOGICAL DEVELOPMENT OF THE ON-SITE INSPECTION PROTOCOL

3.3.1 Rationale behind the on-site inspection protocol

The welfare of horses has become an increasingly important issue, as evident by their high representation in animal welfare investigations. Industry personnel report that a significant proportion of the welfare problems occurring within recreational horse populations are due to horse owner neglect or mismanagement, as a result of ignorance rather than intentional abuse. Furthermore, the limited literature indicates that inappropriate management by the recreational

horse owner is potentially detrimental to the horse's health and welfare (c.f. Section 2.4). The quality of the human-animal relationship considerably influences the way in which an individual manages and interacts with animals. Considerable research, primarily from the livestock industries, reports that the quality of the human-animal relationship is of significant importance to the welfare of the animal (c.f. Section 2.4). In addition, the equine literature suggests that a horse's welfare is potentially influenced most significantly by the attributes of the horse owner (Leckie, 2001; Pearson, 2004). Thus, the human-horse relationship requires further examination.

3.3.2 The development of the on-site protocol

The on-site protocol was designed to collect data concerning horse owner attributes, horse husbandry and management practices, human-horse interactions, and horse health and welfare outcomes in order to examine the antecedents of horse owner husbandry and management behaviour, and the ensuing relationship with welfare outcomes.

The development of the on-site inspection protocol began by defining the construct to be measured. This entailed an extensive literature review and discussions with the steering committee and industry personnel. A comprehensive review of the literature concerning topics that included human-animal interaction and the human-animal relationship, the assessment of animal welfare on-site and the impact of human attitudes on animal welfare, with a focus on research that involved horses was conducted. Discussions were then held with the steering committee and equine industry personnel that included members of the RSPCA Victorian equine inspectorate, to determine which horse owner, environment, management/husbandry and horse-based variables were to be investigated by the on-site inspection protocol and the manner in which the variables were to be measured. These discussions focused on determining which management and husbandry practices were relevant for recreational horses in Victoria and the health and welfare challenges that these horses may encounter. Once the relevant horse management, health and welfare variables were identified, potential methods for investigating those variables and horse owner attributes were discussed.

It was determined that any investigation needed to include a range of attitudinal, behavioural and demographic variables associated with horse ownership on the assumption that a participant's

acquisition, ownership and ongoing interactions with the horse may all be related to these variables. In order to examine the human-horse relationship, the on-site protocol needed to measure both horse owner- and horse-based variables; including not only the horse owner variables described, but also horse-based variables concerning health, welfare, housing, and husbandry and management practices. Focus groups were conducted with industry personnel, members of the public and the steering committee to assist in the structural development of the data collection methods. The on-site protocol was then developed and piloted with members of the steering committee and the public. The subsequent feedback was utilised when finalising the current on-site protocol.

The on-site protocol involved the researcher conducting on-site inspections with horse owners and their horses, where an inspection of the horses and the horse management practices of the horse owner were performed. In addition, an attitude questionnaire was completed. Consequently, both human (CF07/0303 - 2007000103) and animal (SPPPM/2008/01-S1) ethics approvals were sought and obtained from the Monash University Human Research Ethics Committee (MUHREC) and Monash Animal Research Platform Animal Ethics Committees (MARP AECs). The visit began with an explanation of what the inspection would entail. Once the initial discussion was concluded, the researcher had the participant complete the attitude questionnaire. This was followed by the inspection of the horses and horse management and husbandry practices of the horse owner.

The attitude questionnaire

The attitude questionnaire was intended to investigate the antecedents of recreational horse owner husbandry and management behaviour through the examination of horse owner attitudes towards horses and horse husbandry and management practices. The theoretical framework for the attitude questionnaire was the TPB (Ajzen, 1985) which has been successfully employed to predict human behaviour from attitudes when the behaviour in question is not under complete volitional control (c.f. Section 2.5.1). As discussed in Section 2.5, a sequential relationship has been established between human attitudes and behaviour, and subsequent animal behaviour and welfare. Three forms of beliefs, behavioural beliefs (attitude towards behaviour), normative beliefs (subjective norms) and control beliefs (perceived behavioural control) combine to form an

individual's attitude towards the behaviour in question. According to the TPB, these three types of belief about horse husbandry and management behaviour would determine both a horse owner's behavioural intention and performance of horse husbandry and management behaviours.

Human attitudes are good predictors of behaviour when attitudes towards the behaviour, normative beliefs and perceived behavioural control are measured (c.f. Section 2.5.1). The TPB can be used to predict and understand the performance of specific action tendencies, and identify target strategies to change behaviour. Substantive knowledge regarding the determinants of specific action tendencies may be obtained by examining the informational foundation of attitudes, subjective norms, and perceived behavioural control (Ajzen, 1985). When combined, this information can provide a detailed explanation of an individual's tendency to perform, or not perform a particular behaviour (Ajzen, 1985). In accordance with the extensive human-animal literature, human attitudes towards behaviour rather than intention were investigated as the antecedents of horse owner behaviour. The particular category of attitude object under consideration by the TPB is behaviour, which makes the conceptual link between human attitude and human behaviour both direct and specific. Furthermore, several studies have demonstrated a direct effect of human attitudes on human-behaviour (Christian and Armitage, 2002; Christian, Armitage and Abrams, 2003; Christian and Abrams, 2004).

In Victoria, under the Prevention of Cruelty to Animals Act 1986, the minimum acceptable standards for horse welfare and management are described by the Code of Practice for the Welfare of Recreational Horses. The horse husbandry and management guidelines outlined in the Codes of Practice and the feedback derived from the focus groups were used as the guidelines for the equine husbandry and management practices investigated in the on-site attitude questionnaire. The questionnaire was an extension of that used to examine human-animal interaction in the dairy industry by both Breuer et al. (2000) and Waiblinger et al. (2000), however it also included general statements about horses and horse welfare, questions about equine health, welfare and management, and human-horse interaction.

There were three types of attitude statements, each of which was based on a different salient belief. The questionnaire was divided into three sections according to the type of attitude statement, as described below. A copy of the attitude questionnaire is located in Appendix 2.

1. Attitude towards a behaviour: measuring an individual's behavioural beliefs about performing a particular equine husbandry, health or management practice.
2. Subjective norms: measuring an individual's normative beliefs about the performance of a particular equine husbandry, health or management practice.
3. Perceived behavioural control: measures an individual's control beliefs about performing a certain equine husbandry, health or management practice.

Using a Likert scale, the participants were either asked to indicate their level of agreement or disagreement with the attitude statement, or the level of importance they placed on the attitude statement. Depending on the nature of the statement, participants were given five options for each answer; relating to their level of agreement, degree of importance and frequency of occurrence. The use of a variety of statements concerning a particular topic allows a reliable measurement of beliefs relating to that topic. Beliefs were measured because they are antecedents of attitudes and, as 'subjectively factual' statements, are less confronting for respondents than value statements and therefore may be answered more honestly (Hemsworth and Coleman, 2010).

The attitude questionnaire consisted of 146 questions. The questionnaire data were reduced to a more manageable size by sorting the variables into sections with similar content. The data were reduced into 12 attitude subscales, the items within which were then summed to create single composite attitude variables for each subscale. The calculation of the attitude subscales is described in Section 5.2.3.1.

The horse and horse husbandry and management inspection

The horse and horse management and husbandry inspection collected data on horse health, horse husbandry and management practices and horse welfare outcomes, using a range of horse-based and resource/environment-based parameters (Appendix 3). The Welfare Quality® assessment scheme (c.f. Section 2.2.2), past research concerning on-site animal welfare assessment and the equine welfare assessment methods employed by the Victorian RSPCA inspectorate were used as guidelines to develop the horse and horse management and husbandry inspection parameters and data collection methodology.

The implementation of animal welfare assessment at herd/farm level has become commonplace, particularly within the livestock industries (c.f. Section 2.2). It is widely accepted that an on-site welfare assessment tool needs to measure both resource/environment-based and animal-based parameters. Environmental/resource parameters describe the features of the environment and the husbandry and management practices that can be considered prerequisites for the animal's welfare, while the animal-based parameters record an animal's reaction to its environment and include measures of behaviour, health and physiology. The success of any on-site welfare assessment relies on the validity (meaningful with respect to animal welfare), reliability (reflecting the tendency to give the same results on repeated measures) and feasibility (concerning time and financial restraints) of the measured parameters.

Animal welfare can be a difficult concept to define. There is however general consensus within the scientific community about what represents good animal welfare (c.f. Section 2.2), which is clearly expressed in the Five Freedoms (Farm Animal Welfare Council, 1992), which state that a balanced animal welfare assessment system has to satisfy public, industry, political and scientific concerns before it can be widely accepted. Following extensive research and discussion the animal welfare research project Welfare Quality® defined four animal welfare principles; good housing, good feeding, good health and good behaviour (Table 8). From within these principles came twelve distinct yet complementary animal welfare criteria which underpin the on-farm welfare assessment method and parameters, designed to be employed over a range of animal species (Botreau et al., 2007).

Table 8 The Welfare Quality® four animal welfare principles.

Welfare criteria		Welfare principles	Meaning
Good feeding	1.	Absence of prolonged hunger	Animals should not suffer from prolonged hunger and should have an appropriate diet
	2.	Absence of prolonged thirst	Animals should not suffer from prolonged thirst
Good housing	3.	Comfort around resting	Animals should be comfortable, especially within their lying areas
	4.	Thermal comfort	Animals should be in a good thermal environment
	5.	Ease of movement	Animals should be able to move around freely
Good health	6.	Absence of injuries	Animals should not be physically injured
	7.	Absence of disease	Animals should be free of disease
	8.	Absence of pain induced by inappropriate management procedures	Animals should not suffer from pain induced by inappropriate management
Appropriate behaviour	9.	Expression of social behaviours	Animals should be allowed to express natural, non-harmful, social behaviours
	10.	Expression of other behaviours	Animals should have the possibility of expressing other intuitively desirable natural behaviours, such as exploration and play
	11.	Good human-animal relationship	Good human-animal relationships are beneficial to the welfare of animals
	12.	Absence of general fear	Animals should not experience negative emotions such as fear, distress, frustration or apathy

The welfare of an animal depends on how it experiences the situation in which it lives. The Welfare Quality® assessment scheme emphasizes the animal's point of view by placing increased importance on animal-based measures in its assessment of the degree of fulfilment of the twelve welfare criteria outlined previously. This allows the assessment scheme to be independent of the animals rearing/housing system. The Welfare Quality® assessment scheme also includes resource/environment-based and management-based measures. It was hoped that collectively these measures would help to reliably assess the animal's welfare status, to identify causes of poor welfare and to formulate advice for farmers, owners and animal handlers on possible improvements. The on-farm welfare assessment method and parameters, based on both resource/environment-based and animal-based measures, employed in the Welfare Quality®

project were used as guidelines when developing the on-site inspection of horse and horse location protocol.

A number of animal welfare outcomes, previously employed in livestock welfare assessment, were identified and the method of assessment modified to ensure that the welfare parameters were valid, repeatable and feasible when applied to recreational horses. The resource/environment-based and horse-based parameters that comprise the horse and horse husbandry and management inspection are listed below in Table 9. The horse and horse husbandry and management inspection is found in Appendix 3.

Table 9 The welfare criteria comprising the horse husbandry and management inspection, and a description of the on-site welfare parameters assessed.

Welfare Criteria	Welfare Principle		On-site parameter
Feeding	1	Absence of prolonged hunger	- body condition score, - pasture quality, - feed and feeding routine
	2	Absence of prolonged thirst	- water supply and inspection routine
Housing	3	Comfort around resting	- dry area availability, - stable bedding
	4	Thermal comfort	- shelter availability (rain, wind and sun)
	5	Ease of Movement	- paddock and stable size, - condition and maintenance of housing system
Health	6	Absence of injuries	- lameness score, - hoof condition score, - injury score
	7	Absence of disease	- disease/injury/illness score
Behaviour	8	Expression of social behaviour	- social interactions, - stocking density
	9	Expression of other behaviours	- stereotypies
	10	Good human-animal relationship	- human approach test

Recreational horse owner attribute variables

The horse owner attribute variables, collected during both the random telephone survey (primarily the background factors) and the on-site inspection are grouped according to the type of variable. The attribute variables to be examined with regard to their relationship to recreational horse welfare are horse owner background factors (demographics and knowledge), horse owner

attitudes (behavioural, normative and control beliefs) towards behaviour, and horse owner husbandry and management behaviour. A list of the recreational horse owner attribute variables and their descriptions can be found in Appendix 6.

3.3.3 Participant selection

At the conclusion of the random telephone questionnaire described in Section 3.2, participants were informed of the research that would be conducted during the on-site inspections and invited to participate. Those participants that were interested were re-contacted by the researcher, whereby the research and participation requirements were further explained, and if willing a date and time for the on-site inspection was organized.

3.4 METHODOLOGICAL DEVELOPMENT OF THE QUALITATIVE INTERVIEW

3.4.1 Rationale behind the qualitative interview

Qualitative research is concerned with meaning. It examines how individuals make sense of the world and the events they experience. Qualitative investigation aims to understand what it is like to experience particular conditions and how people manage certain situations. Thus it is concerned with the quality and texture of the experience, rather than the identification of the cause-effect relationships. The interest lies with the meanings attributed to events by the participants. An objective of qualitative research is to describe and possibly explain events and experiences, but never to predict. Qualitative investigation occurs in the participants own environment, within naturally occurring settings (Willig, 2001). In addition to the quantitative investigations conducted in earlier sections of the study, it was deemed appropriate to use qualitative methods to examine recreational horse owner perceptions of recreational horse ownership in Victoria, due to the potential interaction between a recreational horse owner's personal and situational factors (Smith, 1986). Recreational horse ownership is an individual and subjective experience, thus investigating the complex social issues and subjective experiences in a qualitative manner may provide insights that quantitative surveys may not.

3.4.2 The development of the qualitative interview

The qualitative interview was developed to ascertain recreational horse owner's viewpoints regarding the welfare concerns faced by the recreational horse population, why they arise and

potential measures to manage and prevent them. It was also designed to investigate recreational horse owners' views and experiences concerning possible systems of identification and registration in recreational horses in Victoria, as well as the regulatory framework that might be appropriate for recreational horses.

Qualitative analysis is commonly used to examine the life world of the participant, and allow the development of a detailed explanation from an individual's reported experiences (Willig, 2001, Patton, 2002). Qualitative analysis allows the researcher to understand social reality in a subjective yet scientific manner. Generally, qualitative information is collected using one of four methods; interviews and focus groups, questionnaires consisting of open-ended questions, observations, and document analysis. The most regularly employed form of qualitative data collection is in-depth interviewing. These interviews involve open-ended questions, which allow the participant to answer the question on their own terms (Patton, 2002). The interview is generally conducted in a structured, semi-structured or unstructured form depending on the type of information required, and may consist of questions regarding knowledge, experience, practices, opinions, beliefs, and/or feelings. All qualitative research is characterised by a search for meaning and understanding, the researcher as the primary instrument for data collection and analysis, an inductive investigative strategy, and a detailed descriptive end product.

The lack of information pertaining to recreational horse ownership in Victoria includes a limited knowledge concerning recreational horse owners' experiences, viewpoints, ideas and concerns regarding recreational horses and their ownership in Victoria (c.f. Section 1.4). Following interactions with recreational horse owners in earlier parts of the study, a qualitative component of the project was developed to examine participants' viewpoints and experiences concerning recreational horse ownership in Victoria. Discussions with the project steering committee determined the topics to be investigated and the information that was to be sought. A review of the literature involving qualitative analysis and the collection of qualitative information was undertaken. This enabled the development of a semi structured interview guideline to be implemented during the studies qualitative investigation. Ethics approval for the qualitative interviews was sought and obtained (CF07/0303 – 2007000103) from the Monash University Human Research Ethics Committee (MUHREC).

The semi-structured interview guideline

The qualitative interview guide examined four main topic areas concerning recreational horse ownership in Victoria. The topics and a description of the information obtain during the interview is detailed in Table 10. The qualitative interview guide is located in Appendix 4.

Table 10 The topic areas investigated during the qualitative interview, a description of the topic areas, and the type of information sought by the qualitative interview guide

Qualitative interview topic	Description of topic	Information sought during qualitative interviews
Participants' involvement with recreational horses in Victoria	An introduction into a participants involvement with recreational horses in Victoria	- how participant came to be involved - the manner in which their involved - the types of horse owners they encounter - their involvement in the future
Participants' views on the recreational horse industry and ownership today	How participants view the recreational horse industry and recreational horse ownership in Victoria today	- the areas participants' believe are of concern - their thoughts on the availability and value of information and resources - the ways in which they believe horse ownership in Victoria may be improved
Participants' views on welfare issues and concerns in recreational horses	Participants' views regarding the welfare concerns and problems faced by recreational horses in Victoria	- the ways in which these concerns/problems may arise - what may be done to manage and prevent these concerns/problems from occurring
Participants' views on registration and identification of recreational horses	Participants' knowledge on any proposed registration and identification systems	- participants' thoughts and views on the potential proposals, and ideas regarding possible systems that could be applied to recreational horses in Victoria

3.4.3 Participant selection

At the conclusion of the on-site inspections participants were informed of the additional research involving qualitative analysis and offered the opportunity to participate in a qualitative interview. Participants who had indicated an interest in undertaking a qualitative interview were re-contacted by the researcher and a convenient time for the interview was scheduled.

CHAPTER 4
A SURVEY OF RECREATIONAL HORSE OWNERSHIP IN VICTORIA, AUSTRALIA

4.1 INTRODUCTION

With the details concerning the recreational horse population in Victoria largely unknown (cf. Section 1.4), this study aimed to investigate the circumstances surrounding recreational horse ownership in Victoria. From this point forward, the recreational horse will be referred to as simply horse. Thus, any mention of horse will now refer to the recreational, rather than racing form of horse ownership unless otherwise specified. The investigation involved the random sampling of Victorian horse owners using an initial random telephone survey, collecting data pertaining to horse owner demographics and beliefs, horse demographics, horse management and husbandry practices and horse owner-horse interactions. Due to the difficulties associated with recruiting horse owners, past research has generally recruited participants through horse clubs and societies or equine welfare investigations. The type of horse owners recruited via these methods tend to be either well informed and managing their animals in an appropriate manner, or lacking knowledge and clearly failing to provide their animals with the type of management they require (cf. Section 2.3). Consequently, the type of horse owner recruited via non-random sampling methods is unlikely to accurately represent the greater population of horse owners, and as a result bias the sample. It was therefore important for this investigation to ensure that a random sampling method, such as the initial random telephone survey, was employed in order to obtain an accurate representation of the recreational horse population in Victoria. The aims of this component of the study were;

i. To estimate the incidence of recreational horse ownership in Victoria,

ii. To examine the details surrounding recreational horse ownership in Victoria and begin to develop a profile of the recreational horse population in Victoria,

iii. To characterise recreational horse owners in Victoria by comparing demographic differences between recreational horse owners and non-horse owners, and

iv. To recruit participants for further components of the research project.

4.2 METHODS

4.2.1 Study design

Data were collected using the random telephone questionnaire, described in detail in Section 3.2 and located in Appendix 1. The questionnaire was initially implemented by the professional pollster company I-View during the initial random telephone survey, conducted over a four week period between June and July 2007. As anticipated, the incidence of horse ownership made recruiting an adequate sample size via the initial random telephone survey unfeasible, both financially and with respect to time, and as a result alternative methods of recruiting horse owners were sought. The additional survey-based investigation involved the development and implementation of three alternative horse owner recruitment methods, and was conducted between June 2007 and December 2009.

4.2.2 Participant recruitment, classification and the administration of the random telephone questionnaire

Victorian horse owners were recruited for the study using four recruitment processes. The initial random telephone survey determined the incidence of recreational horse ownership in Victoria, and began the recruitment of both horse owners and non-horse owners. Three alternative recruitment methods, the Computer assisted telephone interview (CATI) telephone omnibus, the My-view and Marketview on-line panels, and the random cold-calling into regional Victoria, were developed and implemented in order to complete the recruitment and sampling of horse owners. Data was only collected from non-horse owners during the initial random telephone survey. The criteria for horse owner inclusion and classification are described in Section 3.2.3, and listed in Table 6. The questionnaire was employed during each of the recruitment processes, and administered via telephone to each participant by means of the method described in Section 3.2.4. The four recruitment processes will now be described.

The initial random telephone survey

An initial random telephone survey of Victorian households was conducted by I-View, over a 4-week period in June and July of 2007. Victorian households were randomly contacted via

telephone using a public domain source (the telephone book) and sampled with the questionnaire described in Section 3.2. The survey was the only recruitment process to sample both horse owners and non-horse owners, and 27 horse owners and 755 non-horse owners were recruited.

CATI telephone omnibus

The first alternative recruitment method involved the inclusion of a question concerning horse ownership and a willingness to participate in future research, in a monthly CATI telephone omnibus that was routinely conducted by I-View. An omnibus survey is a method of quantitative research where data on a wide variety of subjects is collected on a regular basis during a single interview. Participants recruited via the omnibus survey were randomly selected from the telephone book, and contacted via telephone by I-View during the routine monthly omnibus survey of 259 Victorian households in the fourth week of every month. The question 'Do you or anyone in your household own or provide the primary care for a horse(s)?' and if yes, 'would you be willing to participate in a future study?' was included in the omnibus survey. Those horse owners that were willing to participate were re-contacted at a later date by I-View and the random telephone questionnaire was administered using the method described in the Section 3.2.4. The horse ownership question was included in the monthly CATI telephone omnibus survey from September 2007 until October 2008, and 73 participants were recruited.

My-View and Marketview on-line panels

The second alternative recruitment method involved contacting horse owners on-line via two pre-existing I-View panels, My-view and Marketview. The on-line panels comprised people who had agreed to complete on-line questionnaires. Panel members who had indicated that they were horse owners were contacted by I-View on-line and notified of the current study. Those willing to participate were then re-contacted by I-View via telephone and the method described in Section 3.2.4 was used to administer the random telephone questionnaire. The sampling of participants using I-Views on-line panels occurred in April 2009, and 28 horse owners were recruited.

Random cold calling into regional Victoria

The final alternative recruitment method involved random cold calling into areas of regional Victoria. The data collected during the initial random telephone survey, detailed in Section 4.2, suggested that approximately 70% of horse owners lived in regional areas of Victoria, and as a result random cold calling to regional Victoria rather than all areas of Victoria was considered a more effective participant recruitment option. Regional participants were randomly selected from a public domain source (the telephone book) and contacted via telephone by I-View. Participants were then sampled using the random telephone questionnaire in the method described previously in Section 3.2.4. Participants were recruited in this manner during April 2009, and 64 horse owners were recruited. A further eight horse owners completed the questionnaire after being recruited via referral. Potential participants referred to I-View by current participants were contacted and notified of both the current study and the manner in which their contact details were obtained. Those willing to participate then completed the questionnaire as described in Section 3.2.4. A total of 72 participants were recruited via random cold calling into areas of regional Victoria.

4.2.3 Statistical analysis

All analyses were conducted using the statistical program SPSS, version 16.0. Data were entered into the statistical program by the I-View employee once the telephone survey had been completed. Data screening was performed on the complete data file using SPSS 16.0 DESCRIPTIVES and SPSS 16.0 FREQUENCIES to ensure the integrity and accuracy of the data prior to analysis. All variables were checked for normality and transformation was not required. Descriptive statistics were generated from the survey data using SPSS 16.0 FREQUENCIES, for both the initial random telephone survey sample (Table 11) and the total sample of horse owners. There were four types of descriptive data collected from horse owners; horse owner demographics, horse demographics, horse husbandry and management, and human-horse interactions. These descriptive statistics will begin to build a profile of the horse population and horse ownership in Victoria. The descriptive statistics for all variables are presented in Appendix 11. Paired t-tests and chi-squared analysis were employed to examine differences in demographics, horse husbandry and management practices employed by the horse owner, and human-horse interactions between H1 and H2. Participant demographic data were analysed using chi-squared analysis to compare horse owners and non-owners on demographic factors.

4.3 RESULTS

The results reported in this section are based on pooled data collected during the initial random telephone survey and those collected during the subsequent investigation into horse ownership in Victoria. A brief summary of the sample demographics will be presented first, both the initial random telephone survey sample and the complete horse owner sample. This will be followed by the horse owner descriptive statistics, reported as horse owner demographics, horse demographics, horse management and husbandry, and human-horse interactions. The final results reported will be the characterisation of horse owners, the comparison of horse owners and non-horse owners according to basic demographic factors, and the investigation of differences between horse owners with respect to a number of key independent variables.

4.3.1 Initial random telephone survey sample demographics

The initial random telephone survey sampled 782 Victorian households, and the sample comprised 755 non-horse owners and 27 horse owners. The participant demographics are reported in Table 11.

Table 11 Participant demographics, n = 782 (Horse owners, n = 27; Non-horse owners, n = 755).

Demographic Variable	Sample %	Horse owner %	Non-horse owner %
% of sample	100	3.5	96.5
Participant location			
City/Urban	68.2	25.0	69.8
Regional	31.8	75.0	30.2
Region of primary residence			
City	24.9	10.7	25.4
Urban	40.4	14.3	41.3
Peri-urban	5.9	3.6	6.1
Semi-rural	13.2	28.6	12.6
Rural	15.6	42.9	14.6
Gender			
Female	64.3	78.6	63.8
Male	35.7	21.4	36.2
Age (years)			
< 18	2.9	3.6	2.9
18-25	8.4	14.3	8.3
26-35	14.0	17.9	13.8
36-45	23.7	7.1	24.4
46-55	20.6	35.7	20.0
56-65	14.6	17.9	14.5
65 +	15.7	3.6	16.1
Level of education			
Did not complete high school	24.7	32.1	24.4
Secondary education	28.1	32.1	27.9
Tertiary education	32.5	25.0	32.8
Post-tertiary education	8.7	7.1	8.7
TAFE course	5.6	0	5.8
Other (undefined)	0.4	3.6	0.3
Field of occupation			
Professional	31.7	10.7	32.5
Non-professional	14.2	21.4	13.9
Trades and services	9.6	28.6	8.9
Student	6.3	10.7	6.2
Retired	13.3	3.6	13.6
Unemployed	10.6	10.7	10.6
Domestic	3.7	0	3.8
Other (undefined)	10.6	14.3	10.5
Household annual income (before tax)			
< $20 000	21.2	13.0	21.5
$20 000 – 35 000	14.3	13.0	14.5
$36 000 – 50 000	16.6	30.4	16.0
$51 000 – 70 000	18.8	21.7	18.7
$71 000 – 1000 000	13.5	13.0	13.5
> $100 000	15.5	8.7	15.8
Residence type			
Apartment/townhouse	17.0	10.7	17.3
Small land block	48.8	14.3	50.0
Large land block	26.5	17.9	26.8
Acreage	7.7	57.1	5.9

The incidence of recreational horse ownership in Victoria

The participant response rate for horse owners was 100%. The incidence of horse ownership was found to be 3.5%, several times higher than the estimate that had been made prior to the survey. The incidence rate of horse ownership in regional Victoria was 8%, while the incidence rate of horse ownership in urban Victoria was 1.5%. Despite the incidence of horse ownership being greater than the previously suggested estimate, there were insufficient numbers of horse owners to allow any comprehensive data analysis to be performed on this sample.

4.3.2 Sample demographics

The total sample (including horse owners recruited as part of the second part of the research; c.f. Chapter 5) consisted of 755 non-horse owners and 205 horse owners. Of the 205 horse owners, 194 were horse owners who provided their horses with their daily primary care, 10 were horse owners who did not provide daily primary care to their horses, and one was a non-horse owner who provided the daily primary care to a recreational horse. The demographic characteristics of the sample are reported in Appendix 9. The descriptive statistics for all variables are located in Appendix 10. The data collected from the 194 Victorian recreational horse owners who provided their horses with their daily primary care will be reported in the forthcoming sections of the chapter.

Recreational horse owner demographics

The demographic data and responses to attitude statements regarding horses and their management, of the samples 194 horse owners/primary carers and one non-horse owner who provided the daily primary care to a recreational horse, are reported below. The 195 participants who provided their horses with their daily primary care owned 714 horses, thus on average, Victorian horse owner/primary carers owned 3.6 horses.

Eighty-six percent of horse owners resided in regional Victoria, and 52% of horse owners described their region of primary residence as rural. The distribution of horse owners according to region type is depicted in Figure 3. Figure 4 shows the percentage distribution of horse owners' type of primary residence. Horse owners were most commonly aged between 35-55 years of age.

The distribution of horse owners' age is given in Figure 5. Eighty-five percent of Victorian horse owners were female. Figures 6 and 7 portray the distribution of horse owners' level of education and field of occupation, respectively. Horse owners most commonly reported an annual household income of $51,000-70,000. The distribution of annual household income for Victorian horse owners is shown in Figure 8.

Fifty six percent of horse-owning participants were members of some form of equine club, society or organization. Approximately 75% of participants who owned horses had done so for over 10 years. Figure 9 depicts the distribution regarding the number of years horse owners have owned horses. Almost 75% of participants owned more than one horse (see Figure 10). Of those participants who owned horses, only 4.5% became involved with horses for reasons other than personal interest (46%) or through family involvement (42%). Approximately 38% of horse owners who participated in the study had registered their details as a horse owner with their local council. Over 40% of horse owners were actively competing in some form of horse competitions. Eighty seven percent of horse owners strongly agreed with the statement 'I am responsible for my horses' welfare'.

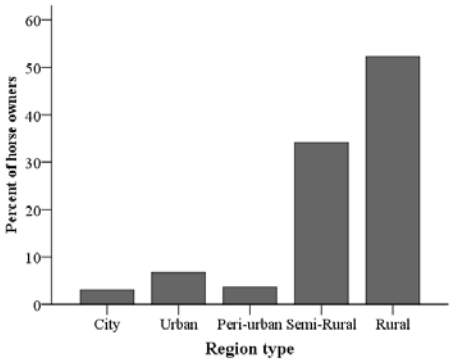


Figure 3 Horse owners' region of primary residence

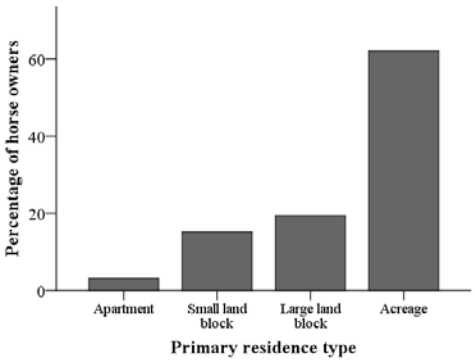


Figure 4 Horse owners' primary residence type

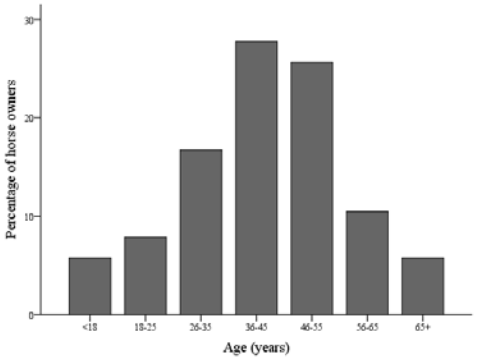


Figure 5 Horse owners' age

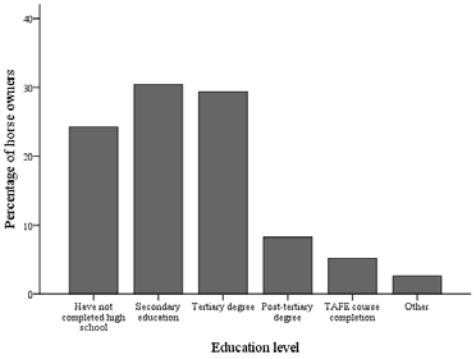


Figure 6 Horse owners' level of education

Figure 7 Horse owners' occupation field

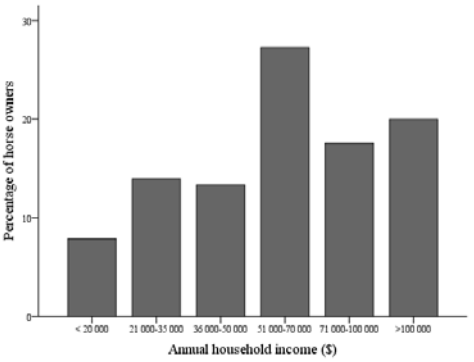


Figure 8 Horse owners' annual household income

Figure 9 Horse owners' years of ownership

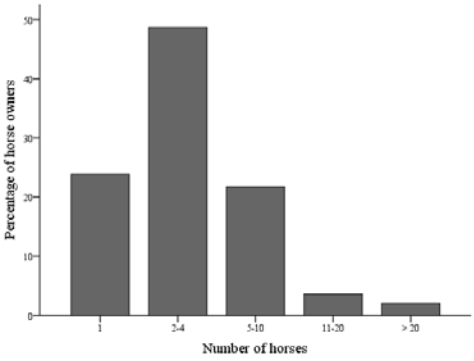
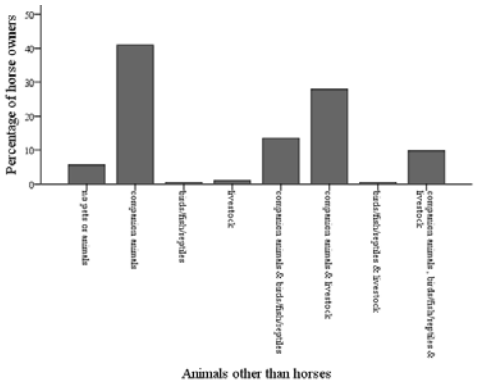


Figure 10 Horse owners' number of horses owned

Seventy percent of horse-owning participants were parents. Approximately 80% of parents had dependent children who were of an age capable of riding horses. Of those participants who owned horses, only 7% did not own any other companion animal or livestock. The distribution of animals other than horses owned by the recreational horse owner is shown in Figure 11. Approximately 75% of horse-owning participants claimed to actively try to improve their knowledge of horses, while over 25% did not read any form of information regarding horses. Figure 12 portrays the distribution of the literature read by horse owners. Over 50% of horse owners were not aware of the Codes of Practice pertaining to the welfare of recreational horses. Approximately 80% of participants claimed the cost of owning horses was what they expected, while 50% strongly agreed that owning horses was expensive. Approximately 80% of Victorian horse owners would recommend owning horses to others.



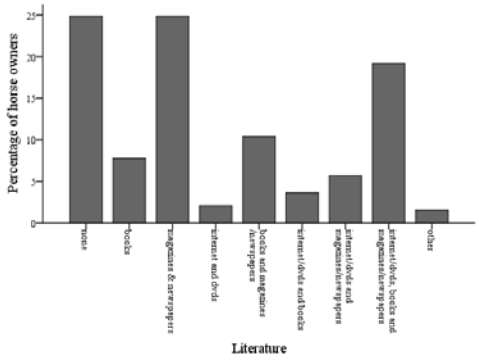


Figure 11 Horse owners' animals other than horses Figure 12 Literature read by horse owners

In response to the statement 'It is not my responsibility to provide a safe and comfortable environment for my horse' 98% of participants either disagreed or strongly disagreed. 'It is important to be aware of the possible risks to horses' welfare' was agreed or strongly agreed with by 98% of participants. The statement 'My horse provides me with companionship' resulted in 92% of participants nominating either agree or strongly agree. In response to the statement 'There is always something new to learn about horses' 63% of participants strongly agreed and 33.5% agreed with the statement. Approximately 70% of participants strongly agreed with the statement 'It is important to treat horses regularly for worms'. The statement 'It is important to me that I see my horse regularly' resulted in 97% of participants either agreeing or strongly agreeing. When participants were given the statement 'It is important to have my horses feet attended to regularly' 95% either agreed or strongly agreed. The statement 'It is important to regularly check a horses

condition' resulted in 97% of participants selecting either agree or strongly agree. Horse owners' responses to further attitude statements regarding horses and their management are reported in Table 12.

Table 12 Participant responses to attitude statements about recreational horses and horse management (n=195)

Attitude statement	Strongly agree %	Agree %	Neither agree nor disagree %	Disagree %	Strongly disagree %
It is important to ensure that owners know how to look after a horse	93	5	1	1	0
It is important to have my horse checked by a vet annually	26	15	37	16	6
Horses are expensive to keep	50	28	14	5	2
Horses make great pets	79	16	3	0	2
I am not responsible for my horses welfare	0	1	1	11	87
Horses are intelligent animals	69	24	6	1	0
It is not necessary to provide my horse with a constant supply of water	3	0	1	4	92
Horses take up a lot of your time	39	34	18	7	2
Industry personnel can provide information and assistance that can improve the way we handle and care for horses	43	45	10	1	1
Horses require a great deal of care	56	27	10	6	1
During times of difficulty my horse provides me with comfort	38	41	15	3	3
It is annoying that I sometimes have to change my plans because of my horse	4	18	21	33	24
Losing my horse would be a traumatic experience	69	23	4	2	2

Recreational horse demographics

Horse demographics were only collected from horse owners who provided their horses with their daily primary care. If the participant owned more than one horse, demographic data were collected from the horse they had most contact with (H1) and the horse they had the least contact with (H2). From the 194 horse owner/primary carers and one non-horse owner/primary carer, the

demographic statistics for 338 horses are reported below. Of the 338 horses, 195 were classified as H1 (58%) and 143 were classified as H2 (42%).

With regard to the age of the horse, the highest percentage of H1 were found in the age brackets 5-10 years (30%) and 11-15 years (27%), and similarly for H2 in the age brackets 5-10 years (23%) and 11-15 years (26%). Geldings were the most highly represented equine gender for both H1(55%) and H2(50%). When participants were given a list of 17 equine breeds, the most commonly selected horse breed was Thoroughbred (22%), for both H1(24%) and H2(19%). The breed classification Thoroughbred was further categorised according to their horse racing experience, from which approximately two thirds of the sampled Thoroughbreds had some form of experience within the horse racing industry. Approximately 88% of horses were located in rural or regional areas of Victoria, H1 (86%) and H2 (89%). Forty-four percent of horses were registered (49% of H1 and 40% of H2). Of those horses that were registered, 41% were registered with a breed organisation (43% of H1 and 44% of H2), followed by 32% with equestrian organisations (37% of H1 and 30% of H2).

There was no significant difference between H1 and H2 in terms of age ($t=-0.64$, $p>0.05$), sex ($\chi^2(1) =2.83$, $p>0.01$) and breed ($\chi^2(10) =13.4$, $p>0.01$).

Recreational horse management and husbandry

The horse management and husbandry of H1 and H2 are detailed below. Figures 13a and 13b show that the most common housing location for horses was the participant's primary residence, for both H1 (70%) and H2 (71%). Ninety percent of participants resided within 20 kilometres of the location where their horses were housed. Approximately 50% of horses were kept on properties that were less than seven hectares in size. The most common form of housing employed by horse owners was full time paddock (75%), for both H1 (73%) and H2 (82%) as shown in Figures 14a and 14b. Over 70% of both H1 and H2 were housed in paddocks less than four hectares in size. Pasture condition was most commonly described by the horse owner as good (36%), for both H1 (39%) and H2 (37%). The most common form of fencing for both H1 (35%) and H2 (35%) was plain wire fencing, followed by wire and electric fencing (H1 (23%) and H2 (23%)). The most common water source provided to both types of horse were automatic

troughs (39%), H1 (38%) and H2 (42%), followed by hand filled troughs (32%), H1 (34%) and H2 (32%). Only 7% of horses (8% of H1 and 6% of H2) were housed with no form of social contact from other horses or livestock. Figures 15a and 15b provide the reasons given for recreational horse housing methods. The most common reason given for the horses method of housing was owner preference (30%), for both H1 (32%) and H2(31%), followed by owner convenience (17%). The frequency of inspection of horses' condition is given in Figure 16a and 16b. Approximately 80% of participants check their horse's condition on a daily basis. The degree of general supervision at the horse's location was most commonly reported as the 'at all times' option for both H1 (43%) and H2 (41%).

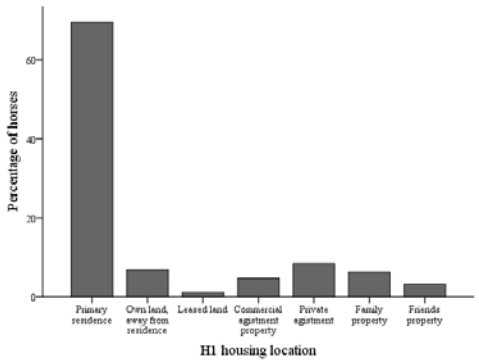


Figure 13a The housing location of H1

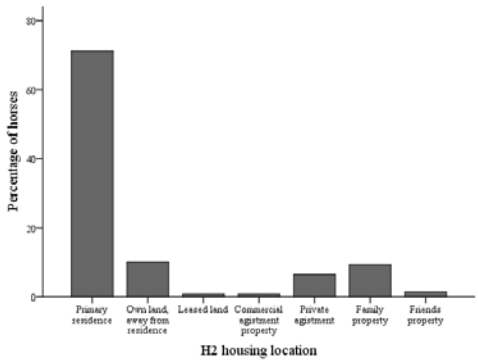


Figure 13b The housing location of H2

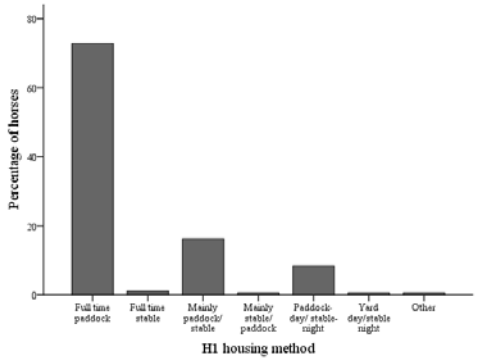


Figure 14a The housing method of H1

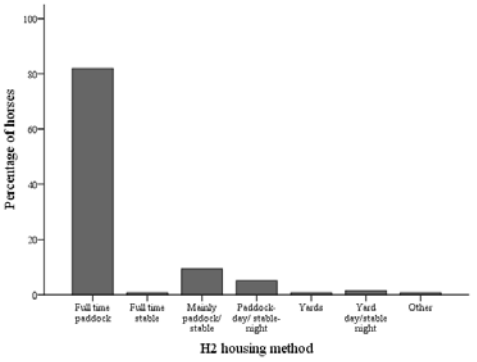


Figure 14b The housing method of H2

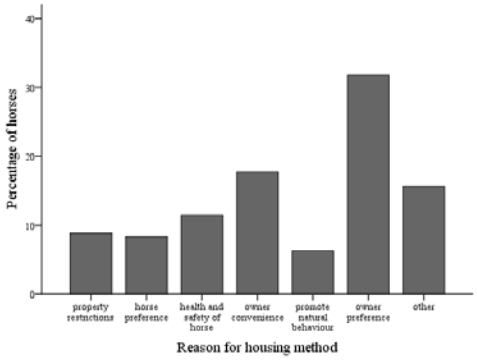


Figure 15a Reason for H1 housing method

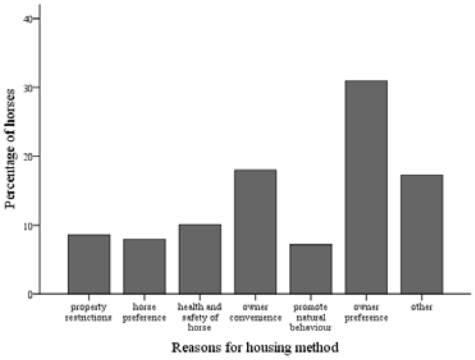


Figure 15b Reason for H2 housing method

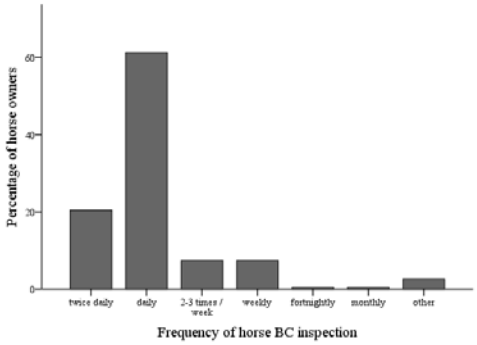


Figure 16a Frequency of H1 BC inspection

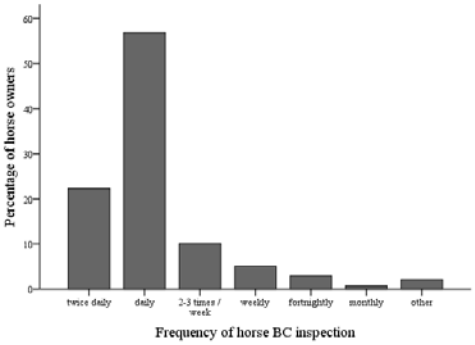


Figure 16b Frequency of H2 BC inspection

Figures 17a and 17b depict participant ratings for their horse's body condition score (BCS). The most commonly rated BCS was correct condition (61%), in the case of both H1 (68%) and H2 (57%). The most common reason reported for a horse's BCS was correct care (57%) in both H1 (62%) and H2 (54%). The methods used to determine the diet of horses are reported in Figures 18a and 18b. A change in BCS was the most regular response when participants were asked how they determined their horse's diet (47%), for both H1 (47%) and H2 (49%). Approximately 89% of H1 are fed supplementary feed in addition to pasture in summer, in comparison to 83% of H2. The most common diet fed to horses in summer was pasture, hay and hard feed, in both H1 (31%) and H2 (25%). In winter approximately 89% of H1 received supplementary feeding, compared to 85% of H2. The most common diet fed to horses in winter was pasture, hay and hard feed, in both H1 (36%) and H2 (27%).

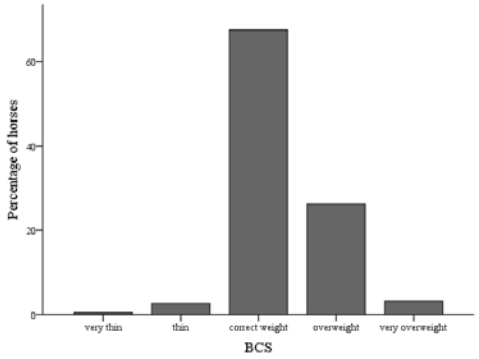


Figure 17a Horse owners' rating of H1 BCS

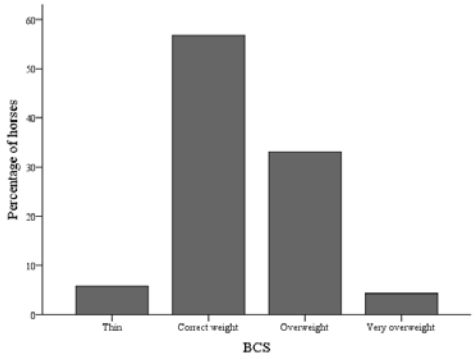


Figure 17b Horse owners' rating of H2 BCS

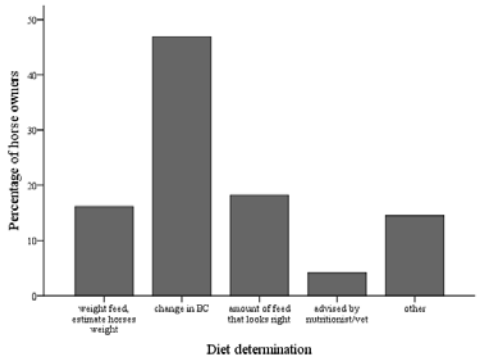


Figure 18a Horse owners' H1 diet determination

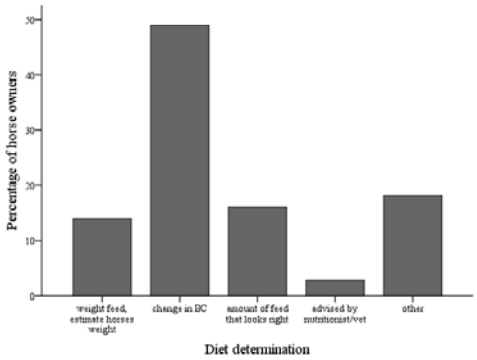


Figure 18b Horse owners' H2 diet determination

The distribution of parasite control treatment is reported in Figure 19a and 19b. The most common application of parasite control treatment for H1 (36%) and H2 (34%) was every 12 weeks. Figures 20a and 20b depict the distribution of hoof care. Both H1 (59%) and H2 (54%) most commonly received hoof care every 6-8 weeks. The frequency of dental care is shown in Figure 21a and 21b. With regard to health problems, approximately 76% of horses had not experienced any health concerns in the last 12 months (73% of H1 and 83% of H2). The most commonly reported health concern for horses was lameness followed by laminitis and founder. Lameness was the most highly represented health concern in H1, while for H2 it was colic. Approximately 55% of H1 compared with 37% of H2 had been treated by a veterinarian at some point in time. Figures 22a and 22b report the incidence of veterinary consultation in the preceding 12 month period.

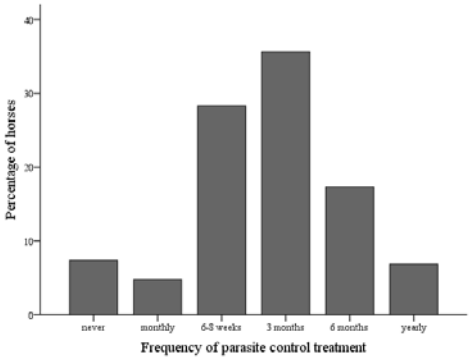


Figure 19a Frequency of H1 parasite control

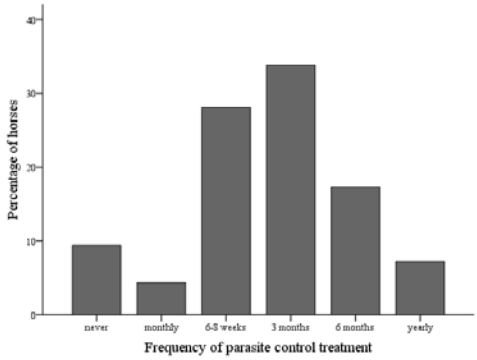


Figure 19b Frequency of H2 parasite control

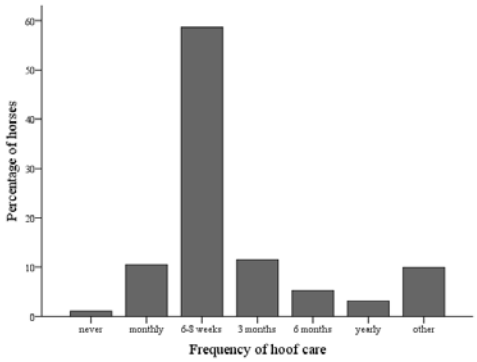


Figure 20a Frequency of H1 hoof care

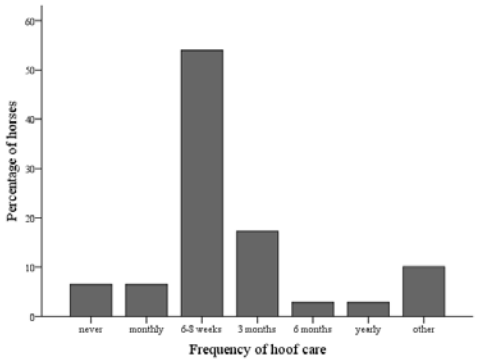


Figure 20b Frequency of H2 hoof care

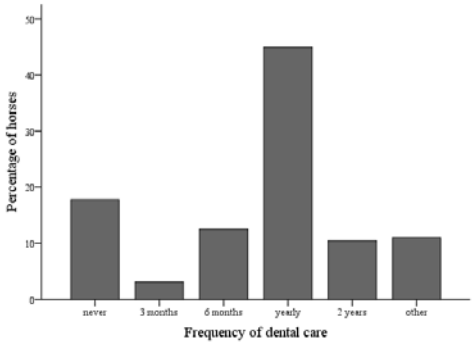


Figure 21a Frequency of H1 dental care

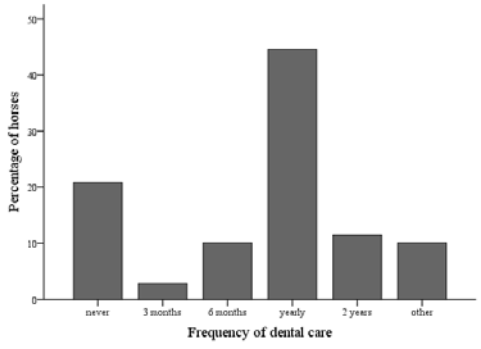
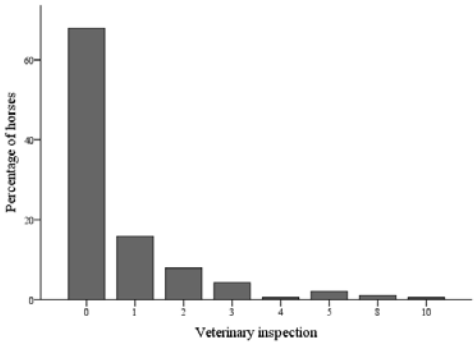


Figure 21b Frequency of H2 dental care



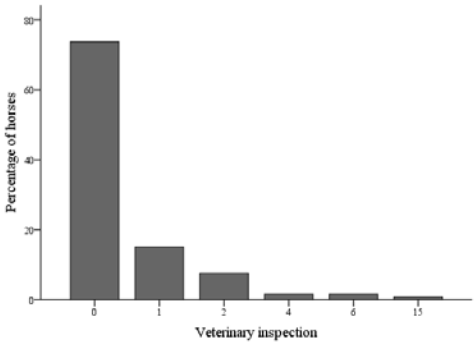
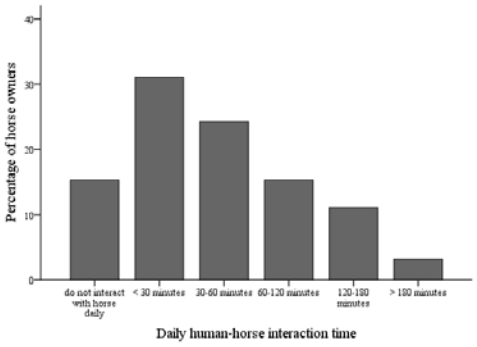


Figure 22a H1 veterinary inspections in past 12 mths Figure 22b H2 veterinary inspections in past 12 mths

With regard to the husbandry and management of Victorian horses, there were limited differences between the two groups of horses (H1 and H2). Significant differences were found between H1 and H2 with regard to whether the horse receives hoof care from a farrier ($\chi^2(1) = 4.4$, $p<0.05$), whether the horse is housed permanently in a paddock ($\chi^2(1) = 3.8$, $p<0.05$), veterinary inspection ($\chi^2(1) = 9.8$, $p<0.01$), and recent health concerns ($\chi^2(1) = 4.5$, $p<0.05$). These findings indicate that when compared with H2, H1 is more likely to have received hoof care from a farrier, be housed in both a paddock and stable, undergone veterinary inspection, and experienced recent health concerns. There were no significant differences between H1 and H2 with regard to the region where the horse was housed ($\chi^2(1) = 0.40$, $p>0.05$), the size of the property on which the horse is housed ($t = 0.21$, $p>0.05$), the size of the paddock in which the horse is housed ($t = -1.7$, $p>0.05$), whether the horse was housed at the primary residence of the horse owner ($\chi^2(1) = 0.10$, $p>0.05$), the distance between the primary residence of the horse owner and the location where the horse is housed ($t = -1.7$, $p>0.05$), and the degree of social contact ($\chi^2(3) = 7.0$, $p>0.05$). Although not significant, the negative t-values imply that H2 tends to be both housed in a larger paddock, and at a greater distance from the horse owner's primary residence than H1. No significant differences were found between H1 and H2 in terms of the treatment of hoof care ($\chi^2(6) = 11.9$, $p>0.05$), parasite control ($\chi^2(5) = 0.88$, $p>0.05$), and dental care ($\chi^2(5) = 1$, $p>0.05$). Furthermore, there was no significant difference between H1 and H2 with regard to the frequency of veterinary consultation ($t=0.75$, $p>0.05$), however the positive t-value implies that H1 may have received more veterinary treatment in the proceeding twelve months than H2. In addition, there were no significant differences between H1 and H2 with regard to BCS ($\chi^2(4) = 6$, $p>0.05$), BC inspection ($\chi^2(6) = 4.8$, $p>0.05$), and the provision of a supplementary diet in both summer ($\chi^2(1) = 0.87$,

p>0.05), and winter ($\chi^2(1) = 0.46$, p>0.05). There was no significant difference in H1 and H2 in terms of horse registration ($\chi^2(1) = 2.80$, p>0.05).

The most common reason for owning horses was recreation (55%), followed by companion animal (20%). For both H1 (28%) and H2 (31%), the most common method of acquiring the horse was via friends and acquaintances. The length of time the participant had owned the horse was most commonly represented in the 4-7 year bracket (27%), for both H1 (28%) and H2 (26%). The average time horse owners spent interacting with their horses is reported in Figures 23a and 23b. Horse owners most commonly spent less than 30 minutes per day interacting with their horse (33%), for both H1 (31%) and H2 (38%). Approximately 19% of horse owners who provide their horse with its primary care did not interact with it on a daily basis (15% for H1 and 27% for H2). Approximately 80% of horses interact with people other than their owner, for both H1 (82%) and H2 (79%). Approximately 21% of horses were reported to have behavioural problems when handled (19% of H1 and 25% of H2). Approximately 50% of horses are not ridden, with 38% of H1 and 67% of H2 not being ridden, while approximately 30% of horses are ridden by people other than their owner (30% of H1 and 31% of H2). Of those horses that are ridden, 24% reportedly display behavioural problems when being ridden. Over 70% of horse owners had riding lessons at some point in time. Approximately 44% of horse owners actively competed in equestrian competitions with their horses.



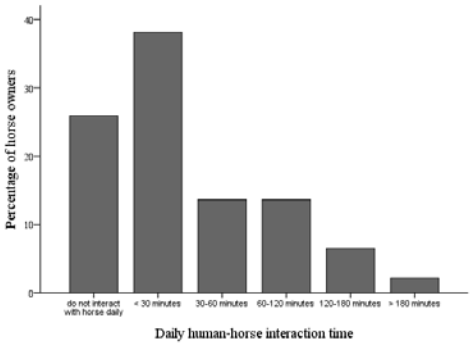


Figure 23a H1 daily human-horse interaction time Figure 23b H2 daily human-horse interaction time

The two groups of horses (H1 and H2) were found to be significantly different in terms of human-horse interaction. There was no significant difference between H1 and H2 with regard to daily

human-horse interaction ($\chi^2(1) = 2.9$, $p > 0.05$), however a significant difference was found in terms of the amount of time the horse owner spent interacting with the horse on a daily basis ($\chi^2(5) = 12.5$, $p < 0.05$). This finding implies that horse owners spent a greater amount of daily time interacting with H1 than H2. Furthermore, a significant difference was found between H1 and H2 with regard to the horse being ridden ($\chi^2(1) = 23.4$, $p < 0.01$), indicating that horse owners were more likely to ride H1 than H2.

4.3.3 Relationships between key independent variables and demographic variables

Comparisons between horse owners and non-horse owners with respect to demographic factors are reported first, followed by comparisons between horse owners with regard to a number of demographic variables.

4.4.1.1 Differentiating recreational horse owners from non-horse owner

To distinguish horse owners from non-horse owners according to demographic factors, comparisons were made using chi-square analysis. The relationships between horse ownership and a number of participant demographic variables are described below.

Independent variable: Recreational horse ownership

With regard to the type of region (urban or regional) where a participant resides, horse owners predominantly resided in regional Victoria (85%), while non-horse owners (75%) were found to reside largely in urban areas of Victoria ($\chi^2(1) = 2.02$, $p < 0.01$). The prime region for horse owners to be located was in rural areas of Victoria (53%). Non-horse owners were primarily located in urban regions of Victoria (41%) ($\chi^2(4) = 2.41$, $p < 0.01$). The primary residence of horse owners was for the most part located on acreage (61%), while non-horse owners were largely residing on small land blocks (50%) ($\chi^2(1) = 3.45$, $p < 0.01$).

There were no gender differences between horse owners and non-horse owners, with both types of participant predominantly female. Approximately 84% of horse owners were female and 16% were male, while 63% of non-horse owners were female and 37% were male ($\chi^2(1) = 31.41$, $p < 0.01$). Horse owners were primarily aged between 36-55 years (27% of horse owners were aged between 36-45 years and 28% were 46-55 years of age). Non-horse owners were most

commonly aged between 36-45 years (24%) ($\chi^2(6) = 23.58$, $p<0.01$). The main field of occupation listed by horse owners was 'other' (35%), and for non-horse owners it was 'professional' (33%) ($\chi^2(6) = 84.56$, $p<0.01$). Horse owners were found to occupy the higher brackets of annual household income. Approximately 63% of horse owners reported an annual household income of greater than $51 000. For non-horse owners, participants are evenly represented in all income brackets, with the highest percentage of non-horse owners having an annual household income of below $20 000 (21.5%) ($\chi^2(5) = 19.89$, $p<0.01$).

4.4.1.2 Characterising recreational horse owners

In order to investigate whether different types of horse owners exist, according to demographic and behavioural factors, comparisons were made using chi-square analysis. Describing different types of horse owners adds to the developing profile of horse ownership in Victoria.

Independent variable: Gender

Female horse owners were more likely to be members of horse clubs and societies than male horse owners. Approximately 60% of female horse owners were members of a horse club or society, while 40% of male horse owners held a membership to a horse club or society ($\chi^2(1)=4.41$, $p=0.04$). A substantial proportion of female horse owners actively improved their knowledge of horses and horse management. Approximately 80% of female horse owners reported attempts to improve their knowledge, compared with 60% of male horse owners who sought to improve their knowledge ($\chi^2(1) = 7.148$, $p<0.01$).

Female horse owners were also more likely to seek veterinary consultation for H1 than not. A greater percentage of female (58%) than male (37%) horse owners had a veterinarian treat H1 in the preceding twelve months ($\chi^2(1) = 3.98$, $p<0.05$). Both male and female horse owners tended not to seek veterinary consultation for H2 however, female horse owners appeared more likely than their male counterparts to have H2 treated by a veterinarian. That is, 40% of female horse owners sought veterinary treatment for H2 in the past twelve months, compared with 17% of male horse owners ($\chi^2(5)=4.35$, $p<0.04$).

Independent variable: Recreational horse club and society membership

Research suggests that horse club and society membership has the potential to reduce the risk of welfare concerns in horses (c.f. Section 3.2). The reasoning for this may be the regular access to information and advice relating to horse husbandry and management that is granted to horse owners who are affiliated with a horse club or society. Consequently, discernable differences may exist between horse owners that are members of a horse club or society and those who are not.

Both horse club and society members and non-members were predominantly female. Approximately 90% of horse club and society members were female, while 80% of non-members were female ($\chi^2(1) = 4.41$, $p=0.04$). Both horse club and society members and non-members were largely located in regional Victoria. A greater percentage of horse club and society members than non-members were primarily residing in urban areas of Victoria. Approximately 80% of horse club and society members were located in regional Victoria, compared with 93% of non-members ($\chi^2(1) =6.75$, $p<0.01$). Both horse club and society members and non-members primarily housed H1 and H2 in rural areas of Victoria. Approximately 80% of horse club and society members kept H1 in rural Victoria, in comparison to 94% of non-club members. In comparison to non-members, a greater percentage of horse club and society members housed H1 in urban areas of Victoria ($\chi^2(1) =6.15$, $p<0.01$). As with H1, H2 were predominantly housed in rural areas of Victoria by both horse club and society members (84%) and non-members (96%). A greater percentage of horse club and society members than non-members had H2 located in urban areas of Victoria ($\chi^2(1) = 4.04$, $p=0.04$).

Horse club and society members were more likely to have H1 identifiable than not. Approximately 77% of horse club and society members reported H1 was identifiable, in comparison to 53% of non-members ($\chi^2(1) =11.67$, $p<0.01$). Horse club and society members tended to register H1, while non-members appeared to largely keep H1 unregistered. Roughly 70% of horse club and society members registered H1, while 30% of non-members had H1 registered ($\chi^2(1) =34.08$, $p<0.01$). Approximately 50% of horse club and society members registered H2, in comparison to 20% of non-members who had registered H2 ($\chi^2(1) = 11.47$, $p<0.01$). Horse club and society members were also inclined to register their horse ownership

details (60%). Non-members were largely unregistered (15% registered horse owners) ($\chi^2(1)= 38.01$, $p<0.01$). A high proportion of horse club and society members competed in horse competitions. Approximately 70% of horse club and society members actively competed, compared with 4% of non-members were competing in horse competitions ($\chi^2(1)= 91.30$, $p<0.01$).

A substantial proportion of horse club and society members attempted to improve their knowledge on horses and horse husbandry and management. Approximately 90% of horse club and society members actively improve their knowledge on horses and horse husbandry and management, compared with 60% of non-members ($\chi^2(1)=29.86$, $p<0.01$). Horse club and society members reported a greater awareness of the Codes of Practice regarding the welfare of horses. Approximately fifty percent of members (57%) when compared with one third of non-members (37%)($\chi^2(1)=7.63$, $p<0.01$).

Independent variable: Region of primary residence

The region in which a horse owner resides is likely to influence the way in which they manage their horses and therefore may have the potential to impact on horse welfare. As a result, relationships between the region where the horse owner resides and demographic and behavioural variables were examined. The results for which are reported below.

Horse owners predominantly resided in regional Victoria. Approximately 85% of horse owners resided in regional Victoria, compared with 15% located in urban areas of Victoria. Horse owners who reside in regional areas of Victoria were more likely to house H1 at their primary residence (76%) than horse owners residing in urban Victoria (27%) ($\chi^2(1)= 25.47$, $p<0.01$). Regional horse owners were more inclined to interact with H1 on a daily basis, than urban horse owners. Roughly 85% of regional horse owners have daily interaction with H1, in comparison to 50% of urban horse owners ($\chi^2(1)= 19.09$, $p<0.01$). Urban horse owners (65%) were more likely to be registered as horse owners than regional horse owners (36%) ($\chi^2(1)= 8.00$, $p<0.01$). Although not significant ($\chi^2(1)= 3.14$, $p<0.10$), urban horse owners were more likely to register H1 than regional horse owners. When compared to regional horse owners, urban horse owners were more inclined to be members of horse clubs or societies. Approximately 80% of horse owners who

were located in urban areas of Victoria were members of a horse club or society, compared with 50% of regional Victorian horse owners ($\chi^2(1)=6.76$, $p<0.01$).

4.5 DISCUSSION

As far as is known, this is the first survey-based investigation into recreational horse ownership in Victoria, Australia. The results presented in this chapter provide an estimate of the incidence of horse ownership in Victoria, and begin to build a profile of the Victorian horse population and the ownership associated with it. They detail the demographic differences detected during comparison analysis between horse owners and non-horse owners, and between distinct types of horse owners. These results are discussed in the following sections.

4.5.1 The representativeness of the sample

The study's random recruitment processes aimed to obtain a sample that contained both horse owners and non-horse owners, and provide an accurate representation of horse ownership in the Victorian population (c.f. Sections 3.2 and 4.1). According to Anastasi and Urbina (1997), a sample size should ideally be five times larger than the number of items in the questionnaire. The random telephone questionnaire contained 121 items, thus a sample size of 600 or above would be ideal. The sample size obtained during this study was approximately 8 times greater than the number of questionnaire items. The distribution of demographic data collected from the sample appears to be similar to available population estimate and census data (Australian Bureau of Statistics, 2006; Victorian Population Bulletin 2010, Department of Planning and Community Development, Victorian Government).

As of June 2010, Victoria's population was estimated at approximately 5.5 million people, with 4.1 million people in urban areas (73%) and 1.4 million in regional Victoria (27%). The most recent estimates of age distribution in Victoria suggest that the median age of Victorians is approximately 37 years of age and while there is a reasonably even representation across all age groups, the highest percentage is in the < 18 years of age bracket. With regard to gender estimates in Victoria, the statistics suggest that approximately 50.5% of the population are female (Victorian Population Bulletin 2010, Department of Planning and Community Development,

Victorian Government). When comparisons are made between the demographic distributions of the Victorian population and those of the sample reported in Section 4.2.2.1, similarities exist in terms of region of residence and age distributions. The gender distribution of females however was considerably higher in the sample than in the Victorian population. A possible explanation for the over representation of females in the sample may be a potential gender bias in survey response rate. Literature has reported that a gender bias in survey response rates exists whereby male respondents are often under-represented (O'Rourke and Lakner, 1989; Cull et al., 2005). Thus with regard to telephone surveys, female members of the household may be more likely to answer the telephone and therefore complete the survey than male household members. Apart from the gender bias, the brief comparisons of basic demographic factors indicate that the sample appears to be a reasonable representation of the Victorian population.

A key objective of the study was to obtain a sample of Victorian horse owners without recruiting participants through recreational horse clubs or societies. A number of difficulties are associated with contacting recreational horse owners, and as a result the majority of past research has recruited participants via membership to horse clubs or societies, or a history of equine welfare investigation (c.f. Sections 2.3 and 4.1). Participants recruited via these means tend to be homogeneous and lack variation. Consequently, the type of horse owner recruited via non-random sampling methods may not accurately represent the population of horse owners, and as a result bias the sample. Therefore, a key objective of the study was to ensure that the sample of recreational horse owners was obtained using random sampling methods, in order to obtain an accurate representation of the horse population in Victoria. It is important to note that while the initial random telephone survey and the CATI telephone omnibus involved a completely random form of sampling, the pre-existing online panels (random initial recruitment to on-line panel) and random cold calling into regional Victoria involved an element of targeted recruitment. The rationale behind the implementation of the two later recruitment methods was the opportunity to increase the rate of participant recruitment, without reducing the variability or heterogeneity of the sample. The targeted recruitment may have resulted in a slightly exaggerated representation of regional Victorian recreational horse owners; the percentage of regional horse owners in the total sample was 86% (n=205) and the smaller sample from the initial random telephone survey was 75% (n=27). Given the small sample size of initial random telephone survey, the difference in percentage of regional horse owners between the two samples is approximately three horse owners and would therefore appear to be negligible. Despite the potential bias in terms of

regional recreational horse ownership, the key objective was achieved and as a result a varied and heterogeneous sample, representative of the current population of Victorian horse owners was obtained.

4.5.2 The incidence of recreational horse ownership

The observed incidence of horse ownership in Victoria was 3.5%. While higher than the original estimated figure of 1-2%, the fact that the current estimate was based on a large random sample suggests that 3.5% is an accurate estimate of the prevalence of horse ownership in Victoria. Furthermore, the obtained percentage of Victorian urban horse ownership is similar to the expected incidence of horse ownership in Victoria prior to the study's commencement. According to these findings, the number of Victorian horse owners should be approximately 176, 000, of which 116, 000 horse owners reside in regional Victoria and 60, 000 horse owners are located in urban areas of Victoria.

On average, each Victorian horse owner owns approximately four horses. In terms of the region where the participant resides, regional horse owners own on average four horses, while urban horse owners own three horses. Consequently, there may be some 608,800 horses in Victoria. Furthermore, the total number of horses owned by regional horse owners is approximately 440,800, compared with 168,000 horses for urban horse owners.

4.5.3 Profiling recreational horse ownership in Victoria

Recreational horse owner demographics

Horse owners reside primarily in regional Victoria. As a result, the incidence rate of horse ownership in regional Victoria is significantly higher than that of urban Victoria. These findings were expected given the limitations and additional expenditure often associated with urban horse ownership, including but not limited to housing horses at a location separate from the primary residence, and the resulting separation between horse and horse owner. This survey found that horse owners typically own more than one horse, which is supported by equine industry figures and the limited literature concerning recreational horse populations (personal correspondence, Mr Barry Smyth, AHIC; Christie et al, 2004). On average, regional horse owners own at least one more horse than urban horse owners. This finding in itself is not unexpected however, the small

difference in the number of horses owned and the fact that urban horse owners tend to own more than one horse may be considered unexpected given the limitations and additional costs involved with urban horse ownership, which would be expected to further increase with each additional horse. Regional horse owners were found to reside primarily on acreage, while horse owners located in urban Victoria resided on small land blocks. Furthermore, approximately three quarters of urban horse owners housed their horses at locations other than their primary residence, compared with only a quarter of horse owners residing in regional areas. Again, neither finding is unexpected given the conditions associated with an urban horse ownership.

Victorian horse owners are predominantly female. This is consistent with studies by Christie et al. (2004) and Pearson (2004) who reported a greater percentage of females than males in horse owner populations. This study found that horse owners ranged in age from under 18 years of age to greater than 90 years of age. The percentage representation of owners across the age brackets was reasonably uniform, with the exception of those in the 36-45 years and 46-55 year groups. Within these age groups, the percentages were approximately twice that of other age brackets and accounted for half of the horse owners surveyed. A possible explanation for the high representation of horse owners in these age brackets may be that this group is accounting for both horse owners of that age and parents of horse owners who are minors. The survey found that almost three quarters of horse owners were parents. Furthermore, in addition to personal interest, the most commonly reported reason for horse ownership was family involvement. Thus, the current survey may have sampled participants who consider themselves the owner of their childrens' horses. If this is the case, one could question who is providing the horse with their daily primary care, and subsequently taking responsibility for the welfare of the horse.

In Victoria, approximately half of all horse owners are members of horse clubs and societies. A horse owner's affiliation with a horse club, society or organisation generally provides both regular interaction with other horse owners and industry personnel, and a means of accessing information and advice relating to horse health, husbandry and management (c.f. Section 2.3.2). In addition, horse club and society members were found to be more likely to actively improve their knowledge and have an awareness of the Code of Practice pertaining to the welfare of recreational horses when compared to non-members. Increasing a horse owner's knowledge reportedly reduces mismanagement and ensuing horse welfare problems. Consequently, horse

club and society membership may reduce the risk of welfare concerns in horses. The corollary of this is that a lack of affiliation with horse clubs or societies limits the ability of the horse industry to identify and contact horse owners. A lack of affiliation with horse clubs and societies places the onus on the horse owner to actively seek to improve their knowledge and gain information and assistance when required. The current findings appear to suggest that horse owners are actively seeking information and support, as evident by the overwhelming agreement of participants to attitude statements regarding the importance of such behaviour, and the substantial proportion of horse owners claiming to perform it. However, the survey still indicates that a quarter of participants do not access any form of information or news concerning horses, and more than half of participants were unaware of the Code of Practice regarding the welfare of recreational horses.

Despite the benefits associated with horse club and society membership, the incidence of horse club and society membership in Victoria is approximately 50%. A possible explanation for this finding may be that for horse owners the incentive for horse club and society membership is likely not to be the opportunity for knowledge improvement but rather the opportunity it affords them to undertake competitive recreational horse ownership. According to the current findings, less than half of horse owners compete in equine competitions, and those that do tend to be members of horse clubs or societies. Furthermore, horse owners typically reported recreation and companionship as the primary reasons for their ownership, and approximately half of the horses surveyed were not ridden. Thus, if a horse owner has no interest in competing, does not ride their horses, provides the primary care for their childrens' horses, or owns horses solely for recreational or companionship purposes, there appears to be little incentive for horse club or society membership. These findings imply that the educational benefits associated with horse club and society membership are likely to only be experienced by those horse owners interested in competitive rather than non-competitive recreational horse ownership. Furthermore, they indicate that with regard to future legislation and education, different strategies may be required for competitive and non-competitive recreational horse owners.

Recreational horse demographics

It would appear that there are more than 600, 000 horses in Victoria. The most common horse breed is the Thoroughbred, generally with a history of horse racing experience. They are most commonly aged between 5-15 years, and geldings are only slightly more represented than fillies or mares. In order to account for the potential diversity that may exist between the different types of horses and the use and management of different horses owned by the same horse owner, if the participant owned more than one horse, demographic data were collected from the horse they had most contact with (H1) and the horse they had the least contact with (H2) (c.f. Section 3.2.2). It was hypothesised that demographic differences may exist between H1 and H2 due to the different reasons for ownership. It was anticipated that H1 would generally be the horse of greatest use, that is, the horse that is regularly handled or ridden by the horse owner, while H2 could potentially occupy a number of roles including young or old/retired horse, companion animal, or brood mare. The research findings however indicate that there is little difference between H1 and H2 according to demographic factors, including age and breed. A possible explanation for this finding is that because the cost of owing and maintaining horses is high, horse owners are likely to only own horses which have a specific use, i.e. H1 and H2 may not be different in this respect. The lack of difference in breed between the two types of horses is also consistent with H1 and H2 having similar uses. Although no difference in age was found between H1 and H2 and the age distribution between the two groups appears similar, there is a greater representation of H1 in the 5-10 year age bracket (which may be considered a horses performance age bracket and that which was hypothesised as H1) and H2 in the 0-5 year and the 11+ year brackets (young and old horses as hypothesised for H2). This finding may indicate a slight trend towards the hypothesised differences between horses owned by the same horse owner, and may have been more evident if horse owners owned on average a greater number of horses. However, because the anticipated diversity between H1 and H2 is not significant, when discussing the demographic statistics of horses in Victoria there is no need to differentiate between H1 and H2.

Thoroughbreds are the most prevalent breed of horse in Victoria. This is unsurprising given the size of the Victorian horse racing industry. It would appear that two main factors may predispose Thoroughbreds, particularly those with horse racing history, to being highly represented within the horse population in Victoria. The first involves the number of Thoroughbreds bred every year and the subsequent surplus of horses no longer suitable for use in the horse racing industry. The

second concerns the reduced cost associated with buying a Thoroughbred with horse racing history, when compared with that of horses bred specifically for recreational purposes (personal correspondence, Mr Barry Smyth, AHIC). Thus the number of available horses and the often reduced cost, are likely to result in Thoroughbreds being a popular choice of horse for Victorian horse owners.

Horses are typically aged between 5-15 years of age. This age bracket could be considered the performance age, when a horse is at the peak of its abilities. Ages outside of this range are generally associated with horses that are still undergoing initial training or ground work, or are experiencing a reduced level of work and heading towards retirement. Given that horse owners potentially only own horses they have specific uses for, it is unsurprising that the age bracket most highly represented corresponds with the age when horses are most able to perform the tasks horse owners require of them. Although there were no significant differences, the most highly represented gender in horses was geldings. This may be explained by Thoroughbreds being a highly represented horse breed in Victoria, and unlike mares, fillies or stallions, once a gelding has finished racing they have no role in the breeding industry. As a result a higher percentage of geldings are potentially available to horse owners.

Recreational horse management and husbandry

Although differences were found between H1 and H2, Victorian horse owners appear to largely provide similar husbandry and management practices to both of their horses, regardless of their level of interaction. These findings indicate that a difference in the level of human-horse interaction does not appear to significantly influence the horse husbandry and management behaviour of horse owners with multiple horses. In addition to the anticipated difference in the degree of daily human-horse interaction, variation between the two groups of horses was found in terms of whether the horse was permanently housed in a paddock, whether the horse received hoof care from a farrier, veterinary assessment, and recent health concerns. Although these differences will be discussed, the majority of the results will be discussed in terms of the husbandry and management of Victorian horses, rather than two separate groups of horses.

Horses are predominantly housed at the primary residence of the horse owner. This finding is expected considering horse owners are primarily located on acreage in regional Victoria. The most common form of housing was full time paddock, and the reasons for this housing method were owner preference and owner convenience. Although both were predominantly housed in paddocks, H1 was more likely housed in a stable or yard than H2. Stables and yards often increase the ease of handling the horse and reduce the time spent locating and/or retrieving the horse, both of which a horse owner may consider beneficial for the horse with which they have the greatest level of interaction. Furthermore, stables and yards are often in close proximity to the house, which may also be considered convenient by the horse owner when handling H1. Horses were largely housed with other horses in paddocks between 0-4 hectares in size, with plain wire and electric fencing, automatic water troughs and supplementary feeding. These findings indicate that horse owners primarily house their horses at their primary residence in a largely extensive manner.

The Victorian climate and the availability of land allow horse owners to house their horses in an extensive manner, whereby horses spend the majority of time in a paddock as opposed to a stable or yard. The housing of horses in a full-time paddock environment is often considered a convenient housing option as it reduces the time and effort a horse owner has to expend, as the horse is usually provided with continuous access to exercise, feed and water. In comparison, the intensive management conditions involved in the stable environment commonly found in European countries, requires the horse owner to provide a greater level of care, whereby the horse's condition is regularly checked, the stable is maintained and cleaned, and the horse is provided with the regular provision of feed, water and exercise. The appeal of a paddock environment is further evident given that while Victorian horse owners typically check their horses' condition every day they tend to spend less than 30 minutes per day interacting with their horses. Although horse owners in Victoria appear to report the appropriate management of horses in terms of the provision of space, forage, social interactions and safe housing fittings, the limited human-horse interaction represents a considerable equine welfare risk, due to an increased potential for a delay in the detection and treatment of horse health and welfare problems.

Victorian horse owners largely report the performance of horse husbandry practices such as parasite control, hoof care and dental care, in accordance with the recommendations made by the

Code of Practice pertaining to the welfare of recreational horses, in both H1 and H2. While there is no difference in the performance of hoof care in the two groups of horses, horse owners are more likely to have a farrier attend to the hooves of H1, while someone other than a farrier generally performs hoof care on H2. Given that H2 most commonly receives barefoot trimming, it is not unexpected for someone other than the farrier to perform this type of hoof care treatment. The provision of hoof care by someone other than a farrier may represent a potential welfare risk due to a possible increase in the chance of inappropriate hoof care behaviour because of insufficient knowledge or skill. Horse owners reported a low frequency of injury or illness in their horses. Although this finding may indicate that the incidence of reported injury or illness in horses appears reasonably low, it may alternatively imply that horse owners are failing to adequately identify injury and illness in their horses. Approximately half of the surveyed horse owners had not sought veterinary consultation or assessment for their horse. While both explanations for the low incidence of reported equine health concerns may explain the lack of veterinary consultation, if horse owners are unable to identify injury and illness in their horses and are failing to seek veterinary consultation, a significant welfare risk to Victorian horses may exist. Furthermore, a difference is found between the two groups of horses with regard to veterinary consultation, with horse owners more likely to seek veterinary attention for the horse they have the most interaction with rather than the horse they have a lesser degree of contact with. Considering the high representation of horses in welfare investigations in Victoria, these findings indicate that the incidence of equine health concerns and their identification and treatment by the horse owner requires further investigation.

The diet of Victorian horses typically includes the provision of supplementary feeding in addition to the pasture they are housed upon. The supplementary diet includes hay and concentrated feed. Horse owners report that diet is determined according to a change in horses' body condition score, and they most commonly describe their horses' BCS as correct condition. The determination of equine diet according to change in BCS is appropriate if the horse owners assessment is accurate. Industry reports suggest that the likelihood of underestimation of BCS by the horse owner is considerable as evident by the high body condition scores commonly observed in Victorian horses (c.f. Section 2.3). The provision of an inappropriate diet which leads to increased BCS is a significant risk to the welfare of horses due primarily to the association with the equine health concerns laminitis and founder. Although the findings of this study suggest Victorian horse owners are appropriately managing their horses diet and body condition, industry

reports indicate that horses may be at risk of increased BCS due to horse owners inability to accurately determine horses' BCS.

Less than half of all Victorian horses are registered with some form of equine organisation. The benefits horse registration affords to the horse industry concern the opportunity to identify and contact horse owners, in addition to obtaining information regarding horse owners and their horses (c.f. Section 2.3). Similarly to horse club and society membership, the incentive for horse owners to register their horses appears to primarily involve the opportunity to compete in horse competitions. In order for a horse owner to be eligible to compete in horse competitions, their horses must be registered with the relevant equine organisation. It would therefore be expected that the percentage of horse owners who registered their horses corresponds to that of those that actively compete in horse competition. Furthermore, it may be reasonable to assume that under current conditions horse owners predominantly involved with non-competitive recreational horse ownership are unlikely to register their horses.

Although Victorian horse owners largely report the appropriate performance of horse husbandry practices and a low incidence of horse injury and illness, the limited human-horse interaction and the predominantly extensive management practices commonly found in the Victorian horse population pose a significant risk to horse welfare because of the increased opportunity for a delay in the horse owners identification and subsequent response to horse health and welfare problems.

Recreational horse owner-horse interaction

As with the other variables, little difference was found between H1 and H2 with regard to human-horse interaction statistics. The variation between the two groups of horses concerns the time spent on daily human-horse interaction and whether the horse was ridden by the horse owner. Horse owners spend on average a greater amount of time each day with H1 compared with H2. This finding was anticipated given the distinction between the two groups of horses was the degree of human-horse interaction. Horse owners were found to be more likely to ride H1 than H2, and taking into account H1 is the horse with which the horse owner has the greatest level of

interaction, this finding is also not unexpected. The current findings concerning human-horse interactions will now be discussed not in terms of H1 and H2, but rather horses in Victoria.

On average, Victorian horse owners spend less than 30 minutes per day interacting with their horses. Furthermore, almost a quarter of horse owners, who are providing their horses with their daily primary care, do not interact with their horse every day. This lack of human-horse interaction represents a potential welfare risk in horses, due to the aforementioned potential for delay in the detection and treatment of horse health and welfare problems. Horse health and welfare problems can be experienced by all horses, however some of these problems and concerns are more preventable than others. Limited human-horse interaction is likely to result in the need for a greater emphasis on the appropriate performance of horse health and management behaviour by the horse owner in order to both promote horse health and to limit the occurrence of preventable health and welfare concerns. It also places greater importance on the horse owner's knowledge and ability to accurately identify and respond to health threats, given their lack of interaction with their horses. The lack of human-horse interaction, commonly observed in Victorian horse ownership, indicates that future education strategies need to underline the importance of frequent human-horse interaction, while also highlighting the value of the appropriate performance of horse husbandry and management practices and continual knowledge improvement when attempting to prevent horse health and welfare concerns.

Approximately half of the horses in Victoria are not ridden. An explanation for this finding may be that these horses are being kept by horse owners as primarily companion animals. The survey's findings indicate that horse owners typically own horses for recreation and companionship purposes. Literature and industry reports also imply that the percentage of horses kept as companion animals is increasing (c.f. Section 2.3). Past research has linked the use of horses as companion animals with reduced horse welfare (Pearson, 2004). The management requirements of horses are different from those of traditional companion animals such as cats and dogs. Consequently, if horse owners manage their horses in a manner appropriate for companion animals rather than horses, the resultant mismanagement is likely to increase the risk of welfare concerns in these horses. Furthermore, horse owners primarily involved with non-competitive recreational horse ownership are less likely to be members of horse clubs and societies or register their horses, both of which have been previously linked with improved horse husbandry and

management through access to information and support and subsequently knowledge gain. Given a substantial proportion of horses in Victoria are kept for companionship or non-competitive recreational reasons, further research examining the horse's role as a companion animal and the husbandry and management of these types of horses is clearly warranted. Furthermore, the lack of horse club and society membership and horse registration commonly associated with non-competitive recreational horse ownership indicates that future legislation and education programs need to include specific strategies focused on these types of horse owners to ensure the performance of appropriate husbandry and management practices and ensuing welfare outcomes in non-competitive recreational horses in Victoria.

4.5.4 Relationships, owner attributes, and demographic variables

One of the aims of the current study was to characterise Victorian horse owners in terms of demographic factors and attitudes.

4.5.4.1 Differentiating recreational horse owners from non-horse owners

Comparisons between horse owners and non-horse owners in Victoria found similarities in terms of gender and age, and differences with regard to region of primary residence, occupation and annual household income.

Both horse and non-horse owners sampled by the survey were found to be predominantly female and aged between 36-45 years of age. Although horse owners would be expected to be largely female (Pearson, 2004; Christie et al. 2005), the high representation of females in non-horse owners was not anticipated as it is in direct conflict with census data which demonstrates a relatively even gender distribution in Victoria (Victorian Population Bulletin 2010, Department of Planning and Community Development, Victorian Government). An explanation for the surveys over representation of female non-horse owners is likely to be the previously mentioned gender bias in survey response rate, whereby male respondents are often under-represented due to a propensity for female members of the household to answer the telephone and subsequently complete the survey (O'Rourke and Lakner, 1989; Cull et al., 2005). The survey's findings also suggest that horse owners and non-horse owners were both found to be between 36-45 years of age, which is in accordance with recent estimates of age distribution which indicate that the

median age in Victoria is 37 years (Victorian Population Bulletin 2010, Department of Planning and Community Development, Victorian Government).

Horse owners reside primarily on acreage in regional Victoria, while non-horse owners' primary residence is predominantly located in urban areas of the state. This finding was expected given a regional lifestyle affords horse owners with the land and space to house their horses in close proximity to themselves, and census data demonstrates a greater population in urban (4.1 million people) rather than regional (1.4 million people) areas of Victoria. Horse owners most commonly occupy the higher brackets of annual household income, in comparison to non-horse owners who, despite a reasonably even representation across all annual household income brackets, were most highly represented in the income bracket of below $20 000. A possible explanation for this finding may be that owning horses is costly, and therefore people in the higher income brackets are more likely than those in the lower income brackets to be horse owners. However, a range of incomes was found across horse owners, and it is reported that horse owners with lower incomes are those most commonly experiencing horse welfare concerns. Despite being provided with an extensive list of options, Victorian horse owners most commonly classify their occupation as 'other', in comparison to 'professional' for non-horse owners. A clear distinction between horse owners and non-horse owners in terms of occupation was not anticipated, and an occupation classification of professional, non-professional or tradesperson was expected. A possible explanation for this finding may be that horse owners, largely rural women with a high household income, may not engage in paid work and therefore other was deemed the only appropriate classification for their occupation.

4.5.4.2 Characterising recreational horse owners

The demographic differences between Victorian horse owners with respect to the key independent variables gender, region of primary residence and membership to a horse club or society will be discussed.

Gender

Victorian horse owners are predominantly female. When compared to male horse owners, female horse owners appear to demonstrate a greater concern for ensuring that they are able to

appropriately manage the health and welfare of their horses. Female horse owners are more likely than their male counterparts to be members of horse clubs and societies and to actively seek to improve their knowledge about horses and their management. A horse owner's ignorance or lack of knowledge may result in the inappropriate management of their horses, and potentially reduce their welfare (c.f. Section 2.3). In addition, female horse owners appear more inclined to seek veterinary consultation and treatment for their horses than male horse owners. A male horse owner's apparent reluctance to both access information and support, to improve their equine knowledge and employ the services of a veterinarian when their horses are experiencing health concerns, is likely to increase the risk to the welfare of their horses. Thus, male horse owners in Victoria appear to be at a greater risk of experiencing horse welfare concerns due to mismanagement, than their female counterparts.

Recreational horse club and society membership

With regard to membership of a horse club or society, Victorian horse owners are evenly represented in terms of members and non-members. The literature suggests that the opportunity to access information and support associated with horse club and society membership has the potential to promote appropriate horse management and therefore reduce the risk of welfare concerns in horses (c.f. Section 2.3.2). When compared with members of horse clubs and societies, a greater proportion of non-members were males, which may be explained by a possible reluctance to actively seek to improve knowledge of horse health and management. A greater number of urban horse owners are members of horse clubs and societies compared with non-members. Owning a horse in an urban environment is a conscious decision and more likely to be associated with competitive rather than non-competitive recreational horse ownership. Consequently, competitive recreational horse ownership is often associated with horse club and society membership, and may therefore explain the association between urban horse ownership and membership to horse clubs and societies, as previously discussed.

When compared to non-members, members of horse clubs and societies appear more likely to register their horse ownership with their local council, and their horses with an equine organisation. These findings are not unexpected given that horse club and society membership and both forms of registration have been previously linked with the improvement of horse owner

knowledge, through communication with the equine industry and the subsequent provision of information, support and assistance (c.f. Section 2.3.2). Furthermore, members of horse clubs and societies are more inclined than non members to actively improve their knowledge and have an awareness of the Codes of Practice pertaining to the welfare of recreational horses in Victoria. These findings would appear apparent as a possible incentive for horse club and society membership is to improve knowledge on horse management, health and welfare. Thus, horse owners who are members of horse clubs or societies appear more equipped than non-members, to provide their horses with the appropriate management required to limit the occurrence of horse welfare concerns.

Region of primary residence

Horse owners reside primarily in regional Victoria. As previously discussed, the region of primary residence has the potential to influence the manner in which horse owners manage their horses. When compared to urban horse owners, regional Victorian horse owners are more likely to house their horses at their primary residence and interact with their horses on a daily basis. These findings were anticipated, given the differences between the two region types in terms of the location of the horse with regard to the horse owner's primary residence. A regional primary residence is often associated with an increased proximity between the horse and horse owner in comparison to a primary residence located in an urban area. The close proximity between the horse owner and their horses may provide greater opportunities for human-horse interaction and therefore increase the likelihood of appropriate horse management. When compared with their regional counterparts, urban horse owners appear more inclined to register their horse ownership and hold membership to a horse club or society. The previously discussed association between urban horse ownership and competitive recreational horse ownership may explain these findings. Horse owners primarily residing in urban areas tend to own horses for competitive recreational purposes which often require horse club and society membership. Alternatively, regional horse owners are more commonly associated with non-competitive recreational horse ownership, for which there is often little incentive to hold horse club and society membership. Consequently, the variation found between regional and urban horse owners concerns both the location of the horse with regard to the horse owner's primary residence and the type of horse ownership, that is, competitive or non-competitive recreational horse ownership. Thus, the appropriate management of horses appears likely to be both encouraged and challenged in different ways according to the horse owners region of primary residence.

4.6 CONCLUSIONS

The findings of this survey provide insight into the Victorian recreational horse and horse owner populations. In addition to knowing little about these horse owners and their horses, there appears to be no evident means of contacting or locating a considerable proportion of them. Similar findings have been reported in horse populations around the world. Reasons for which may include an absence of a compulsory registration system and the difficulty associated with contacting horse owners who are not members of horse clubs and societies. Such reasoning appears justifiable given the current findings which indicate that just over half of all horse owners are members of horse clubs and societies, less than half of horse owners register their horses, and the difficulty encountered when attempting to randomly recruit an adequate sample. Furthermore the results suggest that due to a greater likelihood of membership to horse clubs and societies and the registration of their horses, there appears to be both more information available and a greater opportunity to contact urban horse owners, rather than regional horse owners.

Horse owners typically provide their horses with their daily primary care. As a result, it is the horse owner who is responsible for the welfare of horses in Victoria. Although this is a view held widely by those involved in the equine industry, it is also acknowledged by participants, as evident by the overwhelming disagreement to attitude statements denying horse owners' responsibility for their horse's welfare. Horses have been increasingly represented in welfare investigations conducted by the RSPCA annually. Furthermore, the majority of the welfare concerns observed in horses are believed to be the result of inappropriate management by the horse owner due to ignorance rather than intentional abuse (pers. comm., G. Boland, RSPCA Victoria; pers. comm., Ms Dani Hughes, RSPCA Inspectorate Victoria; Pearson, 2004). Although the current study demonstrates that horse owners predominantly report the appropriate performance of horse husbandry and management practices and a low incidence of horse injury and illness, the limited human-horse interaction and the largely extensive management practices found in the horse population represent a significant risk to horse welfare. This risk relates to the potential for a delay in the detection and subsequent treatment of horse health and welfare problems by the horse owner. These findings suggest that the main form of horse owner mismanagement, associated with the welfare concerns observed in Victorian horses could potentially be the limited degree of human-horse interaction rather than the inappropriate

performance of horse husbandry and management practices. Limited human-horse interaction is likely to result in a greater reliance on the horse owner's appropriate performance of horse health and management behaviour to promote horse health and to limit the incidence of avoidable health and welfare concerns. Furthermore, a greater reliance is placed on the horse owner's knowledge and ability to accurately identify and respond to health threats and problems, given the lack of time spent interacting with their horses.

With regard to the development of potential policy and education programs, intended to promote appropriate horse husbandry and management in order to reduce horse welfare concerns, the current findings indicate that the need for appropriate horse husbandry and management behaviour, the continual improvement of knowledge concerning horse health, husbandry and management, and increased human-horse interaction should be emphasised. Furthermore, the clear distinction between competitive and non-competitive recreational horse ownership suggests that in order to be effective, different strategies for different types of horse ownership are likely to be required.

CHAPTER 5
THE HUMAN-HORSE RELATIONSHIPS

5.1 INTRODUCTION

The human-horse relationship with regard to horse health and welfare is largely uninvestigated. The human component of this relationship involves both behavioural and psychological aspects. Research indicates that the manner in which a person behaves when managing their animals may be influenced by a number of factors including social pressures, environment, motivation, knowledge and skills, and the satisfaction gained from animal interaction (Hemsworth and Coleman, 2010). However, the greatest influence on human behaviour remains the attitude an individual possesses towards performing the behaviour in question (Fishbein and Ajzen, 1975; Ajzen, 1985). The sequential human attitude-behaviour relationship described by the Theory of Planned Behaviour (TPB) has been successfully demonstrated in the pork, poultry, veal and dairy industries (c.f. Section 2.4). In these studies, stockperson attitudes were correlated with stockperson behaviour, which in turn were correlated with animal productivity and welfare.

Azjen's (1985) TPB (cf. Section 2.5) can be employed to both predict and understand motivational influences on behaviour in humans and to identify target strategies for changing behaviour. Consequently, the TPB may be able to identify the attitudinal antecedents of horse owner behaviour, and ascertain strategies for behavioural change. According to the theory, horse owners' attitudes toward their horses influence their intention, which in turn affects their behaviour and consequently has the potential to impact upon horse welfare. At the most basic level of explanation, an individual's behaviour is assumed to be a function of their beliefs relevant to the behaviour in question. The three beliefs, behavioural beliefs, normative beliefs, and perceived behavioural control, combine to form an individual's perception of the outcomes arising from the performance of the behaviour in question, from which attitude towards the behaviour develops. As such, a horse owner's attitude towards horse husbandry and management determines their intention to perform horse husbandry and management behaviours. According to the perceived human-horse relationship, a horse owner's performance or non-performance of the

horse husbandry or management behaviour has the potential to influence horse welfare outcomes. The three beliefs and thus an individual's intention to perform the behaviour in question can be indirectly measured using an attitude questionnaire, based on an attitude scale such as a Likert scale.

Horse owners' attitudes towards horse ownership are likely to influence their behaviour in terms of the implementation of horse husbandry and management practices. Subsequently, these horse owner behaviours may impact on the welfare of the horse. The antecedents of a horse owner's attitudes may include a number of background factors including demographics, horse ownership history, knowledge and commitment. Thus, based on the general literature concerning the TPB (Ajzen, 1985) and the limited research available regarding human-horse relationships, a number of horse owner attributes are potentially associated with horse welfare. The horse owner attributes to be examined should include background factors, attitudinal variables and behavioural variables. In relation to horse-based variables, those concerning horse health and welfare are obvious inclusions for investigation.

The aim of this study was to investigate the associations between horse owner attributes within the context of the human-horse relationship and the subsequent association with horse welfare outcomes. Based on the TPB (Ajzen, 1985), it was hypothesised that:

i. Horse owner background factors are associated with horse owner beliefs (behavioural, normative and control) which underlie horse owner attitudes towards behaviour

ii. Horse owner attitudes towards behaviour, determined by horse owner behavioural, normative and control beliefs, are the antecedents of horse owner behaviour,

iii. Horse owner behaviour is associated with horse welfare outcomes,

iv. The inappropriate performance of husbandry and management behaviour by the horse owner is associated with poor horse welfare outcomes, and

v. With regard to owners of multiple recreational horses, differences are likely to exist in the way in which they manage their different horses.

In order to investigate the nature of the human-horse relationship, the associations between horse owner attributes were investigated. The attributes examined included horse owner demographics and knowledge (background factors), beliefs about horse husbandry and management practices, self-reported horse husbandry and management practices, and horse owner husbandry behaviour. Secondly, the antecedents of horse owner behaviour pertaining to the performance of three key horse husbandry and management practices, parasite control, hoof care and dental care, were investigated.

5.2 METHODS

5.2.1 Study design

Data were collected using the on-site inspection protocol, consisting of the attitude questionnaire (Appendix 2) and the horse and horse husbandry and management inspection (Appendix 3), during on-site inspections with Victorian horse owners and their horses between May 2008 and December 2009. The sample consisted of 57 horse owners and 99 horses. The selection criteria required participants to be Victorian horse owners over 12 years of age who provided their horses with their daily primary care.

5.2.2 Participant recruitment

Participants were recruited from the study investigating recreational horse ownership in Victoria that was reported in Chapter 4. The participant recruitment methods are described in Section 4.3.1.3. All participants completed the random telephone questionnaire, the administration of which is detailed in Section 3.2.4. At the conclusion of the questionnaire, participants were asked about their interest in participating in subsequent research. If a participant agreed to further participation, their contact details were obtained and forwarded to the researcher. Willing participants were re-contacted by the researcher, and the details regarding the research and requirements of subsequent participation in the current study were explained. If the participant was willing to continue an appropriate time for the on-site inspection was determined and location details were recorded. Finally, just prior to the scheduled on-site inspection the researcher contacted the participant in order to confirm the appointment.

5.2.3 On-site inspection protocol

The on-site inspection protocol rationale and development are detailed in Section 3.3. The on-site inspection was used to collected demographic, attitudinal, and behavioural data from horse owners, and horse-based health and welfare outcomes. On average, the on-site inspection took approximately 120 minutes to complete. After explaining the inspection procedure to the horse owner, the researcher had the participant complete the attitude questionnaire. This was followed by an inspection of the horses and horse management and husbandry practices of the horse owner. The attitude questionnaire is explained in Section 5.2.3.1, followed by the horse and horse husbandry and management inspection in Section 5.2.3.2. The horse owner attribute variables are described in Appendix 6.

5.2.3.1 Attitude questionnaire

The development of the attitude questionnaire is detailed in Section 3.3.2.1. The attitude questionnaire measured horse owner attitudes towards horses and horse management and husbandry practices, using three types of attitude statements, based on behavioural beliefs, normative beliefs, and control beliefs. Using a Likert scale, the participants were asked to either indicate their level of agreement with the attitude statement, or the level of importance they placed on the attitude statement. The use of a variety of statements concerning a particular topic allowed consistent beliefs relating to that topic to be identified and therefore the attitude toward the topic was able to be inferred (Hemsworth and Coleman, 2010). Thus, the beliefs that horse owners held regarding horse husbandry, health and management practices were used to establish their attitudes towards these aspects of horse ownership. A copy of the attitude questionnaire is located in Appendix 2.

The development of attitude subscales

The attitude questionnaire contained 146 attitude items designed to measure the three types of horse owner beliefs (the behavioural beliefs, normative beliefs and the perceived behavioural) associated with each aspect of horse management and husbandry in Victoria. It was not possible to reduce these items to a more manageable size using a PCA because the number of items in the questionnaire was greater than the sample size (Tabachnik and Fidell, 1996). Therefore to reduce the questionnaire data to a more appropriate size for data analysis, the items were grouped into

attitude subscales with similar content. The items within each subscale were summed to create a single score for each subscale.

While each attitude statement within a given attitude subscale was designed to measure a similar topic, in order to account for the different scale types (i.e. importance verses frequency verses agreement) all item scores were converted to Z-scores before summing. From the 146 items measured in the attitude questionnaire, 113 items were reduced into 12 attitude subscales. The remaining 33 items were not grouped into an attitude subscale due to poor item-total correlations, and as a result, were treated as individual belief variables during data analysis. All of the variables in a subscale were significantly correlated at a significance level of 0.01 with the subscale total, and all attitude subscales had a Cronbach's alpha coefficient greater than 0.7 (Kline, 1994; Tabachnick & Fidell, 1996). The items combined to create each of the attitude subscales are presented in Tables 13-19. The labelling of each attitude subscale based on semantic content is also provided. Tables 13-15 present the behavioural beliefs that horse owners hold about horse management and husbandry. Tables 16 and 17 contain the normative beliefs horse owners have regarding horse management and husbandry. Tables 18 and 19 report the control beliefs horse owners hold concerning horse management and husbandry.

Table 13 presents the general beliefs that horse owners hold about horses.

Table 13 The questionnaire items that were combined to create the *General attitude statements* subscale, and the associated Cronbach's alpha coefficient

Attitude subscale	Cronbach's alpha	Items in attitude subscale
General attitude statements (positive): The horse owner's positive view on horses and horse ownership	0.71	I am responsible for my horses' welfare Horses are not expensive to keep$^{(-ve\ RC)}$ Horses make great pets Horses are not scary$^{(-ve\ RC)}$ Horses are affectionate animals. Horses are not dangerous$^{(-ve\ RC)}$ Horses are intelligent animals Horses are beautiful animals Horses are kind animals

NOTE: $^{(-ve\ RC)}$ re-coded negative attitude item

Table 14 presents behavioural beliefs relating to horse husbandry and management practices held by horse owners. The behavioural beliefs that were combined to form the attitude subscales involve those concerning the outcomes of horse husbandry and management practices relating to horse health and welfare and horse housing. The questionnaire asks the participants to either agree or disagree, or rank the importance or unimportance of attitude statements concerning horse husbandry and management practices. For example, variables in the attitude subscale *Horse husbandry and management - Health and welfare (Bb)* relate to participants awareness and beliefs about performing horse husbandry and management practices concerning horse health and welfare. By agreeing with or placing importance on the statements included in the attitude subscale, participants are recognizing the importance of the behaviour outcome and implying that they perform, or intend to perform, these practices when managing their horses.

Table 14. The two attitude subscale that concern horse owners' behavioural beliefs about horse husbandry and management practices, the questionnaire items that were combined to create the attitude subscales, a description of the attitude subscale, and the associated Cronbach's alpha coefficient

Attitude subscale	Cronbach's alpha	Items in attitude subscale
Horse husbandry and management - Health and welfare (Bb): The horse owner's attitudes towards the performance of horse husbandry and management practices concerning horse health and welfare	0.80	How important is it to base a horse's diet on its individual needs? How important is it to adjust a horse's diet according to its conditions? How often should you check a horse's condition? How important is it to manage and care for a horse according to the work they are doing? How important is it to regularly attend to horses' teeth? How often should a horse's hooves be attended to? How important is it to have a veterinarian inspect a horse showing signs of ill-health? How important is it to have a horse annually checked by a veterinarian? How important is it for the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment? How important is it to recognize, assess and respond to lameness in horses? How important is it to recognize, assess and respond to injuries in horses? How important is it that horse owners know how to look after a horse? How important is it to be aware of the possible risks to horses' welfare?
Horse husbandry and management - Housing (Bb): The horse owner's attitudes towards the performance of horse husbandry and management practices concerning horse housing	0.83	How important is the weather in determining a horse's water intake? How important is it to consider weather conditions when determining which rugs to use? How often should you check a horse's rugs? How often should you check and maintain the paddocks horses are kept in? How often should you check and maintain a horses' paddock fencing? How important is it that stables do not restrict a horse's freedom to move? How important is it that stables do not restrict a horse's freedom to lie down? How important is it to provide horses with a form of shelter from the wind? How important is it to provide horses with a form of shelter from the sun? How important is it to provide horses with a form of shelter from the rain? How important is it to provide horses with daily supervision? How important is it to provide horses with regular exercise or paddock turnout?

Table 15 presents the behavioural beliefs that form the attitude subscale *Human-horse relationship (Bb)*.

Table 15. The questionnaire items that were combined to create the *Human-horse relationship (Bb)* attitude subscale, a description of the attitude subscale, and the associated Cronbach's alpha coefficient

Attitude subscale	Cronbach's alpha	Items in attitude subscale
Human-horse relationship (Bb): The recreational horse owner's beliefs about the human-horse relationship	0.70	There is always something new to learn about horses Horses provide companionship Horses take up a lot of your time Horses do require a great deal of care(-ve RC) During times of difficulty horses can provide comfort Losing a horse would be a traumatic experience

NOTE: (-ve RC)re-coded negative attitude item

Table 16 describes the normative beliefs held by horse owners regarding horse husbandry and management practices involving horse diet, health and welfare and housing. The normative beliefs that form the three attitude subscales relate to participants' beliefs about other horse owners' attitudes towards the horse husbandry and management practices in question.

Table 16. The three attitude subscales which concern horse owners' normative beliefs about horse management and husbandry practices. The items that were combined to create the attitude subscale, a description of the attitude subscale, and the associated Cronbach's alpha coefficient

Attitude subscale	Cronbach's alpha	Items in attitude subscale
Horse husbandry and management - Diet (Nb): The horse owner's normative beliefs about other horse owners' attitudes towards the performance of horse husbandry and management practices concerning horse diet	0.82	How important do other horse owners believe it is to base a horse's diet on its individual needs? Other horse owners believe that being overweight can be a serious problem for horses How important do other horse owners believe it is to adjust a horses' diet according to its conditions? How important do other horse owners believe it is for horses to have a constant supply of water? How important do other horse owners suggest the weather is in determining a horse's water intake?
Horse husbandry and management - Health and Welfare (Nb): The horse owner's normative beliefs about other horse owners' attitudes towards the performance of horse	0.90	How often do other horse owners believe you should check a horses' condition? How important do other horse owners believe it is to manage and care for a horse according to the work they are doing? How important do other horse owners believe it is to

husbandry and management practices concerning horse health and welfare		regularly attend to horses' teeth? How often do other horse owners believe a horse's hooves should be attended to? How important do other horse owners believe it is to have a veterinarian inspect a horse showing signs of ill-health? How important do other horse owners believe it is to have a horse annually checked by a veterinarian? How important do other horse owners believe it is that the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment? How important do other horse owners believe it is to recognize, assess and respond to lameness in horses? How important do other horse owners believe it is to recognize, assess and respond to injuries in horses? How important do other horse owners believe it is that horse owners know how to look after a horse? How important do other horse owners believe it is to be aware of the possible risks to horses' welfare?
Horse husbandry and management - Housing (Nb): The horse owner's normative beliefs about other horse owners' attitudes towards the performance of horse husbandry and management practices concerning horse housing	0.90	How important do other horse owners believe it is to consider weather conditions when determining which rugs to use? How often do other horse owners suggest you should check your horses' rugs? Do other horse owners believe it is better for a horse to be too hot or too cold? (-ve RC) How often do other horse owners believe you should check and maintain the paddocks horses are kept in? How often do other horse owners believe you should check a horses' paddock fencing? How important do other horse owners suggest it is that stables do not restrict a horse's freedom to move? How important do other horse owners suggest it is that stables do not restrict a horse's freedom to lie down? How important do other horse owners believe it is to provide horses with a form of shelter from the wind? How important do other horse owners believe it is to provide horses with a form of shelter from the sun? How important do other horse owners believe it is to provide horses with a form of shelter from the rain? B19. How important do other horse owners believe it is to provide horses with daily supervision? How important do other horse owners think it is to provide horses with regular exercise or paddock turnout?

NOTE: (-ve RC) re-coded negative attitude item

Table 17 presents the normative beliefs that combine to form the attitude subscale *Human-horse relationship (Nb)* which relate to the participant's beliefs about other horse owners' attitudes towards the human-horse relationship.

Table 17 The questionnaire items that were combined to create the *Human-horse relationship (Nb)* attitude subscale for horse owners' normative beliefs, a description of the attitude subscales, and the associated Cronbach's alpha coefficient

Attitude subscales	Cronbach's alpha	Items in attitude subscales
Human-horse relationship (Nb): The recreational horse owners normative beliefs about other horse owners attitudes towards the human-horse relationship	0.83	Other horse owners believe that it is my responsibility to provide a safe environment for my horse How important do other horse owners believe it is to manage and care for a horse according to the work they are doing? How important do other horse owners believe it is that a horse to responds appropriately to riding aids? How important do other horse owners believe it is to be alert when handling horses? Other horse owners believe that I am responsible for my horse's welfare Other horse owners suggest that there is always something new to learn about horses

Table 18 presents the control beliefs of horse owners concerning horse husbandry and management practices relating to horse diet, health and welfare and housing. The control beliefs that form the three attitude subscales relate to participants' beliefs about their ability to perform the particular horse husbandry and management practices.

Table 18. The three attitude subscales that concern a horse owner's control beliefs about horse husbandry and management practices. The items that were combined to create the attitude subscale, a description of the attitude subscale, and the associated Cronbach's alpha coefficient

Attitude subscale	Cronbach's alpha	Items in attitude subscales
Horse husbandry and management - Diet (Cb): The horse owner's control beliefs about how able they are to perform horse husbandry and management practices concerning horse diet	0.70	To what extent are you able to base your horses' diet on its individual needs? How difficult is it for you to ensure your horse does not become too fat? How difficult is it for you to adjust your horses' diet according to its conditions? How difficult is it for you to provide your horse with a constant supply of water?
Horse husbandry and management - Health and welfare (Cb): The horse owner's control beliefs about how able they are to perform horse husbandry and management practices concerning horse health and welfare	0.80	How often are you able to check your horses' condition? To what extent are you able to manage and care for your horse in a manner suitable for the work they are performing? How often are you able to treat your horses for worms? How difficult is it for you to have your horses teeth regularly attended to? How often are you able to attend to your horses hooves? How difficult is it for you to have a veterinarian inspect your unwell horse? How difficult is it for you to have a veterinarian annually check your horse? How difficult would it be for you to recognize the signs of ill-health in your horse and contact a veterinarian for diagnosis and treatment? How difficult is it for you to recognize, access and respond to lameness in your horses? How difficult is it for you to recognize, access and respond to injuries in your horses? To what extent do you know how to look after a horse? To what extent are you aware of the possible risks to horses' welfare?
Horse husbandry and management - Housing (Cb): The horse owner's control beliefs about how able they are to perform horse husbandry and management practices concerning horse housing	0.81	To what extent can you choose rugs to use according to the weather? How often are you actually able to check your horse's rugs? How difficult is it for you to determine the correct temperature for your horse when using rugs? To what extent are you able to provide your horse with a safe environment? How often can you check and maintain the paddocks your horse is kept in? How often are you able to check and maintain your horses' paddocks fencing? How often can you check and maintain the stables your horse is kept in?

	How difficult is it for you to ensure that stables do not restrict your horse's freedom to move? How difficult is it for you to ensure that stables do not restrict your horse's freedom to lie down? How difficult is it for you to provide your horse with shelter from the wind? How difficult is it for you to provide your horse with shelter from the sun? How difficult is it for you to provide your horse with shelter from the rain? How often are you able to check your horses' condition? How difficult is it for you to provide your horse with daily supervision? How difficult is it for you to provide your horses with regular exercise or paddock turnout? How difficult is it for you to provide your horse with social contact from other horses?

Table 19 presents the control beliefs that form the attitude subscale *Human-horse relationship (Cb)* which relates to the participant's beliefs about their ability to perform behaviours associated with the human-horse relationship. The attitude subscale Cronbach's alpha co-efficient was 0.62. Ideally this coefficient should be above 0.70 (Anastasi and Urbina, 1997) however because the subscale contained a small number of items, a coefficient below 0.7 may be accepted as it does not necessarily represent a lack of correlation, simply a small number of items.

Table 19 The questionnaire items that were combined to create the *Human-horse relationship (Cb)* attitude subscale for horse owners' control beliefs, a description of the attitude subscale, and the associated Cronbach's alpha coefficient

Attitude subscale	Cronbach's alpha	Items in attitude subscale
Human-horse relationship (Cb): The horse owner's control beliefs about how able they are to perform behaviours regarding human-horse relationship	0.62	How difficult is it for you to ride your horse? To what extent are you able to ensure you have good basic riding skills? How difficult is it for you to be responsible for your horse's welfare? How difficult is it for you to access information and assistance from industry personnel to improve the way you handle and care for your horses? How difficult is it for you to learn new things about horses?

The list of attitude items that were not able to be included in the attitude subscales is found in Appendix 5.

5.2.3.2 Horse and horse husbandry and management inspection

Data relating to horse health and welfare outcomes, and horse owner husbandry and management practices were collected during the on-site inspection. The inspections involved the researcher and the participant together inspecting the horses, the location where the horses were housed, and the management and husbandry practices implemented by the horse owner. The researcher assessed horse health and welfare outcomes using horse-based indices, and horse owner husbandry and management behaviour using resource/environment-based indices. The horse- and resource/environment-based indices are described in the horse and horse husbandry and management inspection, located in Appendix 3. The horse welfare outcomes are described in Table 20, and the horse owner husbandry and management behaviours are listed in Appendix 6.

Horse welfare outcome variables

The horse welfare outcomes measured during the on-site horse and horse husbandry and management inspection are listed in Table 20.

Table 20 The horse welfare outcome variables measured during the on-site inspection, and a description of the welfare outcome variable

Horse welfare outcome	Welfare outcome description
Body condition score (*BCS*)	A visual and touch assessment of the horse's body fat cover
Lameness score (*LS*)	A visual assessment of the soundness of the horse's gait
Hoof score (*HS*)	A visual assessment of the condition of the horse's hooves
Injury score (*IS*)	A visual and touch assessment of the horse's body and legs for the presence of injury
Disease/illness/injury score (*DIIS*)	A visual and touch assessment of the horse's body and legs for the presence of disease, illness and injury

BCS is a visual assessment of the horse's body fat cover made by the researcher by averaging body condition scores (BCS) taken from the neck, body and rump/pelvis of the horse. Body condition scoring is made independently of the horse's body weight, size and conformation, and is ranked on a scale of 0-5, whereby a score of 0 signifies very thin and 5 represents obese. The assessment of BCS was based on the method developed by Carol and Huntington (1988), used most commonly in Australia (Appendix 7)

LS is based on a visual assessment of the soundness of a horse's gait, performed by the researcher when the horse was walking in a straight line on even level ground. The variable was scored from 1-3, where an increase in numerical value corresponds with a deterioration in the soundness of the horses gait. A score of 1 signifies normal gait, 2 an irregular gait and 3 represents an avoidance to bear weight.

HS is a visual assessment of the condition of the horse's hooves, primarily the length of the hoof. The hoof assessment was performed by the student researcher while the horse was at a standstill on even level ground. The variable was scored on a scale of 1-4, where an increase in the numerical value signifies an increase in the length of the horse's hoof. A score of 1 was considered short, 2 was classed as normal, 3 was long and 4 represented overgrown. Following the on-site inspections, no horses were scored with a hoof score of 1, therefore an increase in numerical value represented an inappropriate hoof condition.

IS records the presence of any form of injury (scratches, abrasions, cuts, swellings and wounds) on the horse's body and legs. The visual assessment of the horse's body and legs was performed by the researcher while the horse was at a standstill on even level ground. The variable was scored according to the presence of an injury, whereby 1 represented yes and 2 represented no. *DIIS* is an extension of the *IS* variable which accounts for the possibility of disease. In addition to a visual assessment of the horse, the researcher sought information from the horse owner concerning the presence of any type of disease, illness or injury. The assessment of the horse was performed by the researcher while the horse was at a standstill on even level ground. The variable was scored according to the presence of an injury, illness or disease, where yes was assigned the value 1 and no was represented by the value 2.

Horse owner husbandry behaviour

In addition to the range of horse husbandry and management behaviours investigated, a horse owner's performance of three key horse husbandry practices were examined in detail. Parasite control, hoof care and dental care behaviour were investigated because, while they are all essential husbandry practices which a horse requires on a regular basis, they differ according to a

number of factors relating to their implementation. These factors include the frequency with which the husbandry practice is employed, the costs associated with implementation, the time required to apply the husbandry practice, the individual required to perform the husbandry practice (i.e. horse owner, farrier, dentist or veterinarian), and the difficulty which may be associated with implementing the husbandry practice.

A number of practical limitations prevented the human behavioural variables from being measured directly by the researcher during the on-site inspection. Horse owner husbandry and management behaviours are often performed at specific times of day. Furthermore, some behaviours are not performed on a daily basis. As a result, organising the on-site inspections to coincide with the performance of all the husbandry and management behaviours measured was not possible and therefore direct behavioural observation was not feasible for the current study. Consequently, the behavioural variables were derived from questionnaire responses concerning the horse's last treatment and the next scheduled treatment. The reported time interval between the two treatments was considered to be a self-reported measure of the actual behaviour of the horse owner. For example, a participant's performance of parasite control was determined by obtaining a response to when the horse was last treated for parasites and when the horse was next scheduled for parasite control treatment. The interval between the two parasite control treatments was regarded as the behavioural response for the parasite control behaviour variable. Table 21 presents the horse owner behaviour variables, the participant response variables they were derived from and a description of what the variable measured.

Table 21 The horse owner behaviour variables, the participant-response variables from which the behaviour variables were derived, and a description of the horse owner behaviour variable

Behaviour variable	Participant-response variables used to derive behaviour variable	Description of behaviour variable
Parasite control behaviour	– When did you last (date) worm/drench your horse? – When are you next scheduled (date) to worm/drench your horse?	The time interval between the most recent and the next scheduled parasite control treatment
Hoof care behaviour	– When did you last (date) have your horses hooves trimmed or shod? – When are you next scheduled (date) to have your horses hooves trimmed or shod?	The time interval between the most recent and the next scheduled hoof care (i.e. hoof trim or shoeing) treatment
Dental care behaviour	– When did you last (date) have your horses teeth checked? – When are you next scheduled (date) to have your horses teeth checked?	The time interval between the most recent and the next scheduled dental care treatment

The appropriate performance of the horse husbandry practices were determined using the 'best practice' procedures outlined in the Code of Practice for the Welfare of Recreational Horses (Prevention of Cruelty to Animals Act 1986). The correct performance of parasite control behaviour was considered the provision of a worm or drench treatment by the horse owner every 12 weeks. The trimming or shoeing of hooves every 8-12 weeks by the horse owner, farrier or veterinarian was deemed the appropriate implementation of hoof care behaviour. A dental check/inspection by a qualified equine dentist or veterinarian, every 12-18 months was regarded as the appropriate employment of dental care behaviour.

5.2.2 Statistical analysis

Data were analysed using the statistical program SPSS 16.0. Data screening was performed on the complete data file to ensure the integrity and accuracy of the data prior to analysis. These data were then analysed using multiple linear regression to establish the relative contribution of the independent variables to the variability in recreational horse owner behaviour.

Relationships between horse owner attributes and horse welfare outcomes

Previous literature indicates that horse owner background factors, attitudes towards behaviour and behaviour are associated with horse welfare outcomes. However, it is likely that most horse owner attributes do not share a direct relationship with horse welfare outcomes. Rather, horse owner attributes appear likely to form part of a sequential relationship as hypothesised in Figure 24. In accordance with the hypothesised model, a large number of correlations were computed between horse owner attributes, and between horse owner behaviour and horse welfare outcomes, as the objective was not to examine specific relationships between individual variables but rather patterns between key horse owner attributes, horse owner behaviours and a number of measurable horse welfare outcomes.

Factors predicting horse welfare outcomes from a horse owner's performance of key horse husbandry and management practices

The hypothesised human-horse relationship depicted in Figure 24 describes potential factors influencing horse owner behaviour and the ensuing relationship with horse welfare outcomes. Linear regression analysis was employed to establish the relative contribution of the background factors to the variability in attitudinal beliefs (belief variables), and the belief variables to the variability in recreational horse owner behaviour. The variables included in the regression analyses were selected on the basis that they correlated with the dependent variable, with a significance level of $p<0.05$. Finally, Pearson product-moment correlations were used to examine the relationship between horse owner husbandry behaviour and horse welfare outcomes.

Figure 24 Generic model describing the possible factors determining horse owner behaviour and the ensuing relationship with horse welfare outcomes

5.3 RESULTS

5.3.1 Demographic profile of the sample

The demographic characteristics of the sample are reported in Appendix 10. Approximately 75% of participant's primary residence was located in Regional Victoria, from which 60% were considered rural and the remaining 40% were semi-rural. Of the 25% of participants who resided primarily in urban locations, 1% were considered inner city, 60% were urban and 39% peri-urban. Approximately 50% of participants were aged between 26 and 45 years. Of the remaining 50% of the sample, 12% were less than 25 years of age and 38% were over 45 years of age. Over 85% of participants were female. In addition to their horses, all participants owned some other animal species. Over 70% of participants were a member of a horse club or society. Less than 50% participants were registered horse owners. Approximately 50% of participants had owned horses for more than 10 years, and less than 10% of participants had owned horses for less than six years. Approximately 25% of horse owners owned only one horse, however, on average participants owned two horses.

Less than 50% of horses were registered in some way. Approximately 20% of participants did not interact with their horse each day, and participants most commonly spent less than 30 minutes per day interacting with their horses. Seventy percent of horses were housed at the primary residence of the horse owner. Approximately 80% of horses were housed on pasture at all times. Only 15% of horses did not receive supplementary feeding. Over 60% of horses had been inspected by a veterinarian in the 12 months prior to the on-site inspection. Approximately 30% of horses had some form of disease, injury or illness as ascertained by the researcher, from which approximately 64% were the horse that the horse owner had the least amount of contact with. It was ascertained by the researcher that none of the observed horse welfare concerns warranted reporting to relevant welfare authority, i.e. all horses had a BCS above two and were receiving treatment for any disease injury or illness.

5.3.2 The relationships between horse owner attributes and horse welfare outcomes

Prior to conducting the regression analyses to investigate the hypothesised background factor-attitude-behaviour-welfare relationships, preliminary correlations were conducted to identify the variables that showed significant interrelationships. This was done to reduce numbers of variables

in the subsequent regression analyse to a manageable level, given the relatively small sample size. Four aspects of the human-horse relationship were examined using Pearson product-moment correlation analyses; horse owner background factors, horse owner attitudes, horse owner behaviour and horse welfare outcomes. These analyses are presented in three sections, grouped according to section of the hypothesised human-horse relationship model (Figure 24). The first section presents the correlations between horse owner background factors and the three forms of belief which determine horse owners' attitudes. The second section describes the relationships between the horse owner belief variables and horse owner behaviour. Finally, the third section reports the correlations between horse owner behaviour variables and horse welfare outcomes. The descriptive statistics for all variables are presented in Appendix 11.

Correlations between horse owner background factors and horse owner belief variables

A number of horse owner background factors were significantly correlated with the horse owner beliefs that underlie horse owner attitudes. The significant Pearson-product moment correlations are given in Tables 22, 23, 24 and 25 for attitude subscales, individual attitude towards behaviour variables, individual normative belief variables, and individual control belief variables, respectively.

Table 22 Pearson product-moment correlations ($p<0.05$) between horse owner background factors and horse owner attitude subscales (n=57)

	+ve st	-ve st	Resce	Gen A	Bb hw	Bb int	Nb d	Cb hw	Cb h
Age							-0.36**		
Gender				0.30*					
Hcs Member				-0.29*				0.29*	
Reg owner			0.33*					0.30*	
Own yrs	0.28*								
Ride instruct		-0.43*				0.33*			
Aware CofP			0.35**		0.32*				
Impr know									0.38**

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

+ve st refers to positive statements about horses, **-ve st** refers to negative statements about horses, **Resce** refers to Horses require resource provision, **Gen A** refers to General attitude statements (positive), **Bb hw** refers to Horse husbandry and management - health and welfare (Bb), **Bb int** refers to Human-horse interaction (Bb), **Nb d** refers to Horse husbandry and management – diet (Nb), **Cb hw** refers to Horse husbandry and management – health and welfare (Cb), **Cb h** refers to Horse husbandry and management – housing (Cb), **Age** refers to the horse owner's age, **Gender** refers to the horse owner's gender, **Hcs Member** is an abbreviation of horse club and society member, **Reg owner** refers to registered horse owner, **Own yrs** refers to horse ownership years, **Ride instruct** refers to riding instruction, **Aware CofP** refers to awareness of the Code of practice pertaining to the welfare of recreational horses, and **Improve know** refers to the active improvement of knowledge.

Table 23 Pearson product-moment correlations ($p<0.05$) between horse owner background factors and individual horse owner attitude towards behaviour variables (n=57)

	A9	A18	A19	A22	A28	A30	A33	A34	A42	A43	A46
Region type					-0.29*	0.35**					
Age					-0.48**	0.43**		-0.27*			
Gender	0.30*					-0.38*					-0.36**
Children							0.33**	0.27*			
Prop type						0.32**					
Prop size							0.27*				
Horse #											-0.30*
Hcs Member						0.32*		-0.27*			0.31*
Reg owner			0.28*								
Own yrs										0.27*	
Ride instruct	-0.27*					0.28*					
Ride int freq					-0.56**						
Aware CofP		0.33**		0.32*					-0.31*	0.29*	

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

$^{(-ve\ RC)}$ re-coded negative attitude item, **A9**$^{(-ve\ RC)}$. It is my responsibility to provide a safe environment for my horse, **A18**. How often should you check a horses' condition?, **A19**. How important is it to provide horses with daily supervision?, **A22**. How important is it to manage and care for a horse according to the work they are doing?, **A28**$^{(-ve\ RC)}$. How often should you treat horses for worms?, **A30**. How often should a horses' hooves be attended to?, **A33**. How important is it for the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment?, **A34**. How important is it to recognize, assess and respond to lameness in horses?, **A42**. Industry personnel can provide information and assistance that can improve the way we handle and care for horses, **A43**. There is always something new to learn about horses, **A46**. Horses are difficult to look after, **Region type** refers to the region type where the horse owner's primary residence is located, **Age** refers to the horse owner's age, **Gender** refers to the horse owner's gender, **Children** refers to whether the horse owner has children, **Prop type** refers to property type, **Prop size** refers to property size, **Horse #** refers to number of horses, **Hcs Member** is an abbreviation of horse club and society member, **Reg owner** refers to registered horse owner, **Own yrs** refers to horse ownership years, **Ride instruct** refers to riding instruction, **Ride int freq** refers to the frequency of riding instruction, and **Aware CofP** refers to awareness of the Code of practice pertaining to the welfare of recreational horses.

Table 24 Pearson product-moment correlations ($p<0.05$) between horse owner background factors and individual horse owner normative belief variables (n=57)

	B1	B3	B9	B28	B30	B31	B37	B41	B42	B43
Region type				0.33**	0.37**					
Age	-0.33*	-0.34*		-0.32*						
Children					-0.30*					
Animals						-0.41**				
Ride instruct			0.30*		0.32**		0.28*			
Impr know								0.33**	0.31*	0.30*

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

B1. How important do other horse owners believe it is to base a horse's diet on its individual needs, **B3**. How important do other horse owners believe it is to adjust a horses' diet according to its conditions?, **B9**. Other horse owners believe that it is my responsibility to provide a safe environment for my horse, **B28**. How often do other horse owners suggest that horses should be treated for worms?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **B31**. How important do other horse owners believe it is to have a veterinarian inspect a horse showing sighs of ill-health?, **B37**. How important do other horse owners believe it is to be aware of the possible risks to horses' welfare?, **B41**. Other horse owners believe that I am responsible for my horse's welfare, **B42**. Other horse owners believe that industry personnel can provide information and assistance that can improve the way we handle and care for horses, **B43**. Other horse owners suggest that there is always something new to learn about horses, **Region type** refers to the region type where the horse owner's primary residence is located, **Age** refers to the horse owner's age, **Children** refers to whether the horse owner has children, **Animals** refers to animals other than horses, **Ride instruct** refers to riding instruction, and **Improve know** refers to the active improvement of knowledge.

Table 25 Pearson product-moment correlations ($p<0.05$) between horse owner background factors and individual horse owner control belief variables (n=57)

	C18	C19	C28	C29	C30	C34	C36	C41	C42	C43
Region type			0.33**							
Age			0.52**	0.27*	0.33**					
Gender				-0.26*	-0.27*					
Prop size	0.38**								-0.32**	
Animals		-0.28*					-0.27*			-0.31*
Hcs Member										
Reg owner				0.27*	0.36**		0.30*			
Own yrs						-0.36**			-0.26*	
Ride instruct								0.30*		
Ride int freq			0.43**	0.44**						

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

C18. How often are you able to check your horse's condition?, **C19**. How difficult is it for you to provide your horse with daily supervision?, **C28**. How often are you able to treat your horses for worms?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, **C30**. How often are you able to attend to your horse's hooves?, **C34**. How difficult is it for you to recognize, access and respond to lameness in your horses?, **C36**. To what extent do you know how to look after a horse?, **C41**. How difficult is it for you to be responsible for your horse's welfare?, **C42**. How difficult is it for you to access information and assistance from industry personnel to improve the way you handle and care for your horses?, **C43**. How difficult is it for you to learn new things about horses?,**Region type** refers to the region type where the horse owner's primary residence is located, **Age** refers to the horse owner's age, **Gender** refers to the horse owner's gender, **Prop size** refers to property size, **Animals** refers to animals other than horses, **Hcs Member** is an abbreviation of horse club and society member, **Reg owner** refers to registered horse owner, **Own yrs** refers to horse ownership years, **Ride instruct** refers to riding instruction, and **Ride int freq** refers to the frequency of riding instruction.

The attitude subscales *General horse husbandry and management, The importance of the recreational horse to the horse owner, Horse welfare is not the responsibility of the horse owner, Horse husbandry and management – housing (Bb), Horse husbandry and management – health and welfare (Nb), Horse husbandry and management – housing (Cb), Human-horse interaction (Nb), Horse husbandry and management – diet (Cb),* and *Human-horse interaction (Cb)* were not significantly associated with any of the horse owner background factors. Furthermore, there were no significant relationships found between the background factors region type, children, level of education, annual household income, property type, property size, number of horses owned, animals other than horses owned, frequency of riding instruction and any of the attitude subscales.

The attitude subscale *General attitude statements* was significantly positively correlated with *Gender* ($r=0.30$, $p=0.02$). The relationship implies that male horse owners tend to agree more strongly with positive statements about horses than do female horse owners. A significant negative correlation was found between *General attitude statements* and *Horse club and society membership* ($r = -0.34$, $p = 0.01$). This correlation indicates that horse owners who are members

of a horse club or society appear to agree less strongly with positive attitude statements regarding horses than horse owners who do not hold a horse club or society membership.

Significant positive relationships were found between the attitude subscale *Horses require resource provision* and the background factors *Registered horse owner* ($r=0.33$, $p=0.01$) and *Awareness of the Code of Practice pertaining to the welfare of recreational horses* ($r=0.35$, $p<0.01$). These correlations imply that the belief that horse ownership requires the considerable provision of resources is associated with the registration of horse ownership and an awareness of the Code of Practice pertaining to the welfare of recreational horses.

A significant positive relationship was found between the attitude subscale *Positive statements about horses* and *Years of horse ownership* ($r=0.28$, $p=0.03$). The correlation indicates that the greater the horse ownership history the more strongly the horse owner agrees with positive statements concerning horses.

The attitude subscale *Negative statements about horses* was negatively correlated with *Riding instruction* ($r=-0.43$, $p<0.01$). This relationship implies that horse owners who have at some point in time received riding instruction disagree more strongly with negative statements concerning horses than those horse owners who have never received riding instruction.

A significant positive correlation was found between the attitude subscale *Horse husbandry and management – health and welfare (Bb)* and *Awareness of the Code of Practice pertaining to the welfare of recreational horses* ($r = 0.32$, $p = 0.02$). This attitude subscale comprised variables which measured the importance horse owners place on performing husbandry and management practices that concern the health and welfare of the horse. The relationship implies that those horse owners who are aware of the Code of Practice assign more importance to the performance of husbandry practices that concern horse health and welfare than do those horse owners who are unaware.

There was a significant positive relationship found between the attitude subscale *Human-horse interactions (Bb*) and *Riding instruction* ($r = 0.33$, $p = 0.01$). This attitude subscale consisted of variables that measured the importance horse owners place on improving their knowledge and therefore their human-horse interactions. The correlation indicates that horse owners who have received riding instruction appear to assign greater importance to expanding their knowledge and improving the way in which they manage and interact with their horses than do horse owners who have never received riding instruction.

A significant negative correlation was found between the attitude subscale *Horse husbandry and management – diet (Nb)* and *Age* ($r=-0.36$, $p<0.01$). The attitude subscale consisted of variables that measured horse owners' belief regarding the importance other horse owners place on performing husbandry and management practices that concern the provision of an appropriate diet for the horse. The relationship implies that as age increases so to does the normative beliefs of the horse owner with regards to the importance of appropriate diet provision in horses.

A significant positive relationship was found between the attitude subscale *Horse husbandry and management – Health and welfare (Cb)* and the background factors *Horse club and society membership* ($r=0.30$, $p=0.03$) and *Registered horse owner* ($r=0.30$, $p=0.02$). This attitude subscale comprised variables that measured the horse owner's ability to perform husbandry and management practices that concern the health and welfare of the horse. These correlations indicate that favourable control beliefs concerning the performance of horse health and welfare relevant husbandry practices are associated with horse club and society membership and the registration of horse ownership.

A significant positive relationship was found between the attitude subscale *Horse husbandry and management (Cb) – Housing* and *Active improvement of knowledge* ($r=0.38$, $p<0.01$). This attitude subscale measured the horse owner's ability to perform husbandry and management practices that concerned the provision of an appropriate housing environment for the horse. The correlation indicates that horse owners who actively attempt to improve their knowledge believe themselves more able to provide a safe and appropriate housing environment for their horse than those owners who choose to not actively improve their knowledge.

Significant correlations were found between individual horse owner attitude variables and horse owner background factors. The behavioural belief *A9* $^{(-ve\ RC)}$ was significantly positively correlated with *Gender* (r=0.30, p=0.02) and significantly negatively correlated with *Riding instruction* (r=-0.27, p=0.04). The relationships imply that a favourable behavioural belief towards the provision of a safe horse housing environment is associated with a female gender and riding instruction. A significant positive correlation was found between the behavioural belief *A18* and *Awareness of the Code of Practice pertaining to the welfare of recreational horses* (r=0.33, p<0.01). This relationship indicates that favourable behavioural beliefs towards horse condition inspection behaviour are associated with an awareness of the Code of Practice pertaining to the welfare of recreational horses. The significant positive correlation between the behavioural belief *A19* and *Registered horse owner* (r=0.28, p=0.04) implies that a favourable behavioural belief regarding daily horse supervision is associated with the registration of horse ownership. The behavioural belief *A22* was significantly positively correlated with *Awareness of the Code of Practice pertaining to the welfare of recreational horses* (r=0.32, p=0.02). The relationship indicates that favourable behavioural beliefs about the performance of husbandry and management practices appropriate for the horse's workload are associated with an awareness of the Code of Practice pertaining to the welfare of recreational horses. Significant negative correlations were found between the behavioural belief *A28*$^{(-ve\ RC)}$ and the background factors *Region type* (r=-0.29, p=0.03), *Age* (r=-0.48, p<0.01) and *Riding instruction frequency* (r=-0.56, p<0.01). These correlations imply that favourable attitudes towards parasite control behaviour are associated with an urban region of primary residence, a young age, and frequent riding instruction. The behavioural belief *A30* was significantly positively correlated with the background factors *Region type* (r=0.35, p=0.03), *Age* (r=0.43, p<0.01), *Property type* (r=0.32, p=0.02), *Horse club and society membership* (r=0.32, p=0.02), and *Riding instruction* (r=0.28, p=0.04), and negatively correlated with *Gender* (r=-0.38, p=0.02). These correlations indicate that favourable behavioural beliefs towards hoof care behaviour are associated with an urban region of primary residence, a young age, horse club and society membership, riding instruction and a female gender. Significant positive correlations were found between the behavioural belief *A33* and the background factors *Children* (r=0.33, p<0.01) and *Property size* (r=0.27, p=0.04). The relationships imply that a favourable behavioural belief about the ability to recognise, access and appropriately respond to signs of ill health in horses is associated with a small property sizes and children. The behavioural belief *A34* was significantly positively correlated with *Children*

(r=0.27, p=0.04), and negatively correlated with *Age* (r=-0.27, p=0.04), and *Horse club and society membership* (r=-0.27, p=0.05). These correlations indicate that favourable behavioural beliefs regarding the ability to recognise, access and appropriately respond to lameness in horses is associated with children, an older age, and a lack of horse club and society membership. The behavioural belief *A42* was significantly negatively correlated with *Awareness of the Code of Practice pertaining to the welfare of recreational horses* (r=-0.31, p=0.02), implying that a favourable behavioural belief about the obtainment of information and assistance from industry personnel is associated with a lack of awareness of the Code of Practice pertaining to the welfare of recreational horses. Significant positive correlations were found between the behavioural belief *A43* and the background factors *Registered horse owner* (r=0.27, p=0.04) and *Awareness of the Code of Practice pertaining to the welfare of recreational horses* (r=0.29, p=0.03). The relationships indicate that favourable behavioural beliefs towards the continued need for knowledge improvement are associated with the registration of horse ownership and an awareness of the Code of Practice pertaining to the welfare of recreational horses. The behavioural belief *A46* was significantly positively correlated with *Horse club and society membership* (r=0.31, p=0.02), and negatively correlated with *Gender* (r=-0.36, p<0.01), and *Number of horses owned* (r=-0.30, p=0.03). These correlations imply that favourable behavioural beliefs regarding the acknowledgement of the difficulty involved with horse management are associated with horse club and society membership, a female gender and an increased number of horses owned.

A significant negative correlation was found between the normative belief *B1* and *Age* (r=-0.33, p<0.01), which indicates that a favourable normative beliefs regarding the determination of a horse's diet based on its circumstances is associated with an older horse owner age. The significant negative correlation found between the normative belief *B3* and *Age* (r=-0.34, p<0.01) implies that favourable normative beliefs regarding modifying a horse's diet according to its changing conditions are associated with an older age in horse owners. The normative belief *B9* was significantly positively correlated with *Riding instruction* (r=0.28, p=0.03), indicating that a favourable normative belief concerning the provision of a safe horse housing environment is associated with riding instruction. The normative belief *B28* was significantly positively correlated with *Region type* (r=0.33, p<0.01), and negatively correlated with *Age* (r=-0.32, p=0.02). These relationships indicate that favourable normative beliefs about parasite control behaviour are associated with an urban region of primary residence and an older age. The normative belief *B30* was significantly positively correlated with *Region type* (r=0.37, p<0.01)

and *Riding instruction* (r=0.32, p<0.01), and negatively correlated with *Children* (r=-0.30, p=0.03). The correlations imply that favourable normative beliefs regarding hoof care behaviour are associated with an urban region of primary residence, riding instruction and a lack of children. A significant negative correlation was found between the normative belief *B31* and *Animals* (r=-0.41, p<0.01), indicating that a favourable normative belief about veterinary consultation is associated with a lack of animals other than horses. The significant positive correlation found between the normative belief *B37* and *Riding instruction* (r=0.28, p=0.03) implies that favourable normative beliefs concerning an awareness of the possible risks to horse welfare is associated with riding instruction. Significant positive correlations were found between the normative beliefs *B41* (r=0.33, p<0.01), *B42* (r=0.31, p=0.02) and *B43* (r=0.30, p=0.03) and the background factor *Active knowledge improvement*. These relationships indicate that favourable normative beliefs regarding horse owner's responsibility for the welfare of their horses, the obtainment of information and support from industry personnel, and the continued improvement of knowledge are associated with active knowledge improvement in horse owners.

A significant correlation was found between the control belief *C18* and *Property size* (r=0.38, p<0.01), implying that a favourable control belief concerning horse condition inspection behaviour is associated with smaller property sizes. The significant negative correlation between the control belief *C19* and *Animals* (r=-0.28, p=0.03) indicates that a favourable control belief regarding daily horse supervision is associated with a lack of animals other than horses. Significant correlations were found between the control belief *C28* and the background factors *Region type* (r=0.33, p<0.01), *Age* (r=0.52, p<0.01) and *Riding instruction frequency* (r=0.43, p<0.01). These relationships imply that favourable control beliefs about parasite control behaviour are associated with an urban region of primary residence, a young age and frequent riding instruction. The control belief *C29* was significantly correlated with *Age* (r=0.27, p=0.04), *Registered horse owner* (r=0.27, p=0.04), and *Riding instruction frequency* (r=0.43, p<0.01), and negatively correlated with *Gender* (r=-0.26, p=0.05). The correlations indicate that favourable control beliefs concerning dental care behaviour are associated with a young age, the registration of horse ownership, frequent riding instruction and a female gender. The control belief *C30* was significantly positively correlated with *Age* (r=0.33, p<0.01) and *Registered horse owner* (r=0.36, p<0.01), and negatively correlated with *Gender* (r=-0.27, p=0.04). These relationships imply that favourable control beliefs concerning hoof care behaviour are associated with a young age, the registration of horse ownership, and a female gender. The significant negative correlation

between the control belief *C34* and *Years of horse ownership* (r=-0.36, p<0.01) indicates that a favourable control belief regarding the ability to recognise, access and appropriately respond to lameness in horses is associated with an increased horse ownership history. The control belief *C36* was significantly positively correlated with *Registered horse owner* (r=0.30, p=0.02), and negatively correlated with *Animals* (r=-0.27, p=0.04). The correlations imply that favourable control beliefs concerning the possession of the knowledge required to appropriately care for horses are associated with the registration of horse ownership and a lack of animals other than horses. A significant positive correlation was found between the control belief *C41* and *Riding instruction* (r=0.30, p=0.03) implying that a favourable control belief about one's responsibility for horse welfare is associated with riding instruction. Significant negative correlations were found between the control belief *C42* and the background factors *Property size* (r=-0.32, p<0.01) and *Years of horse ownership* (r=-0.26, p=0.05). These relationships indicate that favourable control beliefs regarding the obtainment of information and support from industry personnel are associated with larger property sizes and a greater horse ownership history. The significant negative correlation found between the control belief *C43* and *Animals* (r=-0.31, p=0.02) implies that a favourable control belief concerning the continued improvement of knowledge is associated with a horse owners lack of animals other than horses.

Correlations between the horse owner attitude subscales

Pearson product-moment correlations were conducted between each of the six horse owner attitude subscales derived from the attitude questions in the random telephone questionnaire and the twelve horse owner attitude subscales derived from the attitude questionnaire delivered during the on-site inspection. The results are presented in Tables 26 and 27.

Table 26 Pearson product-moment correlations (p<0.05) between the six attitude subscales derived from the random telephone survey (n = 57)

	+ve st	-ve st	Resce	Gen h	Imprt	Resps
+ve st	1.0			0.45**	0.51**	-0.31*
-ve st		1.0				
Resce			1.0			
Gen h				1.0	0.43**	-0.57**
Imprt					1.0	
Resps						1.0

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df=55

+ve st refers to Positive statements about horses, **-ve st** refers to Negative statements about horses, **Resce** refers to Horses require resource provision, **Gen h** refers to General horse husbandry and management, **Imprt** refers to The importance of the recreational horse to the horse owner, and **Resps** refers to Horse welfare is not the responsibility of the horse owner

Table 27 Pearson product-moment correlations ($p<0.05$) between the twelve horse owner attitude subscales derived from the attitude questionnaire (n = 57)

	Gen A	Bb hw	Bb h	Bb int	Nb d	Nb hw	Nb h	Nb int	Cb d	Cb hw	Cb h	Cb int
Gen A	1.0			0.27*				0.27*	0.26*			0.37**
Bb hw		1.0	0.60**	0.41**	0.45**	0.52**	0.48**	0.55**	0.28*	0.43**	0.31*	0.39**
Bb h			1.0	0.53**	0.45**	0.36**	0.56**	0.55**	0.26*	0.39**	0.57**	0.43**
Bb int				1.0				0.33*	0.36**	0.44**	0.39**	0.46**
Nb d					1.0	0.74**	0.77**	0.74**				0.26*
Nb hw						1.0	0.78**	0.79**				0.27*
Nb h							1.0	0.75**			0.29*	0.33*
Nb int								1.0				0.33*
Cb d									1.0	0.49**	0.52**	0.33*
Cb hw										1.0	0.53**	0.54**
Cb h											1.0	0.38**
Cb int												1.0

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df=55

Gen A refers to General attitude statements (positive), **Bb hw** refers to Horse husbandry and management - health and welfare (Bb), **Bb h** refers to Horse husbandry and management – housing (Bb), **Bb int** refers to Human-horse interaction (Bb), **Nb d** refers to Horse husbandry and management – diet (Nb), **Nb hw** refers to Horse husbandry and management – health and welfare (Nb), **Nb h** refers to Horse husbandry and management – housing (Nb), **Nb int** refers to Human-horse interaction (Nb), **Cb d** refers to Horse husbandry and management – diet (Cb), **Cb hw** refers to Horse husbandry and management – health and welfare (Cb), **Cb h** refers to Horse husbandry and management – housing (Cb), and **Cb int** refers to Human-horse interaction (Cb).

With regard to the six horse owner attitude subscales derived from the random telephone questionnaire, only a few correlations were found to be significant (Table 26). *Positive statements about horses* and *General horse husbandry and management* correlated positively with each other and *The importance of the horse to the owner*, while also correlating negatively with *Horse welfare is NOT the horse owners responsibility*. *Negative statements about horses* did not correlate with any of the other attitude subscales, and *Horses require resource provision* only had a tendency ($p<0.10$) to be correlated with *General horse husbandry and management*.

As reported in Table 27, all horse owner attitude subscales derived from the attitude questionnaire were significantly intercorrelated with the exception of *General attitude statements* (+ve) and the horse husbandry and management subscales concerning normative beliefs (*Horse husbandry and management – Diet (Nb), Horse husbandry and management - Health and welfare (Nb), Horse husbandry and management – Housing (Nb), Human-horse interactions (Nb*)). The variables *Horse husbandry and management - Health and welfare (Bb), Horse husbandry and management – Housing (Bb), Human-horse interactions (Nb)* and *Human-horse interactions (Cb)* positively correlated with all attitude subscale variables. *Human-horse interactions (Bb*) was positively correlated with *Human-horse interactions (Nb)* and all attitude subscales concerning control beliefs. *General attitude statements* was positively correlated with *Horse husbandry and management – Diet (Cb)* and all human-horse interaction attitude subscales.

The correlations between the attitude subscales were performed in order to investigate the presence of a consistent attitude system. Attitude subscales which are well correlated indicate the presence of an attitude system, in which a series of related attitudes are consistent (Hemsworth and Coleman, 2010). The consistent inter-correlations amongst the belief questions (as found between the 12 attitude subscales) may reflect the horse owner's underlying attitude towards certain kinds of interactions with horses, that is, husbandry and management practices.

Correlations between horse owner attitudes (beliefs) and horse owner behaviour variables

Pearson product-moment correlation analyses determined that horse owner attitude subscales were significantly correlated with horse owner behaviour, in both H1 and H2. The significant Pearson product-moment correlations between horse owner attitude subscales and horse owner

husbandry behaviour are given in Tables 28 and 29, for H1 and H2 respectively. The significant Pearson product-moment correlations between horse owner attitude subscales and horse owner management behaviour are given in Tables 30 and 31, for H1 and H2 respectively. In addition, Pearson product-moment correlation analyses were conducted between the individual belief variables which were unable to be included in one of the attitude subscales and horse owner behaviour (Tables 32-43).

Table 28 Pearson product-moment correlations (p<0.05) between horse owner attitude subscales and horse owner husbandry behaviour in H1 (n=57)

	Resrces	Int time	Ride	Compt	Hoof	Worm	Shod	Bare	BC insp	Sup fed
Resce						0.28*	0.28*	-0.26*	0.43**	
Gen h		-0.31*								
Bb hw					-0.30*					
Nb d				-0.32**						
Nb hw			0.27*							
Nb h			0.28*							
Nb int				-0.30*						
Cb d	-0.44**									
Cb hw	-0.30*									
Cb h	-0.50**	-0.30					0.30*	-0.30*		
Cb int			-0.43**				0.26*			-0.27*

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

Resce refers to Horses require resource provision, **Gen h** refers to General horse husbandry and management, **Bb hw** refers to Horse husbandry and management - health and welfare (Bb), **Nb d** refers to Horse husbandry and management – diet (Nb), **Nb hw** refers to Horse husbandry and management – health and welfare (Nb), **Nb h** refers to Horse husbandry and management – housing (Nb), **Nb int** refers to Human-horse interaction (Nb), **Cb d** refers to Horse husbandry and management – diet (Cb), **Cb hw** refers to Horse husbandry and management – health and welfare (Cb), **Cb d** refers to Horse husbandry and management – housing (Cb), **Cb int** refers to Human-horse interaction (Cb), **Resrces** refers to resources available to horse, **Int time** refers to the amount daily horse owner-horse interaction, **Ride** refers to horse ridden, **Compt** refers to compete, **Hoof** refers to hoof care behaviour, **Worm** refers to parasite control behaviour, **Shod** refers to horse shod, **Bare** refers to barefoot horse, **BC insp** refers to horse body condition inspection, and **Sup fed** refers to supplementary feeding.

Table 29 Pearson product-moment correlations ($p<0.05$) between horse owner attitude subscales and horse owner husbandry behaviour in H2 (n=42)

	Reg H	Resrces	Daily int	Int time	Ride	Compt	Hoof	Vet insp	BC insp	Sup fed
+ve st		-0.45**								
Resce			0.60**	-0.41**					0.56**	-0.40**
Gen h				-0.50**	0.36*					
Gen A		-0.34*			0.36*					
Bb hw				-0.40*			0.32*	0.33*	0.33*	
Bb h				-0.34*			0.32*			-0.35*
Bb int	0.32*									
Nb d						-0.32**				
Nb hw									0.32*	
Nb int						-0.30*				
Cb hw										-0.31*
Cb h		-0.33*								
Cb int					0.35*					

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

+ve st refers to positive statements about horses, **Resce** refers to Horses require resource provision, **Gen h** refers to General horse husbandry and management, **Gen A** refers to General attitude statements (positive), **Bb hw** refers to Horse husbandry and management - health and welfare (Bb), **Bb h** refers to Horse husbandry and management – housing (Bb), **Bb int** refers to Human-horse interaction (Bb), **Nb d** refers to Horse husbandry and management – diet (Nb), **Nb hw** refers to Horse husbandry and management – health and welfare (Nb), **Nb int** refers to Human-horse interaction (Nb), **Cb hw** refers to Horse husbandry and management – health and welfare (Cb), **Cb h** refers to Horse husbandry and management – housing (Cb), **Cb int** refers to Human-horse interaction (Cb), **Reg H** refers to registered horse, **Resrces** refers to resources available to horse, **Daily interaction** refers to daily horse owner-horse interaction, **Int time** refers to the amount daily horse owner-horse interaction, **Ride** refers to horse ridden, **Compt** refers to compete, **Hoof** refers to hoof care behaviour, **Vet insp** refers to veterinary inspection, **BC insp** refers to horse body condition inspection, and **Sup fed** refers to supplementary feeding.

Table 30 Pearson product-moment correlations ($p<0.05$) between horse owner attitude subscales and horse owner management behaviour in H1 (n=57)

	H reg t	Supvisn	S diet	W diet	Past qty	Past qly	#H Pad	H_20 insp	Pad size
Resce			-0.39**						
Gen h						0.33**			
Bb hw						0.39**		0.31*	
Bb int								0.34**	0.27*
Nb d	0.28*				-0.31*	0.30*			
Nb hw					-0.37**	0.34**		0.37**	
Nb h					-0.34**				
Nb int					-0.33**	0.29*		0.30*	
Cb d			-0.27*				0.30*	0.40**	
Cb hw			-0.32*	-0.41**				0.33**	
Cb h		-0.30*	-0.36**	-0.30*				0.33*	
Cb int					-0.30*				

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

Resce refers to Horses require resource provision, **Gen h** refers to General horse husbandry and management, **Bb hw** refers to Horse husbandry and management - health and welfare (Bb), **Bb int** refers to human-horse interaction (Bb), **Nb d** refers to Horse husbandry and management – diet (Nb), **Nb hw** refers to Horse husbandry and management – health and welfare (Nb), **Nb h** refers to Horse husbandry and management – housing (Nb), **Nb int** refers to Human-horse interaction (Nb), **Cb d** refers to Horse husbandry and management – diet (Cb), **Cb hw** refers to Horse husbandry and management – health and welfare (Cb), **Cb h** refers to Horse husbandry and management – housing (Cb), **Cb int** refers to Human-horse interaction (Cb), **H reg T** refers to the type of region where the horse is housed, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **Past qty** refers to pasture quantity, **Past qly** refers to pasture quality, **#H pad** refers to the number of horses housed in the paddock with the horse, **H_20 insp** refers to water source inspection, and **Pad size** refers to the size of the paddock where the horse is housed.

Table 31 Pearson product-moment correlations ($p<0.05$) between horse owner attitude subscales and horse owner management behaviour in H2 (n=42)

	H loc	Dist PR	Supvisn	S diet	W diet	Past qty	Past qly	H_20 insp	H meth
Resce	0.31*	0.44**	-0.33*	-0.48**	-0.51**				
Gen h				-0.43**	-0.35*				
Imprt									-0.35*
Resps				0.34*					
Bb hw				0.40**	-0.39**			0.43**	
Bb h				-0.40**	-0.32*	0.32*		0.36*	
Bb int								0.50**	
Nb hw				-0.34*				0.42**	
Nb int				-0.38**				0.51**	
Cb d			-0.34*						
Cb hw				-0.33*				0.40**	
Cb h				-0.32*				0.41**	
Cb int						0.36*	-0.32*		

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

Resce refers to Horses require resource provision, **Gen h** refers to General horse husbandry and management, **Imprt** refers to The importance of the recreational horse to the horse owner, **Resps** refers to Horse welfare is not the responsibility of the horse owner, **Bb hw** refers to Horse husbandry and management - health and welfare (Bb), **Bb h** refers to Horse husbandry and management – housing (Bb), **Bb int** refers to Human-horse interaction (Bb), **Nb hw** refers to Horse husbandry and management – health and welfare (Nb), **Nb int** refers to Human-horse interaction (Nb), **Cb d** refers to Horse husbandry and management – diet (Cb), **Cb hw** refers to Horse husbandry and management – health and welfare (Cb), **Cb h** refers to Horse husbandry and management – housing (Cb), **Cb int** refers to Human-horse interaction (Cb), **H loc** refers to the horses location, **Dist PR** is an abbreviation of the distance from where the horse is housed to the horse owners primary residence, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **Past qty** refers to pasture quantity, **Past qly** refers to pasture quality, **H_20 insp** refers to water source inspection, and **H meth** refers to horse housing method

Table 32 Pearson product-moment correlations ($p<0.05$) between individual horse owner behavioural belief variables and horse owner husbandry behaviour in H1 (n=57)

	Reg H	Resrces	Ride	Compt	Hoof	Worm	Teeth	Vet insp	Shod	BC insp	Sup fed
A9$^{(-ve\ RC)}$			-0.34**								
A18		-0.32*			0.28*		0.35**		0.27*	0.30*	
A28$^{(-ve\ RC)}$				-0.41**		-0.49**	-0.32*				
A29							0.29*				
A30			0.44**	0.27*	0.67**	0.30*	0.44**				
A34				-0.36**							
A36	-0.29*										
A37							-0.29*				
A43								0.31*			-0.29*
A46		-0.26*		0.52**		0.28*					

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

(-ve RC) re-coded negative attitude item, **A9**. It is my responsibility to provide a safe environment for my horse, **A18**. How often should you check a horse's condition?, **A28**. How often should you treat horses for worms?, **A29**. How important is it to regularly attend to horses' teeth?, **A30**. How often should a horse's hooves be attended to?, **A34**. How important is it to recognize, assess and respond to lameness in horses?, **A36**. How important is it that horse owners know how to look after a horse?, **A37**. How important is it to be aware of the possible risks to horses' welfare?, **A43**. There is always something new to learn about horses, **A46**. Horses are difficult to look after, **Reg H** refers to registered horse, **Resrces** refers to resources available to horse, **Ride** refers to horse ridden, **Compt** refers to compete, **Hoof** refers to hoof care behaviour, **Worm** refers to parasite control behaviour, **Teeth** refers to dental care behaviour, **Vet insp** refers to veterinary inspection, **Shod** refers to horse shod, **BC insp** refers to horse body condition inspection, and **Sup fed** refers to supplementary feeding.

Table 33 Pearson product-moment correlations (p<0.05) between individual horse owner behavioural belief variables and horse owner husbandry behaviour in H2 (n=42)

	Resrces	Daily int	Int time	Ride	Compt	Hoof	Worm	Teeth	Vet insp	Shod	BC insp
A3									0.31*		
A9$^{(-ve\ RC)}$						-0.31*					
A18			-0.39**					0.49**			
A22			-0.31**								
A28$^{(-ve\ RC)}$					-0.41**		-0.60**	-0.31*			-0.31*
A30					0.27*	0.61**	0.35*	0.36*			
A31	-0.31*										0.41**
A34		0.35*	-0.31*		-0.36**						
A35				-0.33*							
A41										0.31*	
A42								0.34*			
A46					0.51**		0.43**				

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

(-ve RC) re-coded negative attitude item, **A3**. How important is it to adjust a horse's diet according to its conditions?, **A9**. It is my responsibility to provide a safe environment for my horse, **A18**. How often should you check a horse's condition?, **A22**. How important is it to manage and care for a horse according to the work they are doing?, **A28**. How often should you treat horses for worms?, **A30**. How often should a horse's hooves be attended to?, **A31**. How important is it to have a veterinarians inspect a horse showing signs of ill-health?, **A34**. How important is it to recognize, assess and respond to lameness in horses?, **A35**. How important is it to recognize, assess and respond to injuries in horses?, **A41**. I am responsible for my horses' welfare, **A42**. Industry personnel can provide information and assistance that can improve the way we handle and care for horses, **A46**. Horses are difficult to look after, **Resrces** refers to resources available to horse, **Daily interaction** refers to daily horse owner-horse interaction, **Int time** refers to the amount daily horse owner-horse interaction, **Ride** refers to horse ridden, **Compt** refers to compete, **Hoof** refers to hoof care behaviour, **Worm** refers to parasite control behaviour, **Teeth** refers to dental care behaviour, **Vet insp** refers to veterinary inspection, **Shod** refers to horse shod, and **BC insp** refers to horse body condition inspection.

Table 34 Pearson product-moment correlations ($p<0.05$) between individual horse owner behavioural belief variables and horse owner management behaviour in H1 (n=57)

	H reg t	Supvisn	S diet	W diet	Past qly	H_20 insp	H meth	Pad size
A2		-0.34**						
A3					-0.32*			
A9$^{(-ve\ RC)}$						-0.35**		
A18			-0.26*	-0.29*		0.31*		
A19							0.28*	
A22						0.26*		
A28$^{(-ve\ RC)}$								-0.34**
A30				-0.26*				
A31	-0.37**				0.26*			
A34	-0.31*							
A36					0.39**			
A37					0.33*			
A42								0.40**
A43				-0.35**				
A46		-0.31*	-0.29*					

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

(-ve RC) re-coded negative attitude item, **A2**. Being overweight can be a serious problem for horses, **A3**. How important is it to adjust a horse's diet according to its conditions?, **A9**. It is my responsibility to provide a safe environment for my horse, **A18**. How often should you check a horse's condition?, **A19**. How important is it to provide horses with daily supervision?, **A22**. How important is it to manage and care for a horse according to the work they are doing?, **A28**. How often should you treat horses for worms?, **A30**. How often should a horse's hooves be attended to?, **A31**. How important is it to have a veterinarians inspect a horse showing signs of ill-health?, **A34**. How important is it to recognize, assess and respond to lameness in horses?, **A36**. How important is it that horse owners know how to look after a horse?, **A37**. How important is it to be aware of the possible risks to horses' welfare?, **A42**. Industry personnel can provide information and assistance that can improve the way we handle and care for horses, **A43**. There is always something new to learn about horses, **A46**. Horses are difficult to look after, **H reg t** refers to the type of region where the horse is housed, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **Past qly** refers to pasture quality, **H_20 insp** refers to water source inspection, **H meth** refers to horse housing method, and **Pad size** refers to the size of the paddock where the horse is housed.

Table 35 Pearson product-moment correlations ($p<0.05$) between individual horse owner behavioural belief variables and horse owner management behaviour in H2 (n=42)

	Dist PR	Supvisn	S diet	W diet	Past qty	H_20 insp
A1			-0.39**			
A2		-0.41**				
A3			-0.32*			
A9$^{(-ve\ RC)}$			-0.35*			
A18			-0.58**	-0.34*		
A19			-0.31*			0.38**
A22	0.31*					
A29						0.32*
A31			-0.35*	-0.33*		
A37					0.34*	
A41	0.33*					
A46		-0.36*	-0.31*	-0.32*		

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

(-ve RC) re-coded negative attitude item, **A1**. How important is it to base a horse's diet on its individual needs?, **A2**. Being overweight can be a serious problem for horses, **A3**. How important is it to adjust a horse's diet according to its conditions?, **A9**. It is my responsibility to provide a safe environment for my horse, **A18**. How often should you check a horse's condition?, **A19**. How important is it to provide horses with daily supervision?, **A22**. How important is it to manage and care for a horse according to the work they are doing?, **A29**. How important is it to regularly attend to horses' teeth?, **A31**. How important is it to have a veterinarians inspect a horse showing signs of ill-health?, **A37**. How important is it to be aware of the possible risks to horses' welfare?, **A41**. I am responsible for my horses' welfare, **A46**. Horses are difficult to look after, **Dist PR** is an abbreviation of the distance from where the horse is housed to the horse owners primary residence, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **Past qty** refers to pasture quantity, and **H_20 insp** refers to water source inspection.

Table 36 Pearson product-moment correlations ($p<0.05$) between individual horse owner normative belief variables and horse owner husbandry behaviour in H1 (n=57)

	Resrces	Ride	Compt	Hoof	Teeth	Vet insp	Shod	Bare
B1			-0.30*					
B3			-0.35*					
B28			0.28*					
B30		0.43**		0.35**	0.37**		0.34**	-0.34**
B31	-0.26*							
B33	-0.26*							
B34		0.23*	-0.26*			-0.38**		
B35						-0.38**		
B36		0.30*						

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

B1. How important do other horse owners believe it is to base a horse's diet on its individual needs?, **B3**. How important do other horse owners believe it is to adjust a horse's diet according to its conditions?, **B28**. How often do other horse owners suggest that horses should be treated for worms?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **B31**. How important do other horse owners believe it is to have a veterinarian inspect a horse showing sighs of ill-health?, **B33**. How important do other horse owners believe it is that the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment?, **B34**. How important do other horse owners believe it is to recognize, assess and respond to lameness in horses?, **B35**. How important do other horse owners believe it is to recognize, assess and respond to injuries in horses?, **B36**. How important do other horse owners believe it is that horse owners know how to look after a horse?, **Resrces** refers to resources available to horse, **Ride** refers to horse ridden, **Compt** refers to compete, **Hoof** refers to hoof care behaviour, **Teeth** refers to dental care behaviour, **Vet insp** refers to veterinary inspection, **Shod** refers to horse shod, and **Bare** refers to barefoot horse.

Table 37 Pearson product-moment correlations ($p<0.05$) between individual horse owner normative belief variables and horse owner husbandry behaviour in H2 (n=42)

	Reg H	Daily int	Int time	Compt	Hoof	Worm	Teeth	BC insp
B1				-0.31*	0.34*			
B3				-0.35**				
B18		0.35*	-0.35*		0.32*			
B28				0.28*		0.42**		
B29	0.38**							
B30			-0.33*		0.33*		0.39**	0.38**
B34				-0.26*				0.31*
B42						-0.34*		

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

B1. How important do other horse owners believe it is to base a horse's diet on its individual needs?, **B3**. How important do other horse owners believe it is to adjust a horse's diet according to its conditions?, **B18**. How often do other horse owners believe you should check a horse's condition?, **B28**. How often do other horse owners suggest that horses should be treated for worms?, **B29**. How important do other horse owners believe it is to regularly attend to horses' teeth?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **B34**. How important do other horse owners believe it is to recognize, assess and respond to lameness in horses?, **B42**. Other horse owners believe that industry personnel can provide information and assistance that can improve the way we handle and care for horses, **Reg H** refers to registered horse, **Daily interaction** refers to daily horse owner-horse interaction, **Int time** refers to the amount daily horse owner-horse interaction, **Compt** refers to compete, **Hoof** refers to hoof care behaviour, **Worm** refers to parasite control behaviour, **Teeth** refers to dental care behaviour, and **BC insp** refers to horse body condition inspection.

Table 38 Pearson product-moment correlations ($p<0.05$) between individual horse owner normative belief variables and horse owner management behaviour in H1 (n=57)

	Supvisn	Past qty	Past qly	H_20 insp	Pad size
B2		-0.32**			
B3	0.28*		0.31*		
B9		-0.38**	0.37**		
B18		-0.36**			
B19		-0.26*			
B22		-0.35**	0.39**		
B28					0.31*
B29		-0.32**	0.28*		
B30		-0.40**			
B33		-0.27*	0.32**	0.43**	
B34		-0.31*		0.34**	
B35		-0.31*	0.29*	0.49**	
B36				0.32**	
B37				0.36**	

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

B2. Other horse owners believe that being overweight can be a serious problem for horses, **B3**. How important do other horse owners believe it is to adjust a horses''diet according to its conditions?, **B9**. Other horse owners believe that it is my responsibility to provide a safe environment for my horse, **B18**. How often do other horse owners believe you should check a horse's condition?, **B19**. How important do other horse owners believe it is to provide horses with daily supervision?, **B22**. How important do other horse owners believe it is to manage and care for a horse according to the work they are doing?, **B28**. How often do other horse owners suggest that horses should be treated for worms?, **B29**. How important do other horse owners believe it is to regularly attend to horses' teeth?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **B33**. How important do other horse owners believe it is that the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment?, **B34**. How important do other horse owners believe it is to recognize, assess and respond to lameness in horses?, **B35**. How important do other horse owners believe it is to recognize, assess and respond to injuries in horses?, **B36**. How important do other horse owners believe it is that horse owners know how to look after a horse?, **B37**. How important do other horse owners believe it is to be aware of the possible risks to horses' welfare?, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **Past qty** refers to pasture quantity, **Past qly** refers to pasture quality, **H_20 insp** refers to water source inspection, and **Pad size** refers to the size of the paddock where the horse is housed.

Table 39 Pearson product-moment correlations ($p<0.05$) between individual horse owner normative belief variables and horse owner management behaviour in H2 (n=42)

	H reg t	Dist PR	Supvisn	S diet	W diet	#H Pad	H_20 insp	Pad size
B18				-0.37**	-0.36*	-0.33*		
B22							0.35*	
B29	0.38**							
B30				-0.34*				0.31*
B31			-0.43**					
B33				-0.30*			0.48**	
B34							0.42**	
B35							0.48**	
B36							0.38**	
B37							0.39**	
B41							0.43**	
B42		0.37**						
B43				-0.30*			0.44*	

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 40

B18. How often do other horse owners believe you should check a horse's condition?, **B22**. How important do other horse owners believe it is to manage and care for a horse according to the work they are doing?, **B29**. How important do other horse owners believe it is to regularly attend to horses' teeth?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **B31**. How important do other horse owners believe it is to have a veterinarian inspect a horse showing sighs of ill-health?, **B33**. How important do other horse owners believe it is that the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment?, **B34**. How important do other horse owners believe it is to recognize, assess and respond to lameness in horses?, **B35**. How important do other horse owners believe it is to recognize, assess and respond to injuries in horses?, **B36**. How important do other horse owners believe it is that horse owners know how to look after a horse?, **B37**. How important do other horse owners believe it is to be aware of the possible risks to horses' welfare?, **B41**. Other horse owners believe that I am responsible for my horse's welfare, **B42**. Other horse owners believe that industry personnel can provide information and assistance that can improve the way we handle and care for horses, **B43**. Other horse owners suggest that there is always something new to learn about horses, **H reg t** refers to the type of region where the horse is housed, **Dist PR** is an abbreviation of the distance from where the horse is housed to the horse owners primary residence, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **#H pad** refers to the number of horses housed in the paddock with the horse, **H_20 insp** refers to water source inspection, and **Pad size** refers to the size of the paddock where the horse is housed.

Table 40 Pearson product-moment correlations ($p<0.05$) between individual horse owner control belief variables and horse owner husbandry behaviour in H1 (n=57)

	Resrces	Daily int	Int time	Ride	Compt	Own Ap	Hoof	Worm	Teeth	Vet insp	Shod	Bare	BC insp	Sup fed
C1	-0.29*													
C2	-0.28*													
C3	-0.37**													
C18		0.36**											0.33**	
C19			-0.32*										0.26*	-0.31*
C22														-0.29*
C28					0.40**			0.53**	0.35**	0.30*				
C29				0.31*					0.49**				0.32*	-0.28*
C30				0.41**			0.64**	0.32*	0.41**		0.40**	-0.32*		
C34	-0.43**													
C37							0.30*							
C41				0.29*		0.26*								
C42								0.29*						-0.40**
C43														-0.35**

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

C1. To what extent are you able to base your horse's diet on its individual needs?, **C2**. How difficult is it for you to ensure your horse does not become too fat?, **C3**. How difficult is it for you to adjust your horse's diet according to its conditions?, **C18**. How often are you able to check your horse's condition?, **C19**. How difficult is it for you to provide your horse with daily supervision?, **C22**. To what extent are you able to manage and care for your horse in a manner suitable for the work they are performing?, **C28**. How often are you able to treat your horses for worms?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, **C30**. How often are you able to attend to your horse's hooves?, **C34**. How difficult is it for you to recognize, access and respond to lameness in your horses?, **C37**. To what extent are you aware of the possible risks to horses' welfare?, **C41**. How difficult is it for you to be responsible for your horse's welfare?, **C42**. How difficult is it for you to access information and assistance from industry personnel to improve the way you handle and care for your horses?, **C43**. How difficult is it for you to learn new things about horses?, **Resrces** refers to resources available to horse, **Daily interaction** refers to daily horse owner-horse interaction, **Int time** refers to the amount daily horse owner-horse interaction, **Ride** refers to horse ridden, **Compt** refers to compete, **Own ap** refers to horse owner approach, **Hoof** refers to hoof care behaviour, **Worm** refers to parasite control behaviour, **Teeth** refers to dental care behaviour, **Vet insp** refers to veterinary inspection, **Shod** refers to horse shod, **Bare** refers to barefoot horse, **BC insp** refers to horse body condition inspection, and **Sup fed** refers to supplementary feeding.

Table 41 Pearson product-moment correlations ($p<0.05$) between individual horse owner control belief variables and horse owner husbandry behaviour in H2 (n=42)

	Reg H	Resrces	Daily int	Int time	Ride	Compt	Own Ap	Hoof	Worm	Teeth	Bare	BC insp	Sup fed
C1												0.37*	
C2					0.32*								
C9		-0.36*					0.32*						
C19			0.37**	-0.32*									
C22												0.31*	
C28						0.40**			0.70**	0.45*	-0.35*		
C29									0.36*	0.40**		0.31*	
C30								0.47**					
C31													-0.31*
C36	0.33*												-0.32*
C37		-0.41**											
C41								0.31*					
C43													-0.37*

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 40

C1. To what extent are you able to base your horse's diet on its individual needs?, **C2**. How difficult is it for you to ensure your horse does not become too fat?, **C9**. To what extent are you able to provide your horse with a safe environment?, **C19**. How difficult is it for you to provide your horse with daily supervision?, **C22**. To what extent are you able to manage and care for your horse in a manner suitable for the work they are performing?, **C28**. How often are you able to treat your horses for worms?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, **C30**. How often are you able to attend to your horse's hooves?, **C31**. How difficult is it for you to have a veterinarian inspect your unwell horse?, **C36**. To what extent do you know how to look after a horse?, **C37**. To what extent are you aware of the possible risks to horses' welfare?, **C41**. How difficult is it for you to be responsible for your horse's welfare?, **C43**. How difficult is it for you to learn new things about horses?, **Reg H** refers to registered horse, **Resrces** refers to resources available to horse, **Daily interaction** refers to daily horse owner-horse interaction, **Int time** refers to the amount daily horse owner-horse interaction, **Ride** refers to horse ridden, **Compt** refers to compete, **Own ap** refers to horse owner approach, **Hoof** refers to hoof care behaviour, **Worm** refers to parasite control behaviour, **Teeth** refers to dental care behaviour, **Bare** refers to barefoot horse, **BC insp** refers to horse body condition inspection, and **Sup fed** refers to supplementary feeding.

Table 42 Pearson product-moment correlations ($p<0.05$) between individual horse owner control belief variables and horse owner management behaviour in H1 (n=57)

	H reg t	Supvisn	S diet	W diet	Past qty	#H Pad	H_20 insp	Pad size
C1							0.40**	
C3							0.30*	
C18			-0.48**	-0.30*				
C19	0.35**	-0.38**	-0.34**					
C28				-0.27*				0.28*
C29	0.32*	-0.26*	-0.45**	-0.45**		0.27*	0.29*	
C30				-0.47**				
C31				-0.30*				
C33							0.30*	
C34							0.45**	
C35					-0.26*			

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

C1. To what extent are you able to base your horse's diet on its individual needs?, **C3**. How difficult is it for you to adjust your horse's diet according to its conditions?, **C18**. How often are you able to check your horse's condition?, **C19**. How difficult is it for you to provide your horse with daily supervision?, **C28**. How often are you able to treat your horses for worms?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, **C30**. How often are you able to attend to your horse's hooves?, **C31**. How difficult is it for you to have a veterinarian inspect your unwell horse?, **C33**. How difficult would it be for you to recognize the signs of ill-health in your horse and contact a veterinarian for diagnosis and treatment?, **C34**. How difficult is it for you to recognize, access and respond to lameness in your horses?, **C35**. How difficult is it for you to recognize, access and respond to injuries in your horses?, **H reg t** refers to the type of region where the horse is housed, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **Past qty** refers to pasture quantity, **#H pad** refers to the number of horses housed in the paddock with the horse, **H_20 insp** refers to water source inspection, and **Pad size** refers to the size of the paddock where the horse is housed.

Table 43 Pearson product-moment correlations ($p<0.05$) between individual horse owner control belief variables and horse owner management behaviour in H2 (n=42)

	H reg t	Dist PR	Supvisn	S diet	W diet	Past qty	Past qly	H_20 insp	Pad size
C1				-0.39*				0.37*	
C2			-0.43**						
C9					-0.43**				
C18				-0.35*				0.43**	0.34*
C19	0.32*							0.33*	
C22		0.31*						0.31*	
C29	0.31*			-0.41**	-0.32*				
C33		0.33*						0.48**	
C36		0.41**				0.36*	-0.38*		
C37		0.37*					-0.34*	0.37*	
C41						0.40**			
C42							-0.37*		
C43		0.40**							

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 40

C1. To what extent are you able to base your horse's diet on its individual needs?, **C2**. How difficult is it for you to ensure your horse does not become too fat?, **C9**. To what extent are you able to provide your horse with a safe environment?, **C18**. How often are you able to check your horse's condition?, **C19**. How difficult is it for you to provide your horse with daily supervision?, **C22**. To what extent are you able to manage and care for your horse in a manner suitable for the work they are performing?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, **C33**. How difficult would it be for you to recognize the signs of ill-health in your horse and contact a veterinarian for diagnosis and treatment?, **C36**. To what extent do you know how to look after a horse?, **C37**. To what extent are you aware of the possible risks to horses' welfare?, **C41**. How difficult is it for you to be responsible for your horse's welfare?, **C42**. How difficult is it for you to access information and assistance from industry personnel to improve the way you handle and care for your horses?, **C43**. How difficult is it for you to learn new things about horses?, **H reg t** refers to the type of region where the horse is housed, **Dist PR** is an abbreviation of the distance from where the horse is housed to the horse owners primary residence, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **Past qty** refers to pasture quantity, **Past qly** refers to pasture quality, **H_20 insp** refers to water source inspection, and **Pad size** refers to the size of the paddock where the horse is housed.

Numerous significant relationships were found between horse owner husbandry and management behaviour and both the attitude subscales and individual attitude variables.

No significant correlations were found between the horse owner husbandry behaviours *Registered horse*, *Daily human-horse interaction*, *Seek professional advice*, *Horse owner approach*, *Dental care behaviour*, *Veterinary inspection* and any of the attitude subscales in H1. For H2, there were no significant relationships found between the horse owner husbandry behaviours *Seek professional advice*, *Horse owner approach*, *Parasite control behaviour*, *Dental care behaviour*, *Horse shod* and *Horse barefoot*. No significant correlations were found between horse owner management behaviours *Horse location*, *Distance between the horse owner's primary residence and the horse's location*, *Horse housing method* and *Shelter availability* and any of the horse owner attitude subscales in H1. For H2, there were no significant relationships between the horse owner management behaviours *Region type where horse is housed*, *Stocking density*, *Size of the paddock where horse is housed* and *Shelter availability* and any of the horse owner attitude subscales.

The attitude subscales which failed to significantly correlate with any horse owner husbandry behaviours in H1 were *Positive statements about horses*, *Negative statements about horses*, *The importance of the horse to the owner*, *Horse welfare is not the horse owner's responsibility*, *General attitude statements*, *Horse husbandry and management – Housing (Bb)* and *Human-horse interactions (Bb*). With regard to H2, no significant relationships were found between the attitude subscales *Negative statements about horses*, *The importance of the horse to the owner*, *Horse welfare is not the horse owner's responsibility*, *Horse husbandry and management – Diet (Nb)*, *Horse husbandry and management – Housing (Nb)*, and *Horse husbandry and management – Diet (Cb)* and any of the horse owner husbandry behaviours. No significant relationships were found between the attitude subscales *Positive statements about horses*, *Negative statements about horses*, *The importance of the horse to the owner*, *Horse welfare is not the horse owner's responsibility*, *General attitude statements* and *Horse husbandry and management – Housing (Bb)* and any of the horse owner management behaviours in H1. The attitude subscales which did not significantly correlate with any of the horse owner management behaviours in H2 were *Positive statements about horses*, *Negative statements about horses*, *General attitude statements*,

Horse husbandry and management – Diet (Nb), and *Horse husbandry and management – Housing (Nb).*

Significant correlations were found between the horse owner management behaviour *Resources* and the attitude subscales and individual attitude variables in H1 and H2. *Resource* refers to the range of resources the horse owner provides to their horse. Significant negative correlations were found between *Resources* and the attitude subscales *Horse husbandry and management - Housing (Cb)* (H1 r=-0.30, p=0.02; H2 r=-0.33, p=0.03) in H1 and H2, *Horse husbandry and management – Diet (Cb)* (r=-0.44, p<0.01) and *Horse husbandry and management - Health and welfare (Cb)* (r=-0.30, p=0.02) in H1, and *General attitude statements* (r=-0.34, p=0.03) in H2. These relationships indicate that the horse owner's provision of an increased range of resources to the horse is associated with favourable control beliefs regarding the provision of an appropriate horse housing environment, the provision of an appropriate equine diet, the performance of husbandry behaviours relevant to horse health and welfare, and a positive attitude towards horses and horse ownership. Significant negative relationships were found between *Resources* and the behavioural beliefs *A18* (r=-0.30, p<0.01) and *A46* (r=-0.26, p=0.05), and the normative belief *B31* (r=-0.26, p=0.05) and *B33* (r=-0.26, p=0.05) in H1, and the behavioural belief *A31* (r=-0.31, p=0.05) in H2. These correlations imply that the horse owner's increased provision of resources to the horse is associated with favourable behavioural beliefs towards horse condition inspection behaviour, veterinary consultation, and the acknowledgement of the challenges involved with horse management, and favourable normative beliefs regarding veterinary consultation and one's ability to recognise, access and appropriately respond to signs of ill health in horses. Significant negative correlations were found between *Resources* and the control beliefs *C1* (r=-0.29, p=0.03), *C2* (r=-0.28, p=0.03), *C3* (r=-0.37, p<0.01) and *C34* (r=-0.43, p<0.01) in H1, and *C9* (r=-0.36, p=0.02) and *C37* (r=-0.41, p<0.01) in H2. These relationships imply that a horse owner's increased provision of resources to the horse is associated with favourable control beliefs concerning an ability to base a horse's diet on its circumstances, an ability to appropriately manage a horse's body condition, an ability to modifying a horse's diet according to its changing conditions, an ability to recognise, access and appropriately respond to lameness in horses, the provision of a safe horse housing environment and an awareness of potential risks to horse welfare.

Significant relationships were found between the horse owner husbandry behaviour *Daily human-horse interaction* and the attitude subscales and individual attitude variables in H1 and H2. *Daily human-horse interaction* refers to whether the horse owner interacts with their horse on a daily basis. There was a significant positive relationship between *Daily human-horse interaction* and the attitude subscale *Horses require resource provision* ($r=0.60$, $p<0.01$) in H2, indicating that daily horse owner-horse interaction is associated with the belief that horse ownership requires substantial resource outlay. Significant positive correlations were found between *Daily human-horse interaction* and the control belief *C18* ($r=0.36$, $p<0.01$) in H1, and the behavioural belief *A34* ($r=0.35$, $p=0.02$), the normative belief *B18* ($r=0.35$, $p=0.02$) and the control belief *C19* ($r=0.37$, $p=0.01$) in H2. These relationships indicate that daily horse owner-horse interaction is associated with favourable control and normative beliefs regarding the horse condition inspection behaviour, behavioural beliefs towards recognising, accessing and responding to lameness in horses, and control beliefs concerning the performance of daily horse supervision.

Significant relationships were also found between the horse owner husbandry behaviour *Daily human-horse interaction time* and the attitude subscales and individual attitude variables in H1 and H2. *Daily human-horse interaction time* refers to the amount of daily time the horse owner spends interacting with their horse. Significant negative correlations were found between *Daily human-horse interaction time* and the attitude subscales *General horse husbandry and management* (H1 $r=-0.31$, $p=0.02$; H2 $r=-0.50$, $p<0.01$) in H1 and H2, *Horse husbandry and management - Housing (Cb)* (H1 $r=-0.30$, $p=0.04$) in H1, and *Horses require resource provision* ($r=-0.41$, $p<0.01$), *Horse husbandry and management – Health and welfare (Bb)* ($r=-0.41$, $p=0.02$) and *Horse husbandry and management – Housing (Bb)* ($r=-0.34$, $p=0.03$) in H2. These correlations indicate that increased daily human-horse interaction time is associated with favourable attitudes towards general horse husbandry practices, behavioural and control beliefs relating to the provision of an appropriate horse housing environment, behavioural beliefs concerning the performance of horse health and welfare husbandry practices, and the belief that horse ownership requires substantial resource outlay. There were significant negative relationships found between *Daily human-horse interaction time* and the behavioural beliefs *A18* ($r=-0.39$, $p=0.01$), *A22* ($r=-0.31$, $p<0.01$) and *A34* ($r=-0.31$, $p=0.05$) in H2. These correlations imply that increased daily human-horse interaction time is associated with favourable behavioural beliefs towards horse condition inspection behaviour, the performance of husbandry and management practices appropriate for the horse's work load, and recognising, accessing and

responding to lameness in horses. In H2, significant negative relationships were also found between *Daily human-horse interaction time* and the normative beliefs *B18* (r=-0.35, p=0.02) and *B30* (r=-0.33, p=0.03), which indicate that increased daily human-horse interaction time is associated with favourable normative beliefs regarding horse condition inspection behaviour and hoof care behaviour. Significant negative correlations were found between *Daily human-horse interaction time* and the control belief *C19* (H1 r=-0.32, p=0.02; H2 r=-0.32, p=0.04) in both H1 and H2, which imply that increased daily human-horse interaction time is associated with favourable control beliefs regarding daily horse supervision.

There were significant correlations between the horse owner husbandry behaviour *Hoof care behaviour* and the attitude subscales and individual attitude variables in H1 and H2. Significant positive relationships were found between *Hoof care behaviour* and the attitude subscales *Horse husbandry and management – Health and welfare (Bb)* (H1 r=0.3, p=0.03, H2 r=0.32, p=0.04) in both H1 and H2, and *Horse husbandry and management – Housing (Bb)* (r=0.32, p=0.04) in H2. These correlations imply that appropriate hoof care behaviour is associated with favourable behavioural beliefs concerning the performance of husbandry practices concerning horse health and welfare and the provision of an appropriate horse housing environment. The significant negative correlation between *Hoof care behaviour* and the behavioural belief *A9*$^{(-ve\ RC)}$ (r=-0.31, p=0.05) in H2, indicates that a horse owner's appropriate hoof care behaviour is associated with positive attitudes towards the provision of a safe horse housing environment. Significant positive relationships were found between *Hoof care behaviour* and the behavioural beliefs *A30* (H1 r=0.67, p<0.01; H2 r=0.61, p<0.01) in both H1 and H2, and *A18* (r=0.28, p=0.03) in H1. These correlations imply that the appropriate performance of hoof care behaviour is associated with favourable attitudes towards hoof care behaviour and horse condition inspection behaviour. Significant positive correlations were found between *Hoof care behaviour* and the normative beliefs *B30* (H1 r=0.35, p<0.01; H2 r=0.33, p=0.03) in both H1 and H2, and *B1* (r=0.34, p=0.03) and *B18* (r=0.32, p=0.04) in H2. These relationships imply that appropriate horse owner hoof care behaviour is associated with favourable normative beliefs concerning hoof care behaviour, the determination of a horse's diet based on its circumstances, and horse condition inspection behaviour. There were significant positive correlations found between *Hoof care behaviour* and the control beliefs *C30* (H1 r=0.64, p<0.01; H2 r=0.47, p<0.01) in H1 and H2, *C37* (r=0.30, p=0.03) in H1, and *C41* (r=0.31, p=0.05) in H2. These relationships indicate that the appropriate

performance of hoof care behaviour is associated with favourable control beliefs regarding hoof care behaviour, an awareness of potential horse welfare risks, and horse welfare responsibility.

Significant relationships were found between the horse owner husbandry behaviour *Shod*, which refers to the horse owner having the horse shod, and the attitude subscales and individual attitude variables in H1 and H2. There was a significant positive correlation found between *Shod* and the attitude subscale *Horses require resource provision* (r=0.28, p=0.05) in H2, implying that horse owners who have their horses shod appear to believe that horses require more resources than do those owners who employ barefoot trimming. Significant positive relationships were found between *Shod* and the attitude subscales *Horse husbandry and management - Housing (Cb)* (r=0.30, p=0.03) and *Human-horse interactions (Cb)* (r=0.26, p=0.05) in H1. These correlations imply that horse shoeing is associated with positive control beliefs regarding the provision of an appropriate horse housing environment and the improvement of human-horse interactions. There were significant positive correlations found between *Shod* and the behavioural beliefs *A18* (r=0.27, p=0.04) in H1 and *A41* (r=0.31, p=0.05) in H2, indicating that shoeing horses is associated with favourable attitudes towards horse condition inspection behaviour and horse welfare responsibility. In H1, significant positive relationships were found between *Shod* and the normative belief *B30* (r=0.34, p<0.01) and the control belief *C30* (r=0.40, p<0.01). These correlations imply that horse shoeing is associated with both favourable normative and control beliefs concerning hoof care behaviour.

There were a number of significant correlations found between the horse owner husbandry behaviour *Barefoot*, which reflects the horse owner employing barefoot trimming, and the attitude subscales and individual attitude variables in H1 and H2. Significant negative relationship were found between *Barefoot* and the attitude subscales *Horses require resource provision* (r=-0.26, p=0.05) and *Horse husbandry and management - Housing (Cb)* (r=-0.30, p=0.03) in H1. These correlations indicate that barefoot trimming is associated with the belief that horse ownership does not require substantial resource outlay and less favourable control beliefs relating to the provision of an appropriate horse housing environment. Significant negative correlations were found between *Barefoot* and the normative belief *B30* (r=-0.34, p<0.01) and the control belief *C30* (r=-0.32, p=0.02) in H1, and the control belief *C28* (r=-0.35, p=0.02) in H2. These relationships imply that barefoot trimming is associated with less favourable normative and

control beliefs regarding hoof care behaviour, and less favourable control beliefs towards parasite control behaviour.

A number of the significant correlations were found between the horse owner husbandry behaviour *Parasite control behaviour* and both the attitude subscales and individual attitude variables in H1 and H2. A significant positive correlation was found between *Parasite control behaviour* and *Horses require resource provision* (r=0.28, p=0.04) in H1. The relationship indicates that frequent parasite control behaviour is associated with the belief that horse ownership requires considerable resource outlay. In H1 and H2, significant negative relationships between *Parasite control behaviour* and the behavioural belief *A28*$^{(-ve\ RC)}$ (H1 r=-0.49, p<0.01; H2 r=-0.60, p<0.01) imply that the appropriate performance of parasite control behaviour is associated with positive attitudes towards parasite control behaviour. Significant positive correlations were found between *Parasite control behaviour* and the behavioural beliefs *A30* (H1 r=0.30, p=0.02; H2 r=0.35, p=0.02) and *A46* (H1 r=0.28, p=0.04; H2 r=0.43, p<0.01) in both H1 and H2. These relationships indicate that appropriate parasite control behaviour is associated with favourable behavioural beliefs towards hoof care behaviour and favourable attitudes towards the acknowledgement of the challenges involved with horse management. In H2, the significant positive relationship between *Parasite control behaviour* and the normative belief *B28* (r=0.42, p<0.01) implies that the performance of appropriate parasite control behaviour is associated with positive normative beliefs about parasite control behaviour. The significant negative correlation found between *Parasite control behaviour* and the normative belief *B42* (r=-0.33, p=0.03) in H2, indicates that less frequent parasite control behaviour is associated with favourable normative beliefs regarding the obtainment of information and support from industry personnel. The significant positive correlations found between *Parasite control behaviour* and the control beliefs *C28* (H1 r=0.53, p<0.01; H2 r=0.71, p<0.01) in both H1 and H2, *C30* (r=0.32, p=0.02) and *C42* (r=0.29, p=0.03) in H1, and *C29* (r=0.36, p=0.02) in H2, indicate that the appropriate performance of parasite control behaviour is associated with favourable control beliefs towards parasite control behaviour, hoof care behaviour, the obtainment of information and support from industry personnel, and dental care behaviour.

Significant relationships were found between the horse owner husbandry behaviour *Dental care behaviour* and the individual attitude variables in H1 and H2, however no significant correlations

were found between *Dental care behaviour* and the attitude subscales. Significant positive correlations were found between *Dental care behaviour* and the behavioural beliefs *A18* (H1 r=0.35, p<0.01; H2 r=0.49, p<0.01) and *A30* (H1 r=0.44, p<0.01; H2 r=0.36, p=0.02) in H1 and H2, *A29* (r=0.29, p=0.03) in H1, and *A42* (r=0.34, p=0.03) in H2. These relationships indicate that appropriate dental care behaviour is associated with favourable attitudes towards hoof care behaviour, horse condition inspection behaviour, dental care behaviour, and the obtainment of information and assistance from industry personnel. There were significant negative correlations between *Dental care behaviour* and the behavioural beliefs *A28*$^{(-ve\ RC)}$ (H1 r=-0.32, p=0.02; H2 r=-0.31, p=0.05) in both H1 and H2, and *A37* (r=-0.29, p=0.03) in H1, implying that appropriate dental care behaviour is associated with favourable attitudes towards parasite control behaviour and an awareness of potential horse welfare risks. A significant correlation was found between *Dental care behaviour* and the normative belief *B30* (H1 r=0.37, p<0.01; H2 r=0.39, p=0.01) in H1 and H2, implying that the appropriate performance of dental care behaviour is associated with favourable normative beliefs regarding hoof care behaviour. Significant positive relationships were found between *Dental care behaviour* and the control beliefs *C28* (H1 r=0.35, p<0.01; H2 r=0.45, p<0.01) and *C29* (H1 r=0.49, p<0.01; H2 r=0.40, p<0.01) in H1 and H2, and *C30* (r=0.41, p<0.01) in H1. These correlations indicate that appropriate dental care behaviour is associated with favourable perceived behavioural control towards dental care behaviour, parasite control behaviour, and hoof care behaviour.

There were significant correlations between the horse owner husbandry behaviour *BC inspection* and the attitude subscales and individual attitude variables in H1 and H2. *BC inspection* refers to the frequency of horse body condition inspections performed by the horse owner. Significant positive correlations were found between *BC inspection* and the attitude subscales *Horses require resource provision* (H1 r=0.43, p=0.01; H2 r=-0.56, p<0.01) in H1 and H2, and *Horse husbandry and management – Health and welfare (Bb)* (r=0.33, p=0.03) and *Horse husbandry and management - Health and welfare (Nb)* (r=0.32, p=0.04) in H2. These relationships imply that frequent horse condition inspections are associated with the belief that horse ownership requires considerable resource outlay, and favourable behavioural and normative beliefs towards the performance of horse health and welfare husbandry practices. A significant negative correlation was found between *BC inspection* and the behavioural belief *A28*$^{(-ve\ RC)}$ (r=-0.31, p=0.05) in H2, implying that frequent horse condition inspection behaviour by the horse owner is associated with positive attitudes towards parasite control behaviour. Significant positive relationships were

found between *BC inspection* and the behavioural beliefs *A18* (r=0.30, p=0.03) in H1, and *A31* (r=0.41, p<0.01) in H2. These correlations indicate that frequent horse condition inspection behaviour is associated with favourable behavioural beliefs concerning horse condition inspection behaviour and veterinary consultation. There were significant positive correlations found between *BC inspection* and the normative beliefs *B30* (r=0.38, p=0.01) and *B34* (r=0.31, p=0.04) in H2, which imply that frequent horse condition inspection is associated with favourable normative beliefs concerning hoof care behaviour and one's ability to recognise, access and appropriately respond to lameness in horses. Significant positive correlations were found between *BC inspection* and the control beliefs *C29* (H1 r=0.32, p=0.02; H2 r=0.31, p=0.05) in H1 and H2, *C18* (r=0.33, p=0.01) and *C19* (r=0.26, p=0.05) in H1, and *C1* (r=0.37, p=0.02) and *C22* (r=0.31, p=0.04) in H2. These relationships indicate that the increased performance of horse condition inspection behaviour by the horse owner is associated with favourable control beliefs concerning dental care behaviour, horse condition inspection behaviour, daily horse supervision, an ability to base a horse's diet on its circumstances, and the performance of husbandry and management practices relevant to the horses workload.

The significant relationship between *Veterinary inspection* and the attitude subscale *Horse husbandry and management – Health and welfare (Bb)* (r=0.33, p=0.03) in H2 indicates that the use of veterinary consultation is associated with positive behavioural beliefs towards the performance of husbandry practices relating to horse health and welfare. Significant positive relationships were found between *Veterinary inspection* and the behavioural belief A43 (r=0.31, p=0.02) in H1 and A3 (r=0.31, p=0.05) in H2, and the control belief *C28* (r=0.30, p=0.02) in H1. These correlations imply that the use of veterinary consultation is associated with positive behavioural beliefs towards the continued need for knowledge improvement and the determination of diet according to the horse's circumstances, and favourable control beliefs concerning parasite control behaviour. In H1, significant negative correlations were found between *Veterinary inspection* and the normative beliefs *B34* (r=-0.38, p<0.01) and *B35* (r=-0.38, p<0.01), which imply that the use of veterinary consultation is associated with unfavourable normative beliefs regarding horse owners' ability to recognise, access and appropriately respond to lameness and injury in horses.

Numerous significant relationships were found between the horse owner husbandry behaviour *Supplementary feeding* and the attitude subscales and individual attitude variables in H1 and H2. *Supplementary feeding* refers to the horse owner's provision of a supplementary diet to the horse. Significant negative correlations were found between *Supplementary feeding* and the attitude subscales *Human-horse interactions (Cb)* (r=-0.27, p=0.04) in H1, and *Horses require resource provision* (r=-0.37, p=0.02), *Horse husbandry and management – Housing (Bb)* (r=-0.35, p=0.02), and *Horse husbandry and management - Health and welfare (Cb)* (r=-0.31, p=0.05) in H2. These relationships indicate that supplementary feeding is associated with favourable control beliefs concerning the improvement of human-horse interactions, behavioural beliefs towards the provision of an appropriate horse housing environment, control beliefs relating to horse health and welfare relevant husbandry practices, and the belief that horse ownership requires substantial resource outlay. A significant negative correlation was found between *Supplementary feeding* and the behavioural belief *A43* (r=-0.29, p=0.03) in H1, implying that the provision of a supplementary diet by the horse owner is associated with favourable behavioural beliefs regarding continued knowledge improvement. Significant negative correlations were found between *Supplementary feeding* and the control belief *C43* (H1 r=-0.35, p<0.01; H2 r=0.37, p=0.02) in both H1 and H2, implying that the provision of a supplementary diet by the horse owner is associated with favourable control beliefs regarding the continued improvement of knowledge. In H1, significant negative relationships were found between *Supplementary feeding* and the control beliefs *C19* (r=-0.31, p=0.02), *C22* (r=-0.29, p=0.03), *C29* (r=-0.28, p=0.03), and *C42* (r=-0.40, p<0.01). These correlations indicate that supplementary feeding is associated with favourable control beliefs concerning daily horse supervision, the performance of husbandry and management practices suitable for the horse's workload, dental care behaviour, and the obtainment of information and support from industry personnel. Significant negative correlations were found between *Supplementary feeding* and the control beliefs *C31* (r=-0.31, p=0.05) and *C36* (r=-0.32, p=0.04) in H2. These relationships imply that supplementary feeding is associated with favourable control beliefs concerning the use of veterinary consultation and the possession of the knowledge required to appropriately care for horses.

Significant negative correlations were found between *Horse region type* and the behavioural beliefs *A31* (r=-0.37, p=0.01) and *A34* (r=-0.31, p=0.02) in H1, which imply a rural region of primary residence is associated with favourable behavioural beliefs towards veterinary consultation and recognising, accessing and responding to lameness in horses. Significant

positive relationships were found between *Horse region type* and the control belief *C19* (H1 r=0.35, p<0.01; H2 r=0.32, p=0.04) and *C29* (H1 r=0.32, p=0.02; H2 r=0.31, p=0.05) in H1 and H2, and the normative belief *B29* (r=0.32, p=0.04) in H2. These correlations indicate that an urban region of primary residence is associated with favourable control beliefs concerning daily horse supervision and dental care behaviour, and favourable normative beliefs regarding dental care behaviour. There was a significant relationship found between *Horse location* the attitude subscale *Horses require resource provision* (r=0.31, p=0.05) in H2, which indicates that horse owners who house their horses at their primary residence appear to believe horses require a greater degree of resources than do horse owners who house their horses at a location other than their primary residence. The significant negative correlation found between *Housing method* and the attitude subscale *The importance of the horse to the owner* (r=-0.35, p=0.03) in H2 implies that an increase in the time a horse is housed on pasture is associated with a high level of importance assigned by the horse owner to their horse. In H1, the significant positive correlation between *Housing method* and the behavioural belief *A19* (r=0.28, p=0.03) indicates that a reduction in the time a horse spends housed in a paddock is associated with favourable attitudes towards daily horse supervision.

There were significant correlations found between the horse owner management behaviour *Paddock size* and the attitude subscales and individual attitude variables in H1 and H2. In H1, the significant positive relationship between *Paddock size* and the attitude subscale *Human-horse interactions (Bb*) (r=0.27, p=0.04) implies that a large paddock size is associated with positive behavioural beliefs towards the improvement of human-horse interactions. A significant negative relationship was found between *Paddock size* and the behavioural belief $A28^{(-ve\ RC)}$ (r=-0.34, p=0.01) in H1, which indicates that a small paddock size is associated with positive attitudes towards parasite control behaviour. Significant positive correlations were found between *Paddock size* and the behavioural belief *A42* (r=0.40, p<0.01), the normative belief *B28* (r=0.31, p=0.02) and the control belief *C28* (r=0.28, p=0.03) in H1, and the normative belief *B30* (r=0.31, p=0.04) and the control belief *C18* (r=0.34, p=0.03) in H2. These relationships indicate that smaller paddock sizes are associated with positive attitudes towards seeking information and assistance from industry personnel, favourable normative and control beliefs concerning parasite control behaviour, normative beliefs regarding hoof care behaviour, and control beliefs concerning horse condition inspection behaviour.

Significant relationships were found between the horse owner husbandry behaviour *Distance between horse and horse owner's primary residence* and the attitude subscales and individual attitude variables in H1 and H2. The significant positive correlation between *Distance between horse and horse owner's primary residence* and the attitude subscale *Horses require resource provision* ($r=0.44$, $p<0.01$) in H2 implies that a close proximity between the horse owner's primary residence and the location where the horse is housed is associated with the belief that horse ownership requires considerable resource outlay. In H2, significant relationships were found between *Distance between horse and horse owner's primary residence* and the behavioural beliefs *A22* ($r=0.31$, $p=0.05$) and *A41* ($r=0.33$, $p=0.03$), and the normative belief *B42* ($r=0.37$, $p<0.01$), which imply that an increased proximity between the horse owner's primary residence and the location where the horse is housed is associated with favourable behavioural beliefs regarding the performance of husbandry and management practices appropriate for the horses work load and one's responsibility for horses welfare, and favourable normative beliefs regarding the obtainment of information and support from industry personnel. Significant positive correlations were found between *Distance between horse and horse owner's primary residence* and the control beliefs *C22* ($r=0.31$, $p=0.05$), *C33* ($r=0.33$, $p=0.04$), *C36* ($r=0.41$, $p<0.01$), *C37* ($r=0.32$, $p=0.04$) and *C43* ($r=0.32$, $p=0.04$) in H2. These relationships imply that a close proximity between the horse owner's primary residence and the location where the horse is housed is associated with favourable control beliefs regarding the performance of husbandry and management practices relevant to the horses workload, an ability to recognise, access and appropriately respond to signs of horse ill health, the knowledge required to appropriately care for horses, an awareness of potential risks to horse welfare, and the continued improvement of knowledge.

Several significant relationships were found between the horse owner husbandry behaviour *Degree of general supervision at horse's housing location* and the attitude subscales and individual attitude variables in H1 and H2. The significant correlation between *Degree of general supervision at horse's housing location* and the attitude subscale *Horse husbandry and management – Diet (Nb)* ($r=0.28$, $p=0.04$) in H1 implies that a lesser degree of daily horse supervision is associated with favourable normative beliefs concerning the provision of an appropriate equine diet. Significant negative relationships were found between *Degree of general*

supervision at horse's housing location and the attitude subscales *Horse husbandry and management - Housing (Cb)* (r=-0.30, p=0.03) in H1, and *Horses require resource provision* (r=-0.33, p=0.04) and *Horse husbandry and management – Diet (Cb)* (r=-0.34, p=0.03) in H2. The correlations indicate that a greater degree of daily horse supervision is associated with favourable control beliefs concerning the provision of an appropriate horse housing environment and an appropriate diet, and the belief that horse ownership requires considerable resource outlay. Significant negative relationships were found between *Degree of general supervision at horse's housing location* and the behavioural beliefs *A2* (H1 r=-0.34, p=0.01; H2 r=-0.41, p<0.01) and *A46* (H1 r=-0.31, p=0.02; H2 r=-0.36, p=0.02) in both H1 and H2, implying that a greater degree of daily horse supervision is associated with favourable behavioural beliefs towards the health concerns related to high body condition in horses and the recognition of the challenges involved with horse management. There were significant correlations found between *Degree of general supervision at horse's housing location* and normative beliefs *B3* (r=0.28, p=0.03) in H1 and *B31* (r=0.28, p=0.03) in H2, which indicate that a lesser degree of horse supervision is associated with favourable normative beliefs regarding modifying a horse's diet according to its changing conditions, and veterinary consultation. Significant negative correlations were found between *Degree of general supervision at horse's housing location* and the control beliefs *C2* (r=-0.43, p<0.01), *C19* (r=-0.38, p<0.01) *C29* (r=-0.26, p=0.05) in H1 indicate that a greater degree of daily horse supervision is associated with favourable control beliefs concerning an ability to appropriately manage horses' body condition, daily horse supervision, and dental care behaviour.

There were significant relationships found between the horse owner husbandry behaviour *Summer diet* and the attitude subscales and individual attitude variables in H1 and H2. *Summer diet* refers to the horse owner's provision of a supplementary diet in summer. Significant negative correlations were found between *Summer diet* and the attitude subscales *Horses require resource provision* (H1 r=-0.39, p<0.01; H2 r=-0.48, p<0.01) in H1 and H2, and *General horse husbandry and management* (r=-0.43, p<0.01) in H2. These relationships imply that the provision of a supplementary diet in summer is associated with the belief that horse ownership requires considerable resource outlay, and favourable attitudes towards general horse husbandry practices. There was a significant relationship between *Summer diet* and the attitude subscale *Horse welfare is not the horse owner's responsibility* (r=0.34, p=0.03) in H2, which indicates that summer supplementary feeding is associated with a horse owner's recognition of their responsibility for the welfare of their horses. Significant negative correlations were found between *Summer diet* and

the attitude subscales *Horse husbandry and management – Health and welfare (Bb)* (r=-0.40, p<0.01), *Horse husbandry and management – Housing (Bb)* (r=-0.40, p<0.01), *Horse husbandry and management - Health and welfare (Nb)* (r=-0.34, p=0.03) and *Human-horse interactions (Nb*) (r=-0.38, p<0.01) in H2. These relationships indicate that the provision of supplementary feeding in summer is associated with favourable behavioural and normative beliefs regarding the importance of performing horse health and welfare relevant husbandry practices, the provision of an appropriate horse housing environment, and the importance of improving human-horse interactions. Significant negative relationships were also found between *Summer diet* and the attitude subscales *Horse husbandry and management - Health and welfare (Cb)* (H1r=-0.32, p=0.02; H2 r=-0.33, p=0.04) and *Horse husbandry and management - Housing (Cb)* and *Summer diet* (H1r=-0.40, p<0.01; H2 r=-0.32, p=0.04) in H1 and H2, and *Horse husbandry and management – Diet (Cb)* (r=-0.27, p=0.05) in H1. These correlations imply that the supplementary feeding of horses in summer is associated with favourable horse owner perceived behavioural control regarding the performance of horse health and welfare relevant husbandry practices, the provision of an appropriate housing environment, and the provision of an appropriate equine diet.

There were significant positive relationships found between *Summer diet* and the behavioural belief *A9*$^{(-ve\ RC)}$ (r=0.32, p=0.04) and the normative belief *B30* (r=0.34, p=0.03) in H2, which imply that a summer supplementary diet is associated with positive behavioural beliefs towards the provision of a safe horse housing environment and favourable normative beliefs about hoof care behaviour. Significant negative correlations were found between *Summer diet* and the behavioural belief *A18* (H1 r=-0.26, p=0.05; H2 r=-0.58, p=0.02) and *A46* (H1 r=-0.31, p=0.02; H2 r=-0.31, p=0.05) in both H1 and H2, indicating that supplementary feeding in summer is associated with favourable behavioural beliefs towards horse condition inspection behaviour and the recognition of the challenging nature of horse management. Significant negative correlations were also found between *Summer diet* and the behavioural beliefs *A1* (r=-0.39, p=0.01), *A3* (r=-0.32, p=0.04), *A19* (r=-0.31, p=0.05), and *A31* (r=-0.35, p=0.02) in H2. These relationships indicate that the provision of a supplementary diet in summer is associated with favourable behavioural beliefs towards basing a horse's diet on its circumstances, the adjustment of a horse's diet according to its changing conditions, daily horse supervision, and veterinary consultation. In H2, the significant negative relationships found between *Summer diet* and the normative beliefs *B18* (r=-0.37, p=0.01), *B33* (r=-0.30, p=0.05), and *B43* (r=-0.30, p=0.05) imply that summer

supplementary feeding is associated with favourable normative beliefs concerning horse condition inspection behaviour, an ability to recognise, access and appropriately respond to signs of ill health in horses, and the continued improvement of knowledge. Significant negative correlations were fond between *Summer diet* and the control beliefs *C18* (H1 r=-0.48, p<0.01; H2 r=-0.35, p=0.02) and *C29* (H1 r=-0.45, p<0.01; H2 r=-0.41, p<0.01) in H1 and H2, *C19* (r=-0.38, p<0.01) in H1, and *C1* (r=-0.39, p=0.03) in H2. These relationships imply that the provision of a summer supplementary diet is associated with favourable control beliefs regarding horse condition inspection behaviour, dental care behaviour, daily horse supervision, and an ability to base a horse's diet on its circumstances.

Significant relationships were found between the horse owner husbandry behaviour *Winter diet* and the attitude subscales and individual attitude variables in H1 and H2. *Winter diet* refers to the horse owner's provision of a supplementary equine diet in winter. Significant negative relationships were found between *Winter diet* and the attitude subscales *Horse husbandry and management - Health and welfare (Cb)* (r=-0.41, p<0.01) and *Horse husbandry and management - Housing (Cb)* (r=-0.32, p=0.04) in H1, and *Horses require resource provision* (r=-0.51, p<0.01), *General horse husbandry and management* (r=-0.35, p<0.01), *Horse husbandry and management – Health and welfare (Bb)* (r=-0.39, p<0.01), and *Horse husbandry and management – Housing (Bb)* (r=-0.32, p=0.04) in H2. These correlations indicate that the provision of a winter supplementary diet is associated with favourable behavioural and control beliefs concerning the performance of husbandry practices relating to horse health and welfare and the provision of an appropriate horse housing environment, the belief that horse ownership requires considerable resource outlay, and positive behavioural beliefs towards general horse husbandry practices. There were significant negative correlations found between *Winter diet* and behavioural beliefs *A18* (H1 r=-0.29, p=0.03; H2 r=-0.34, p=0.03) in H1 and H2, *A30* (r=-0.26, p=0.05) and *A43* (r=-0.35, p=0.01) in H1, and *A31* (r=-0.33, p=0.03) and *A46* (r=-0.32, p=0.04) in H2. These relationships indicate that the provision of a winter supplementary diet is associated with favourable behavioural beliefs towards horse condition inspection behaviour, hoof care behaviour, continued knowledge improvement, veterinary consultation, and the recognition of the challenges involved with horse management. The significant negative relationship found between *Winter diet* and the normative belief *B18* (r=-0.36, p=0.02) in H2, indicates a supplementary diet in winter is associated with favourable normative beliefs regarding horse condition inspection behaviour. Significant negative correlations were found between *Winter diet* and the control

beliefs *C29* (H1 r=-0.45, p<0.01; H2 r=-0.32, p=0.04) H1 and H2, *C18* (r=-0.30, p=0.02), *C28* (r=-0.27, p=0.04), *C30* (r=-0.47, p<0.01) and *C31* (r=-0.30, p=0.02) in H1, and *C9* (r=-0.43, p<0.01) in H2. These relationships imply that the provision of a supplementary diet in winter is associated with favourable control beliefs regarding dental care behaviour, horse condition inspection behaviour, parasite control behaviour, hoof care behaviour, veterinary consultation, and the provision of a safe horse housing environment.

There were numerous significant correlations between the horse owner management behaviour *Pasture quality* and the attitude subscales and individual attitude variables in H1 and H2. *Pasture quality* referred to the quality of pasture the horse owner grazed their horses on. Significant positive correlations were found between *Pasture quality* and the attitude subscales *General horse husbandry and management* (r=0.33, p=0.01), *Horse husbandry and management – Health and welfare (Bb)* (r=0.39, p=0.01), and *Horse husbandry and management - Health and welfare (Nb)* (r=0.34, p=0.01) in H1. These relationships indicate that the provision of lesser quality pasture is associated with positive attitudes towards general horse husbandry practices, and favourable behavioural and normative beliefs regarding the performance of health and welfare relevant horse husbandry practices. Significant negative relationships were found between *Pasture quality* and the attitude subscales *Horse husbandry and management – Diet (Nb)* (r=-0.30, p=0.02) and *Human-horse interactions (Nb*) (r=-0.29, p=0.03) in H1, and *Human-horse interactions (Cb)* (r=-0.32, p=0.04) in H2. These correlations imply that the provision of superior quality pasture is associated with favourable normative beliefs regarding the provision of an appropriate equine diet, and favourable normative and control beliefs regarding the improvement of human-horse interactions.

There were significant positive correlations found between *Pasture quality* and the behavioural beliefs *A37* (H1 r=0.33, p=0.01; H2 r=0.34, p=0.03) in H1 and H2, and *A3* (r=0.32, p=0.02), *A31* (r=0.26, p=0.05), and *A36* (r=0.39, p<0.01) in H1. These relationships imply that the provision of a lesser quality pasture is associated with favourable behavioural beliefs towards the need for awareness of potential horse welfare risks, adjusting a horse's diet according to its changing conditions, veterinary consultation, and possessing the knowledge required to care for horses. In H1, there were significant positive correlations found between *Pasture quality* and the normative beliefs *B3* (r=0.31, p=0.03), *B9* (r=0.37, p<0.01), *B22* (r=0.39, p<0.01), *B29* (r=0.28, p=0.03),

B33 (r=0.32, p=0.01) and *B35* (r=0.29, p=0.03). These relationships indicate that the provision of a lesser quality pasture is associated with favourable normative beliefs regarding the adjustment of a horse's diet according to its changing conditions, a horse owners' responsibility for the provision of a safe environment for horses, the performance of husbandry and management practices appropriate for the horse's workload, dental care behaviour, and an ability to recognise, access and appropriately respond to signs of ill health and injury in horses. Significant negative relationships were found between *Pasture quality* and the control beliefs *C3* (r=-0.38, p=0.01), *C37* (r=-0.34, p=0.02) and *C42* (r=-0.37, p=0.02) in H2, which indicate that the provision of superior quality pasture is associated with favourable control beliefs pertaining to the possession of the knowledge required to appropriately care for horses, an awareness of potential risks to horse welfare and the obtainment of information and support from industry personnel.

Significant correlations were found between the horse owner management behaviour *Pasture quantity* and the attitude subscales and individual attitude variables in H1 and H2. *Pasture quantity* referred to the amount of pasture the horse owner made available to their horses. Significant positive correlations were found between *Pasture quantity* and the attitude subscales *Horse husbandry and management – Housing (Bb)* (r=0.32, p=0.04) and *Human-horse interactions (Cb)* (r=0.36, p=0.02) in H2, indicating that the provision of pasture of a lesser abundance is associated with positive behavioural beliefs towards the provision of an appropriate horse housing environment and favourable control beliefs regarding the improvement of human-horse interaction. Significant negative relationships were found between *Pasture quantity* and the attitude subscales *Horse husbandry and management – Diet (Nb)* (r=-0.31, p=0.02), *Horse husbandry and management - Health and welfare (Nb)* (r=-0.34, p=0.01), *Horse husbandry and management - Housing (Nb)* (r=-0.34, p=0.01), *Human-horse interactions (Nb*) (r=-0.33, p=0.01) and *Human-horse interactions (Cb)* (r=-0.27, p=0.04) in H1. These correlations imply that the provision of pasture of increased abundance is associated with favourable normative beliefs regarding the provision of an appropriate equine diet, the performance of husbandry practices related to horse health and welfare, the provision of an appropriate horse housing environment and the improvement of human-horse interactions, and favourable control beliefs regarding the improvement of human-horse interactions.

In H1 there were significant negative correlations between *Pasture quantity* and the normative beliefs *B2* (r=-0.32, p=0.01), *B9* (r=-0.38, p<0.01), *B18* (r=-0.36, p<0.01), *B19* (r=-0.26, p=0.05), *B22* (r=-0.35, p<0.01), *B29* (r=-0.32, p=0.01), *B30* (r=-0.40, p<0.01), *B33* (r=-0.27, p=0.04), *B34* (r=-0.31, p=0.02) and *B35* (r=-0.31, p=0.02). These relationships indicate that the provision of more abundant pasture by the horse owner is associated with favourable normative beliefs regarding the health concerns related to high body condition in horses, a horse owners' responsibility for the provision of a safe environment, horse condition inspection behaviour, daily horse supervision, the performance of husbandry and management practices appropriate for the horses workload, dental care behaviour, hoof care behaviour, and horse owners' ability to recognise, access and appropriately respond to signs of ill health, injury and lameness in horses. The significant negative correlation found between *Pasture quantity* and the control belief *C35* (r=-0.26, p=0.05) in H1 indicates that the provision of more abundant pasture is associated with favourable control beliefs concerning the ability to recognise, access and appropriately respond to injury in horses. In H2, significant positive relationships were found between *Pasture quantity* and the control beliefs *C36* (r=0.36, p=0.02) and *C41* (r=0.36, p=0.02) which imply that the provision of less abundant pasture by the horse owner is associated with favourable control beliefs concerning the possession of the knowledge required to appropriately care for horses and one's responsibility for horse welfare.

Significant relationships were found between the horse owner husbandry behaviour *Water source inspection* and the attitude subscales and individual attitude variables in H1 and H2. *Water source inspection* refers to the frequency of horse owners' water source inspection behaviour. There were significant positive correlations found between *Water source inspection* and the attitude subscales *Horse husbandry and management – Health and welfare (Bb)* (H1 r=0.31, p=0.02; H2 r=0.43, p<0.01) and *Human-horse interactions (Bb*) (H1 r=0.34, p=0.01; H2 r=0.50, p<0.01) in H1 and H2, and *Horse husbandry and management – Housing (Bb)* (r=0.36, p=0.02) in H2, which imply that frequent water source inspection behaviour is associated with favourable behavioural beliefs concerning the performance of husbandry practices relevant to horse health and welfare, the improvement of human-horse interactions, and the provision of an appropriate horse housing environment. Significant positive correlations were found between *Water source inspection* and the attitude subscales *Horse husbandry and management - Health and welfare (Nb)* (H1r=0.37, p<0.01; H2 r=0.42, p<0.01) and *Human-horse interactions (Nb*) (H1 r=0.30, p=0.03; H2 r=0.51, p<0.01) in both H1 and H2. These relationships indicate that frequent water

source inspection behaviour is associated with favourable normative beliefs regarding the performance of husbandry practices relevant to horse health and welfare and the importance of improving human-horse interactions. Significant positive relationships were also found between *Water source inspection* and the attitude subscales *Horse husbandry and management - Health and welfare (Cb)* (H1 r=0.33, p=0.01; H2 r=0.40, p=0.01) and *Horse husbandry and management - Housing (Cb)* (H1 r=0.36, p=0.02; H2 r=0.41, p<0.01) in H1 and H2, and *Horse husbandry and management – Diet (Cb)* (r=0.40, p<0.01) in H1. These correlations imply that frequent water source inspection behaviour by the horse owner is associated with favourable control beliefs relating to horse health and welfare relevant husbandry practices, the provision of appropriate horse housing environment, and the adequate provision of equine diet.

The significant negative correlation between *Water source inspection* and the behavioural belief *A9*$^{(-ve\ RC)}$ (r=-0.35, p=0.01) in H1 implies that an increased frequency of water source inspection behaviour by the horse owner is associated with a favourable behavioural belief towards the provision of a safe horse housing environment. Significant positive correlations were found between *Water source inspection* and the behavioural beliefs *A18* (H1 r=0.31, p=0.02; H2 r=0.50, p<0.01) in H1 and H2, *A22* (r=0.26, p=0.05) in H1, *A19* (r=0.31, p=0.02) and *A29* (r=0.32, p=0.04) in H2. These relationships indicate that frequent water source inspection behaviour is associated with favourable behavioural beliefs towards horse condition inspection behaviour, the performance of husbandry and management practices appropriate for the horses work load, daily horse supervision, and dental care behaviour. Significant positive correlation were found between *Water source inspection* and the normative beliefs *B33* (H1 r=0.43, p<0.01; H2 r=0.48, p<0.01), *B34* (H1 r=0.34, p<0.01; H2 r=0.48, p<0.01), *B35* (H1 r=0.49, p<0.01; H2 r=0.48, p<0.01), *B36* (H1 r=0.32, p<0.01; H2 r=0.38, p<0.01), and *B37* (H1 r=0.36, p<0.01; H2 r=0.39, p<0.01) in both H1 and H2, and *B22* (r=0.35, p=0.02), *B41* (r=0.43, p<0.01) and *B43* (r=0.44, p<0.01) in H2. These relationships indicate that frequent water source inspection behaviour is associated with favourable normative beliefs regarding an ability to recognise, access and appropriately respond to signs of lameness, injury and ill health in horses, ability to recognise, access and appropriately respond to lameness in horses, the need for knowledge in order to appropriately care for horses, an awareness of potential horse welfare risks, the performance of husbandry and management practices appropriate for the horses workload, horse owner's responsibility for the welfare of their horses, and the continued improvement of knowledge. There were significant positive relationships found between *Water source inspection* and the control beliefs *C1* (H1 r=0.40,

p<0.01; H2 r=0.37, p=0.02) and *C33* (H1 r=0.30, p=0.02; H2 r=0.42, p<0.01) in H1 and H2, *C3* (r=0.30, p=0.02), *C29* (r=0.29, p=0.03) and *C34* (r=0.45, p<0.01) in H1, and *C18* (r=0.43, p<0.01), *C19* (r=0.33, p=0.03), *C22* (r=0.31, p=0.05) and *C37* (r=0.37, p=0.02) in H2 in H2. These correlations imply that frequent water source inspection behaviour is associated with favourable control beliefs concerning the ability to base a horse's diet on its circumstances, the ability to recognise, access and appropriately respond to signs of lameness and ill health in horses, ability to modify horse diet according to changing conditions, dental care behaviour, horse condition inspection behaviour, daily horse supervision, the performance of husbandry and management practices relevant to the horse's workload, and an awareness of potential risks to horse welfare.

The significant positive correlation between *Stocking density* and the attitude subscale *Horse husbandry and management – Diet (Cb)* (r=0.30, p=0.02) in H1 implies that an increased horse stocking density is associated with favourable control beliefs concerning the appropriate provision of equine diet. In H2, the significant negative correlation between *Stocking density* and the normative belief *B18* (r=-0.33, p=0.03) indicates that an increased horse stocking density is associated with favourable normative beliefs regarding horse condition inspection behaviour. The significant correlation between *Stocking density* and the control belief *C29* (r=0.27, p=0.04) in H1 implies that a reduced horse stocking density is associated with favourable control beliefs concerning dental care behaviour.

Significant correlations were found between the horse owner behaviour *Ride* and the attitude subscales and individual attitude variables in H1 and H2. Significant positive correlations were found between *Ride* and the attitude subscales *Human-horse interactions (Cb*) (H1 r=0.43, p<0.01; H2 r=0.35, p=0.03) in H1 and H2, *Horse husbandry and management - Health and welfare (Nb)* (r=0.27, p=0.04) and *Horse husbandry and management - Housing (Nb)* (r=0.28, p=0.04) in H1, and *General horse husbandry and management* (r=0.36, p=0.02) and *General attitude statements* (r=0.36, p=0.02) in H2. These relationships indicate that horse owners who ride their horses are associated with favourable control beliefs concerning the improvement of human-horse interactions, favourable normative beliefs regarding the performance of husbandry practices related to horse health and welfare and the provision of an appropriate horse housing environment, and positive attitudes towards the performance of general husbandry practices and

horses and horse ownership. The significant negative relationship between *Ride* and the behavioural belief *A9*$^{(-ve\ RC)}$ (r=-0.30, p<0.01) in H1 implies that horse owners who ride their horses are associated with favourable behavioural beliefs towards the provision of a safe environment for the horse. There were significant positive correlations found between *Ride* and the behavioural beliefs *A30* (r=0.44, p<0.01) in H1 and *A30* (r=0.44, p<0.01) in H2, the normative beliefs *B30* (r=0.43, p<0.01), *B34* (r=0.23, p=0.03) and *B36* (r=0.30, p=0.03) in H1, and the control beliefs *C29* (r=0.31, p=0.02), *C30* (r=0.41, p<0.01) and *C41* (r=0.29, p=0.03) in H1, and *C2* (r=0.32, p=0.04) in H2. These relationships imply that horse owners who ride their horses are associated with favourable behavioural belief towards hoof care behaviour and recognising, accessing and responding to injuries in horses, favourable normative beliefs regarding hoof care behaviour, recognising, accessing and responding to lameness in horses and the need for knowledge in order to appropriately care for horses, and favourable control beliefs concerning an ability to appropriately manage horses' body condition, dental care behaviour, hoof care behaviour, and a responsibility for the welfare of their horses.

Significant correlations were found between the horse owner behaviour *Compete* and the attitude subscales and individual attitude variables in H1 and H2. *Compete* refers to the horse owner's involvement with competitive recreational horse use. Significant negative correlations were found between *Compete* and the attitude subscales *Horse husbandry and management – Diet (Nb)* (H1 r=-0.30, p=0.02; H2 r=-0.32, p<0.01) and *Human-horse interactions (Nb*) (H1 r=-0.30, p=0.02; H2 r=-0.32, p<0.01) in H1 and H2. These relationships indicate that non-competitive horse ownership is associated with favourable normative beliefs regarding the provision of an appropriate equine diet and control beliefs concerning the improvement of human-horse interactions. Significant negative correlations were found between *Compete* and the behavioural belief *A28*$^{(-ve\ RC)}$ (H1 r=-0.41, p<0.01; H2 r=-0.41, p<0.01) in both H1 and H2, which indicate that competitive recreational horse ownership is associated with favourable behavioural beliefs towards parasite control behaviour. Significant positive correlations were found between *Compete* and the behavioural belief *A30* (H1 r=0.27, p=0.05; H2 r=0.27, p=0.05) and *A46* (H1 r=0.52, p<0.01; H2 r=0.51, p<0.01), the normative beliefs *B3* (H1 r=0.35, p<0.01; H2 r=-0.35, p<0.01) and *B28* (H1 r=0.28, p=0.04; H2 r=0.28, p=0.04), and the control belief *C28* (H1 r=0.40, p<0.01; H2 r=0.40, p<0.01) in both H1 and H2. These relationships imply that competitive recreational horse ownership is associated with favourable behavioural beliefs towards hoof care behaviour and the acknowledgment of the challenges involved with horse management,

normative beliefs regarding the adjustment of a horse's diet according to its changing conditions and parasite control behaviour, and control beliefs concerning parasite control behaviour. Significant negative correlations were found between *Compete* and the behavioural belief *A34* (H1 r=-0.36, p<0.01; H2 r=-0.36, p<0.01), and the normative beliefs *B1* (H1 r=-0.30, p=0.02; H2 r=-0.31, p=0.02) and *B34* (H1 r=-0.26, p=0.05; H2 r=-0.26, p=0.05) in both H1 and H2. These relationships imply that non-competitive recreational horse ownership is associated with positive behavioural and normative beliefs towards recognising, accessing and responding to horse lameness, and favourable normative beliefs regarding the determination of a horse's diet based on its circumstances.

A significant positive correlation was found between *Registered horse* and the attitude subscale *Human-horse interactions (Bb*) (r=0.32, p=0.04) in H2 indicating that horse owners who register their horses are associated with favourable behavioural beliefs towards the improvement of human-horse interactions. In H2, the significant negative relationship between *Registered horse* and the behavioural belief *A36* (r=-0.29, p=0.03) implies that horse owners who register their horses are associated with favourable behavioural beliefs towards possessing the knowledge to care for horses. Significant positive correlations were found between *Registered horse* and the normative belief *B29* (r=0.38, p=0.01) and the control belief *C36* (r=0.33, p=0.04) in H2. These relationships indicate that horse owners who register their horses are associated with favourable normative beliefs regarding the dental care behaviour and control beliefs concerning the possession of the knowledge required to appropriately care for horses. The significant correlation found between *Horse owner approach* and the control beliefs *C41* (r=0.26, p=0.05) in H1 and *C9* (r=0.32, p=0.04) in H2, indicate that a calm and steady horse approach behaviour is associated with favourable control beliefs concerning the provision of a safe horse housing environment and a responsibility for the welfare of their horses.

Correlations between horse owner behaviour and horse welfare outcome variables

Pearson product-moment correlation analyses showed that horse owner behaviours were significantly correlated with horse welfare outcomes, in both H1 and H2. The horse owner husbandry and management behaviours are reported individually as horse owner husbandry behaviour and horse owner management behaviour for ease of presentation. The significant

Pearson product-moment correlations between horse owner husbandry behaviour and horse welfare outcomes are given in Tables 44 and 45, for H1 and H2 respectively. The significant Pearson product-moment correlations between horse owner management behaviour and horse welfare outcomes are given in Tables 46 and 47, for H1 and H2 respectively. The significant relationships are discussed below.

Table 44 Pearson product-moment correlations ($p<0.05$) between horse owner husbandry behaviour and horse welfare outcomes in H1 (n=57)

	Int time	Own Ap	Hoof	Shod	Bare	Sup fed
BCS		-0.27*				-0.34*
HS	-0.30*		0.29*	0.28*	-0.31**	

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

BCS refers to a horses body condition score, **HS** refers to hoof score, **Int time** refers to the amount daily horse owner-horse interaction, **Own ap** refers to horse owner approach, **Hoof** refers to hoof care behaviour, **Shod** refers to horse shod, **Bare** refers to barefoot horse, and **Sup fed** refers to supplementary feeding.

Table 45 Pearson product-moment correlations ($p<0.05$) between horse owner husbandry behaviour and horse welfare outcomes in H2 (n=42)

	Resrces	Hoof	Worm	Teeth	Vet insp
BCS		-0.32*		-0.33*	
LS	-0.33*		0.50**		
HS		0.50**		0.42**	0.33*

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 40

BCS refers to a horses body condition score, **LS** refers to lameness score, **HS** refers to hoof score, **Resrces** refers to resources available to horse, **Hoof** refers to hoof care behaviour, **Worm** refers to parasite control behaviour, **Teeth** refers to dental care behaviour, and **Vet insp** refers to veterinary inspection.

Table 46 Pearson product-moment correlations ($p<0.05$) between horse owner management behaviour and horse welfare outcomes in H1 (n=57)

	Supvisn	H_20 insp	H meth
BCS			-0.37**
HS		0.40**	
IS		0.30*	
DIIS	-0.33*	0.39**	

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 55

BCS refers to a horses body condition score, **HS** refers to hoof score, **IS** refers to injury score, **DIIS** refers to disease/injury/illness score, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **H_20 insp** refers to water source inspection, and **H meth** refers to horse housing method.

Table 47 Pearson product-moment correlations ($p<0.05$) between horse owner management behaviour and horse welfare outcomes in H2 (n=42)

	Supvisn	S diet	W diet	H_20 insp	Pad size
BCS				-0.32*	
LS	-0.32*	-0.34*	-0.43**		0.49**
HS		-0.33*	-0.32*	0.41**	0.31*

Note: *p<0.05 **p<0.01, a blank space indicates p>0.10, df = 40

BCS refers to a horses body condition score, **LS** refers to lameness score, **HS** refers to hoof score, **Supvisn** is an abbreviation of the degree of supervision the horse is under, **S diet** refers to summer diet, **W diet** refers to winter diet, **H_20 insp** refers to water source inspection, and **Pad size** refers to the size of the paddock where the horse is housed.

No significant correlations were found between the horse owner husbandry behaviours *Registered horse*, *Resources*, *Daily human-horse interaction*, *Ride*, *Compete*, *Advice*, *Veterinary inspection*, *Parasite control behaviour*, *Dental care behaviour*, and *BC inspection* in H1, or *Registered horse*, *Daily human-horse interaction*, *Daily human-horse interaction time*, *Ride*, *Compete*, *Horse owner approach*, *Advice*, *Veterinary inspection*, *Parasite control behaviour*, *Dental care behaviour*, *Shod*, *Barefoot*, *BC inspection*, and *Supplementary feeding* in H2. With regard to horse owner management behaviours, no significant relationships were found between the *Horses region type*, *Housing location*, *Summer diet*, *Winter diet*, *Pasture quantity*, *Pasture quality*, *Stocking density*, *Paddock size*, *Shelter*, *Literature read*, and *Active knowledge improvement* in H1, and *Horse region type*, *Distance between horse owners primary residence and location of horse*, *Housing location*, *Pasture quantity*, *Pasture quality*, *Stocking density*, *Horse housing method*, *Shelter*, and *Active knowledge improvement* in H2.

A number of significant correlations were found between horse welfare outcomes and horse owner husbandry behaviours in both H1 and H2. Significant negative correlations were found between the horse welfare outcome *BCS* and *Horse owner approach* ($r=-0.27$, $p=0.04$) and *Supplementary feeding* ($r=-0.34$, $p=0.01$) in H1, which implies that high BCS in horses is associated with a calm and steady horse owner approach and the horse owner's provision of a supplementary diet. In H2, significant negative relationships were found between *BCS* and *Hoof care behaviour* ($r=-0.32$, $p=0.04$) and *Dental care behaviour* ($r=-0.33$, $p<0.01$), indicating that high BCS in horses is associated with appropriate hoof care behaviour and the regular performance of dental care behaviour. The significant negative correlation found between the horse welfare outcome *HS* and *Daily human-horse interaction time* ($r = -0.30$, $p = 0.02$) in H1

indicates that an appropriate hoof condition in horses is associated with an increased daily human-horse interaction time. Significant positive relationships were found between the *HS* and *Hoof care behaviour* (H1 r=0.29, p=0.03; H2 r=0.50, p<0.01) in H1 and H2, and *Veterinary inspection* (r=0.33, p=0.04) and *Dental care behaviour* (r=0.42, p<0.01) in H2. These correlations imply that an appropriate horse hoof condition is associated with the appropriate performance of hoof care behaviour, the use of veterinary consultation, and the appropriate performance of dental care behaviour. In H1, the significant positive relationship between *HS* and *Shod* (r=0.28, p=0.03) and the significant negative relationship between *HS* and *Barefoot* (r=-0.31, p=0.02) indicate that appropriate horse hoof condition is associated with horse shoeing rather than barefoot trimming. A significant negative correlation was found between the horse welfare outcome *LS* and *Resources* (r = -0.33, p = 0.04) in H2, implying that a sound gait in horses is associated with the horse owner's provision of a range of resources. The significant positive correlation between *LS* and *Parasite control behaviour* (r=0.50, p<0.01) in H2 indicates gait soundness in horses is associated with the appropriate performance of parasite control behaviour by the horse owner.

Significant correlations were found between horse welfare outcomes and horse owner management behaviours, in both H1 and H2. Significant negative correlations were found between the horse welfare outcome *BCS* and *Housing method* (r=-0.37, p<0.01) in H1 and *Water source inspection* (r=-0.32 p=0.04) in H2. These relationships imply that low BCS in horses is associated with an increased time spent housed in a paddock and high BCS in horses is associated with frequent water source inspection behaviour. Significant negative correlations were found between the horse welfare outcome *HS* and *Summer diet* (r=-0.33, p=0.04) and *Winter diet* (r=-0.32, p=0.04) in H2, which imply that an appropriate hoof condition in horses is associated with the horse owner's provision of a supplementary diet in summer and winter. Significant positive relationships were found between *HS* and *Water source inspection* (H1 r=0.40, p<0.01; H2 r=0.41, p<0.01) in H1 and H2, and *Paddock size* (r=0.31, p=0.04) in H2. These correlations indicate that appropriate horse hoof condition is associated with frequent water source inspection behaviour and small paddock sizes. Significant negative correlations were found between the horse welfare outcome *LS* and *Degree of general supervision at horse's housing location* (r=-0.32, p=0.04), *Summer diet* (r=-0.34, p=0.03) and *Winter diet* (r=-0.43, p<0.01) in H2. These relationships indicate a regular gait in horses is associated with the provision of a supplementary diet in summer and winter, and a low level of daily horse supervision. In H2, a significant positive correlation was found between *LS* and *Paddock size* (r=0.49, p<0.01) implying that a

sound gait in horses is associated with smaller paddock sizes. In H1, a significant relationship was found between the horse welfare outcome *IS* and *Water source inspection* (r=0.30, p=0.02) which implies that the presence of injury in horses is associated with frequent water source inspection behaviour by the horse owner. A significant negative correlation was found between the horse welfare outcome *DIIS* and *Degree of general supervision at horse's housing location* (r=-0.33, p=0.01) in H1, which indicates that the presence of disease, injury and illness in horses is associated with an increased degree of daily horse supervision. Similarly, the significant positive correlation found between *DIIS* and *Water source inspection* (r=0.39, p<0.01) in H1 indicates that the presence of disease, injury and illness in horses is associated with frequent water source inspection behaviour by the horse owner.

5.3.3 Factors predicting horse welfare outcomes from a horse owner's performance of key horse husbandry and management practices

Adapted from the attitude-behaviour relationship described by Ajzen's (1985) Theory of Planned Behaviour, a model describing the hypothesised antecedents of Victorian horse owner husbandry behaviour, and the ensuing relationship with horse welfare outcomes is given in Figure 24. Ideally, the interrelationships between the variables in this model would be investigated using structural equation modelling. However, the sample size did not permit this, and as a result the interrelationships were examined using a series of linear multiple regressions relevant to each stage of the model. The variables identified as being significantly correlated with the relevant dependent variable were used as independent variables in these regression analyses. This was to permit the unique contributions of these variables to the variance in the relevant dependent variable to be determined. As was the case for the correlation analyses above, these analyses should be considered exploratory rather than hypothesis testing because of the large number of analyses and consequent risk of Type I errors. The analyses in subsequent sections are organized in terms of the behaviour in question, namely, *Parasite control behaviour*, *Hoof care behaviour* and *Dental care behaviour*. A series of linear regressions were conducted to investigate these hypothesized relationships.

5.3.3.1 Factors predicting a horse owner's performance of parasite control behaviour and subsequent relationship with horse welfare outcomes

The first horse husbandry and management practice investigated involved parasite control, where the frequency with which the horse owner treated the horse for parasites was examined (Figure

25). As described in Table 20, *Timebtwworm* measured the interval between parasite control treatments. This was measured using two questions, 'When did you last worm your horse (date)?' and 'When are you next scheduled to worm your horse (date)?'. The length of time that passed between the two treatments was taken as the horse owner's *Parasite control behaviour*.

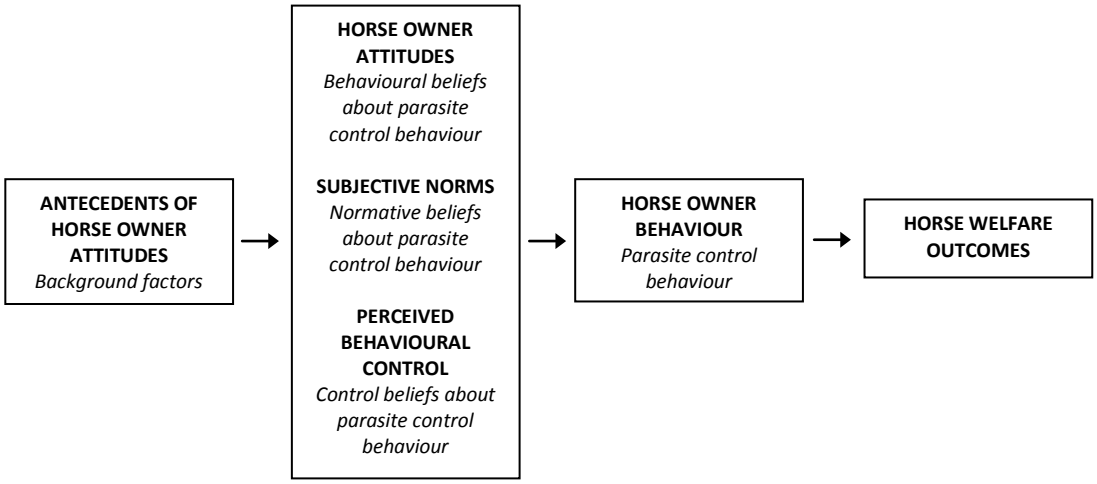


Figure 25 Generic model describing the factors involved with horse owner parasite control behaviour and the ensuing relationship with horse welfare outcomes

Predicting horse owner beliefs about parasite control behavior from horse owner background factors

As reported in Section 5.3.2, background factors are associated with horse owner attitudes towards behaviour. Consequently, the relationships between background factors and the three forms of belief (behavioural, normative and control) which underlie a horse owner's attitude towards parasite control behaviour were examined. The relationship investigated is shown in Figure 26.

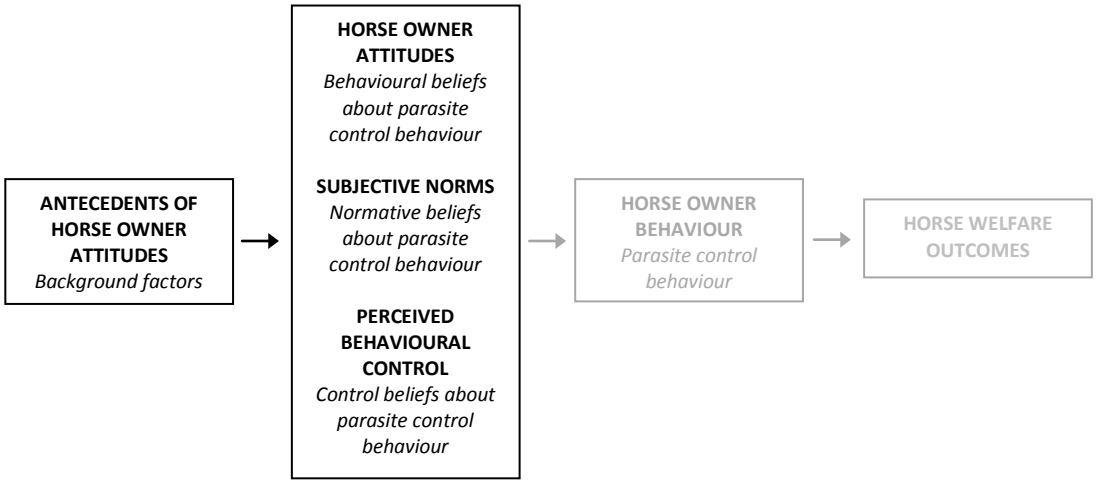


Figure 26 Model describing the factors involved with horse owners parasite control behaviour and the ensuing relationship with horse welfare outcomes. The section of the model that is not greyed out is analysed here

Pearson product-moment correlations were used to examine relationships between horse owner background factors and horse owner beliefs concerning parasite control. The significant correlations between the background factors and the three horse owner belief variables are reported in Table 48, and discussed below. The horse owner background factors which correlated significantly with horse owner beliefs about parasite control behaviour were then entered into a series of linear regression analyses to determine the degree of variance in attitudes which could be accounted for by these variables. The results for these analyses are given in Table 49.

Table 48 Pearson product-moment correlations between horse owner background factors and horse owner beliefs about parasite control variables (n=57)

	Behavioural belief A28$^{(-ve\ RC)}$	Normative belief B28	Control belief C28
Region type	-0.29*	0.33**	0.33**
Age	-0.48**	0.32*	0.52**
Ride int freq	-0.56**		0.43**

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05, df =55

$^{(-ve\ RC)}$ re-coded negative attitude item, **A28**$^{(-ve\ RC)}$. How often should you treat horses for worms?, **B28**. How often do other horse owners believe you should treat horses for worms?, **C28**. How often are you able to treat your horses for worms?, **Region type** refers to the region type where the horse owner's primary residence is located, **Age** refers to the horse owner's age, **Ride int freq** refers to the frequency of riding instruction.

A significant correlation was found between *Region type* and each of the three beliefs about parasite control behaviour. The significant negative correlation between *Region type* and the

behavioural belief (r=-0.29, p=0.03) implies that horse owners residing in urban Victoria believe horses should receive more frequent parasite control treatment than those horse owners residing in regional Victoria. A significant positive correlation was found between *Region type* and the normative belief (r=0.33, p<0.01), which indicates that when compared with regional horse owners, urban horse owners are of the belief that fellow horse owners believe that horses should receive parasite treatment at frequent time intervals. Finally, the significant positive correlation between *Region type* and the control belief (r=0.33, p<0.01) implies that urban horse owners report the ability to provide their horses with parasite control treatment more regularly than regional Victorian horse owners.

A negative correlation was found between *Age* and the behavioural belief (r=-0.48, p<0.01) which indicates that younger horse owners appear to believe in the more frequent parasite control treatment of horses than older owners. The significant positive correlation found between *Age* and the normative belief (r=0.32, p=0.02) implies that compared with older horse owners, younger horse owners believe that fellow horse owners would recommend a greater frequency in parasite control treatment for horses. A significant positive correlation was found between *Age* and the control belief (r=0.52, p<0.01) which indicates that younger horse owners reported a greater frequency of parasite control treatments in horses when compared to older horse owners.

A significant negative correlation was found between *Riding instruction frequency* and the behavioural belief (r=-0.56, p=0.01), which indicates that horse owners who receive regular riding instruction believe that horses should receive parasite control treatment more frequently than horse owners who lack regular riding instruction. The significant positive correlation found between *Riding instruction frequency* and the control belief (r=0.43, p<0.01) implies that compared with horse owners who failed to receive regular riding instruction, horse owners who receive regular riding instruction reported the ability to perform parasite control behaviour at a greater frequency.

Table 49 Linear regression analyses for horse owner beliefs about parasite control and horse owner background factors

Horse owner belief	Background factor	Zero-order correlation	β coefficient	Standard error	Change in R^2	p-value
Behavioural belief A28$^{(-ve\ RC)}$	Age	-0.48	-0.48	0.50	0.20	0.01
	Ride int freq	-0.56	-0.43	0.47	0.11	0.02
Normative belief B28	Region type	0.33	0.33	0.55	0.09	0.01
	Age	0.32	0.26	0.53	0.05	0.04
Control belief C28	Age	0.59	0.59	0.47	0.32	0.00
	Region type	0.30	0.33	0.43	0.09	0.02

$^{(-ve\ RC)}$ re-coded negative attitude item, **A28**$^{(-ve\ RC)}$. How often should you treat horses for worms?, **B28**. How often do other horse owners believe you should treat horses for worms?, **C28**. How often are you able to treat your horses for worms?, **Region type** refers to the region type where the horse owner's primary residence is located, **Age** refers to the horse owner's age, and **Ride int freq** refers to the frequency of riding instruction.

The horse owner background factors which were predictive of horse owner behavioural beliefs about parasite control behaviour were *Age* and *Riding instruction frequency*. Thirty one percent of a horse owner's behavioural belief about parasite control behaviour was accounted for by the two background factors. *Age* (β=-0.48, p=0.01) was of greatest importance to a horse owner's attitude towards parasite control behaviour, and accounted for twenty percent of the variance. *Riding instruction frequency* (β=-0.43, p=0.02) accounted for an additional eleven percent of the variance in horse owners' attitude towards parasite control behaviour. The negative beta values result from the behavioural belief variable *A28*$^{(-ve\ RC)}$ being a re-coded negative attitude item. These findings indicate that favourable attitudes towards appropriate parasite control behaviour in horse owners are associated with a young age and frequent riding instruction.

The horse owner background factors *Region type* and *Age* were predictive of horse owner normative beliefs about parasite control behaviour. Thirteen percent of the variance in horse owners' normative beliefs is accounted for by *Region type* and *Age*. *Region type* (β=0.33, p=0.01) was of greatest importance to a horse owner's normative beliefs about parasite control behaviour, accounting for nine percent of the variance. *Age* (β=0.26, p=0.04) accounted for an additional four percent of the variance in horse owners' normative beliefs concerning parasite control behaviour. The results imply that favourable normative beliefs in horse owners are associated with an urban region of primary residence and a young age.

The horse owner background factors which were predictive of horse owner perceived behavioural control regarding parasite control behaviour were *Age* and *Region type*. Forty one percent of the variance found in horse owners' perceived behavioural control was accounted for by the two background factors. *Age* (β=0.59, $p<0.01$) was of greatest importance to a horse owner's perceived behavioural control regarding parasite control behaviour, accounting for thirty two percent of the variance. *Region type* (β=0.33, $p=0.02$) accounted for a further nine percent of the variance in a horse owner's perceived behavioural control regarding parasite control behaviour. These findings indicate that favourable perceived behavioural control is associated with a young age and an urban primary residence in horse owners.

Predicting horse owner parasite control behaviour from horse owner beliefs about parasite control behaviour

Ajzen and Fishbein (1980) theorise that the direct antecedents of horse owner behaviour are intention and perceived behavioural control. In turn, intention is determined by the three forms of beliefs; attitudes, normative beliefs and control beliefs towards the behaviour, which together underlie a horse owner's attitude towards horses and their management. The relationships between horse owner beliefs about parasite control behaviour and horse owner *Parasite control behaviour*, described in Figure 27, are examined below.

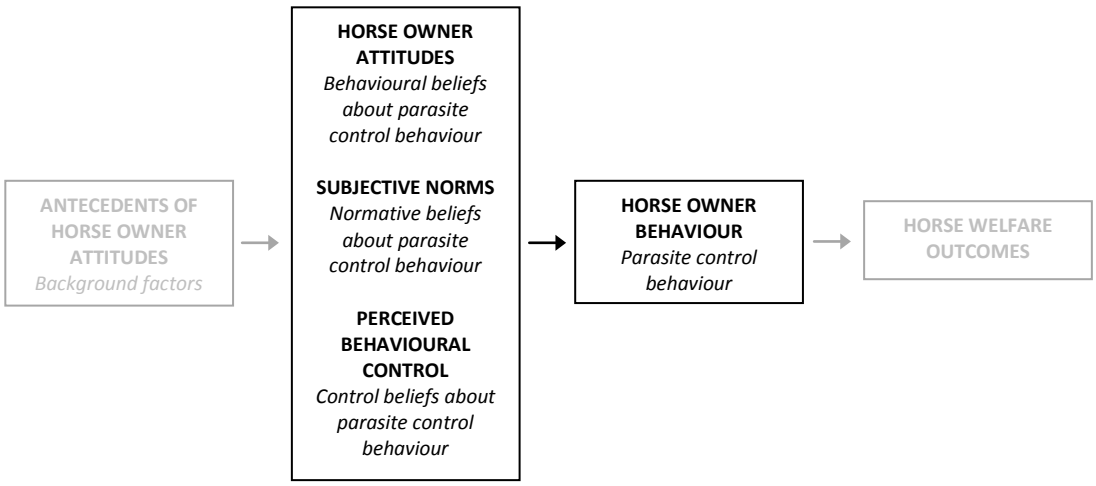


Figure 27 The section of the model that describes the factors concerning the antecedents of horse owner parasite control behaviour. The section of the model that is not greyed out is analysed here

Pearson product-moment correlation analysis was used to examine relationships between horse owner belief variables about parasite control behaviour and *Timebtwworm*, the variable concerning the length of time between parasite control treatments. The results of these analyses are reported in Table 50 for both H1 and H2. The horse owner beliefs about parasite control which correlated significantly with horse owner *Parasite control behaviour* were entered into a linear regression analysis to determine the degree of variance in behaviour which could be accounted for by each of the three belief variables. The results of these analyses are reported for both H1 and H2, in Table 51. The significant results for both forms of analyses are discussed below.

Table 50 Pearson product-moment correlations between parasite control belief variables and horse owner *Parasite control behaviour* (H1 n=57, H2 n=42)

	H1Timebtwworm	*H2Timebtwworm*
Behavioural belief A28$^{(-ve\ RC)}$	-0.49**	-0.60**
Normative belief B28		0.42**
Control belief C28	0.54**	0.71**

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05

$^{(-ve\ RC)}$ re-coded negative attitude item, **A28**$^{(-ve\ RC)}$. How often should you treat horses for worms?, **B28**. How often do other horse owners believe you should treat horses for worms?, **C28**. How often are you able to treat your horses for worms?, ***H1Timebtwworm*** refers to horse owners' parasite control behaviour in H1, and ***H2Timebtwworm*** refers to horse owners' parasite control behaviour in H2.

Horse owner beliefs about parasite control behaviour were significantly correlated with horse owner *Parasite control behaviour*. A significant negative correlation was found between the behavioural belief and horse owner *Parasite control behaviour*, in both H1 ($r = -0.49$, $p<0.01$) and H2 ($r = -0.60$, $p<0.01$), which implies that horse owners who possess a favourable behavioural belief about frequent parasite control treatment are performing *Parasite control behaviour* more frequently than those horse owners who possess less favourable behavioural beliefs. A significant positive correlation between the normative belief and *Parasite control behaviour* was only found in H2 ($r=0.42$, $p<0.01$), implying that horse owners who report that fellow horse owners believe in the frequent treatment of horses for parasites perform appropriate *Parasite control behaviour* in H2. A significant positive correlation was found between the control belief and horse owner *Parasite control behaviour*, in both H1 ($r=0.54$, $p<0.01$) and H2 ($r=0.71$, $p<0.01$). These correlations imply that horse owners who report favourable control beliefs concerning frequent

parasite control treatment perform *Parasite control behaviour* more frequently than horse owners reporting a lack of perceived behavioural control.

Table 51 Linear regression analysis for horse owner *Parasite control behaviour* and horse owner beliefs about parasite control (H1 n=57, H2 n=42)

Horse owner behaviour	Belief variable	Zero-order correlation	β coefficient	Standard error	Change in R^2	P-value
H1Timebtwworm	A28 (-ve RC)	-0.49	-0.49	1.14	0.22	0.00
	B28	0.26	-0.11	1.15	-0.003	0.49
	C28	0.54	0.50	1.08	0.07	0.01
H2Timebtwworm	A28 (-ve RC)	-0.60	-0.60	0.81	0.34	0.00
	B28	0.42	0.11	0.81	-0.009	0.48
	C28	0.31	0.71	0.72	0.12	0.02

(-ve RC) re-coded negative attitude item, **A28**(-ve RC). How often should you treat horses for worms?, **B28**. How often do other horse owners believe you should treat horses for worms?, **C28**. How often are you able to treat your horses for worms?, ***H1timebtwworm*** refers to horse owners' parasite control behaviour in H1, and ***H2timebtwworm*** refers to horse owners' parasite control treatment in H2.

The horse owner beliefs about parasite control which were predictive of horse owners' *Parasite control behaviour* in H1 were attitudes towards parasite control behaviour (behavioural belief) and perceived behavioural control regarding parasite control behaviour (control belief). Twenty nine percent of the variance in horse owner *Parasite control behaviour* for H1 was accounted for by these two beliefs. Attitude towards parasite control behaviour (β=-0.49, $p<0.01$) was of greatest importance to horse owners' *Parasite control behaviour*, accounting for twenty two percent of variance. Perceived behavioural control regarding parasite control behaviour (β=0.71, $p=0.02$) accounted for seven percent of variance in horse owners' *Parasite control behaviour* for H1. These findings indicate that appropriate *Parasite control behaviour* in H1 in horse owners is associated with favourable behavioural and control beliefs regarding the husbandry behaviour.

The horse owner beliefs about parasite control which were predictive of horse owner *Parasite control behaviour* in H2 were attitudes towards parasite control behaviour and perceived behavioural control regarding parasite control behaviour. Horse owner behavioural and control beliefs accounted for forty six percent of the observed variance in *Parasite control behaviour* in H2. Attitudes towards parasite control behaviour (β=-0.60, $p<0.01$) was of greatest importance to horse owner *Parasite control behaviour*, accounting for thirty four percent of variance. Perceived

behavioural control regarding parasite control behaviour (β=0.71, p=0.02) accounted for twelve percent of unique variance in horse owner *Parasite control behaviour* in H2. These results imply that favourable behavioural and control beliefs regarding parasite control behaviour in horse owners are associated with the appropriate performance of *Parasite control behaviour* in H2.

Predicting horse welfare outcomes from horse owner parasite control behaviour

Horse welfare is reportedly influenced significantly by the manner in which horse owners' manage their horses. It is therefore hypothesised that horse owner *Parasite control behaviour* will influence horse welfare outcomes. Consequently, the relationships between horse owner *Parasite control behaviour* and horse welfare outcomes were examined (Figure 28).

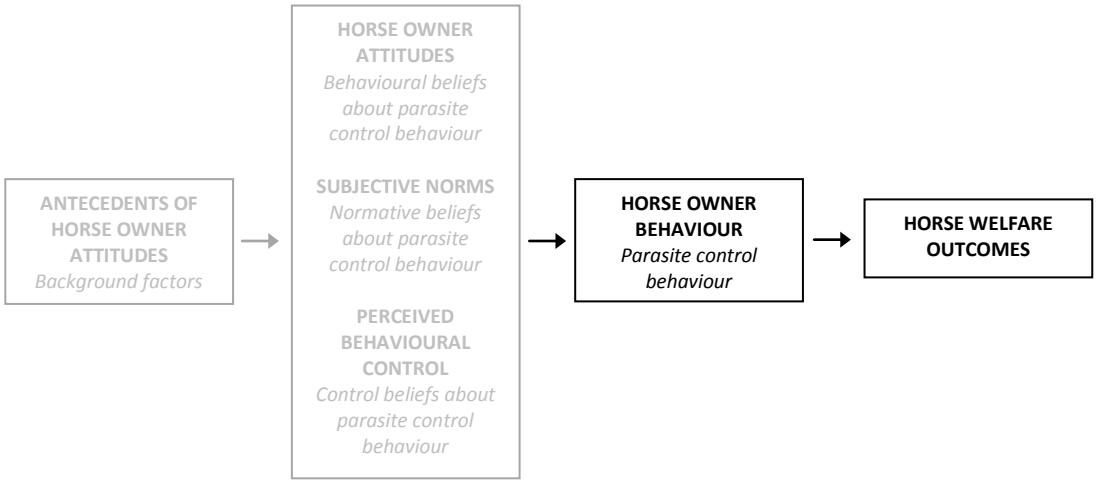


Figure 28 The section of the model that describes the factors influencing horse welfare outcomes. The section of the model that is not greyed out is analysed here

Pearson product-moment correlation analysis was used to examine relationships between *Timebtwworm* and horse welfare outcomes. The only significant positive correlation found was between horse owner *Parasite control behaviour* and *LS* (r=0.47, p<0.01) in H2. This finding implies that horse owners who frequently treat their horses for parasites own horses with hooves in good condition.

5.3.3.1 Factors predicting a horse owner's performance of hoof care behaviour and subsequent relationship with horse welfare outcomes

The second horse husbandry and management practice investigated involved hoof care, where the frequency with which the horse owner had the horses hooves attended to (i.e. shod or barefoot trimmed) was examined (Figure 29). *Timebtwfarrier* measured the interval between hoof care treatments. This was measured using two questions, 'When did you last have your horses hooves trimmed or shod?' and 'When are you next scheduled to have your horses hooves trimmed or shod?'. The length of time that passed between the two treatments was taken as the answer for *Timebtwfarrier* (c.f. Section 5.2.3.2 and Table 20).

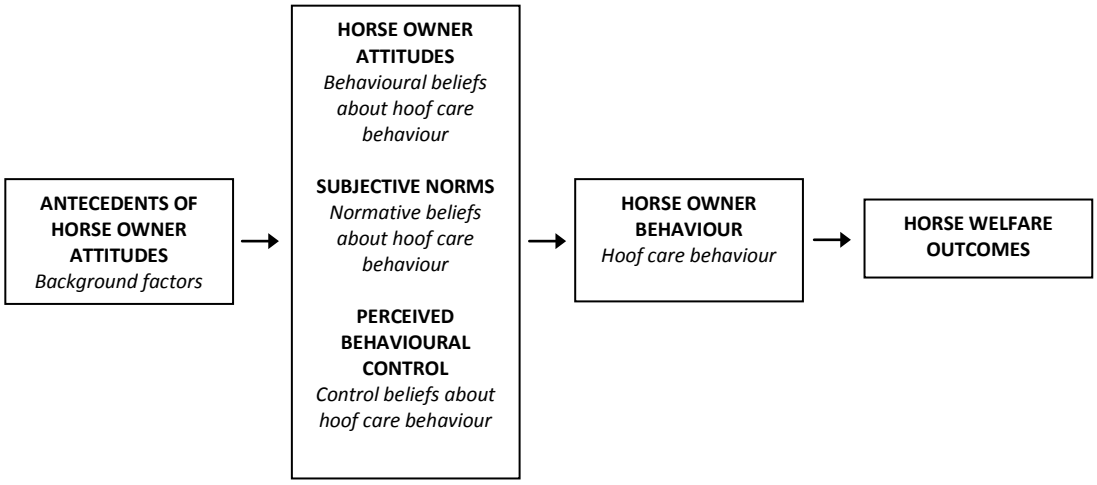


Figure 29 Generic model describing the factors involved with horse owners' hoof care behaviour and the subsequent relationship with horse welfare outcomes

Predicting horse owner beliefs about hoof care behaviour from horse owner background factors

The relationships between horse owner background factors and the three salient beliefs which determine horse owner attitudes towards hoof care behaviour were examined (Figure 30).

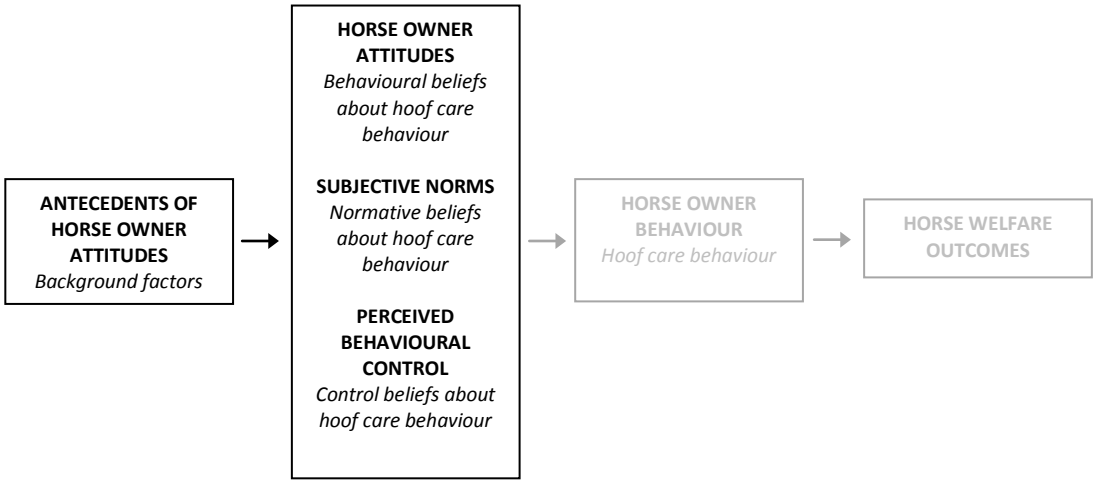


Figure 30 Model describing the factors involved with horse owners' hoof care behaviour and the subsequent relationship with horse welfare outcomes. The section of the model that is not greyed out is analysed here

Pearson product-moment correlations were used to examine relationships between horse owner background factors and horse owner belief variables concerning hoof care. Significant correlations between background factors and horse owner belief variables are reported in Table 52. The horse owner background factors that correlated significantly with horse owner salient beliefs about hoof care behaviour were entered into a series of multiple regression analyses to determine the degree of variance in the beliefs that could be accounted for by these variables. The results for these analyses are given in Table 53.

Table 52 Pearson product-moment correlations between horse owner background factors and horse owner beliefs about hoof care variables (n=57)

	Behavioural belief A30	Normative belief B30	Control belief C30
Region type	0.35**		
Age	0.43**	0.37**	0.33**
Gender	-0.38**		-0.27*
Children		-0.30*	
Prop type	0.32*		
Prop size		0.32*	
Hcs Member	0.32*		0.36**
Ride instruct	0.28*	0.32**	

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05, df =55

A30. How often should a horse's hooves be attended to?, **B28**. How often do other horse owners believe a horse's hooves should be attended to?, **C28**. How often are you able to attend to your horse's hooves?, **Region type** refers to the region type where the horse owner's primary residence is located, **Age** refers to the horse owner's age, **Gender** refers to the horse owner's gender, **Children** refers to whether the horse owner has children, **Prop type** refers to property type, **Prop size** refers to property size, **Hcs Member** is an abbreviation of horse club and society member, **Own yrs** refers to horse ownership years, **Ride instruct** refers to riding instruction.

As shown in Table 52, a number of horse owner background factors were significantly correlated with horse owner beliefs about hoof care behaviour. The significant positive correlation found between *Region type* and the behavioural belief ($r=0.35$, $p<0.01$) implies that horse owners primarily residing in urban regions of Victoria hold more favourable beliefs about frequent hoof care behaviour when compared to horse owners residing in regional Victoria.

Significant correlations were found between *Age* and each of the three beliefs about hoof care behaviour. A significant positive correlation was found between *Age* and the behavioural belief about hoof care ($r=0.43$, $p<0.01$) which implies that younger horse owners hold more favourable beliefs about frequent hoof care behaviour than older horse owners. The significant positive relationship found between *Age* and the normative belief ($r=0.37$, $p<0.01$) indicates that compared with older horse owners, younger horse owners believe that fellow horse owners would recommend a greater frequency for hoof care in horses. A significant positive correlation was found between *Age* and the control belief about hoof care behaviour ($r=0.33$, $p=0.01$) which implies that younger horse owners reported a greater frequency in hoof care behaviour when compared to older horse owners.

A significant correlation was found between *Gender* and the horse owner behavioural and control beliefs about hoof care behaviour. The significant negative correlation found between *Gender* and the behavioural belief ($r=-0.38$, $p<0.01$), implies that male horse owners tend to hold more favourable behavioural beliefs about hoof care behaviour than female horse owners. A significant negative relationship was found between *Gender* and the control belief ($r=-0.27$, $p=0.04$) which indicates that male horse owners reported a greater frequency of hoof care behaviour when compared to female horse owners.

A significant negative correlation was found between *Children* and the normative belief about hoof care behaviour ($r=-0.30$, $p=0.03$), which implies that horse owners with children appear to believe that horses' hooves should be attended to more regularly than horse owners without children. The significant positive relationship found between *Property type* and the behavioural belief ($r=0.32$, $p=0.02$) indicates that larger land blocks are associated with a favourable behavioural belief about frequent hoof care behaviour. A significant positive correlation was

found between *Property size* and the normative belief about hoof care behaviour (r=0.32, p=0.04), which implies that smaller property sizes are associated with favourable normative beliefs about frequent hoof care behaviour.

A significant positive correlation was found between *Horse club and society membership* and the horse owner behavioural and control beliefs about hoof care behaviour. The significant positive correlation found between *Horse club and society membership* and the behavioural belief (r=0.32, p=0.02) implies that members of horse clubs or societies hold more favourable behavioural beliefs about frequent hoof care behaviour than those horse owners that are not a member of any horse clubs or societies. A significant positive correlation was found between *Horse club and society membership* and the control belief (r=0.36, p=0.07), which indicates that compared to non-members, members of horse clubs and societies report a greater frequency of *Hoof care behaviour*.

A significant correlation was found between *Riding instruction* and the horse owner behavioural and normative beliefs about hoof care behaviour. A significant positive correlation was found between *Riding instruction* and the behavioural belief (r=0.28, p=0.04) which implies that horse owners who have received riding instruction hold more favourable behavioural beliefs concerning the frequent performance of *Hoof care behaviour* than horse owners who have not received riding instruction. The significant positive relationship found between *Riding instruction* and the normative belief about hoof care behaviour (r=0.32, p=0.01) indicates that horse owners who have received riding instruction appear to hold more favourable normative beliefs about hoof care behaviour than horse owners who have not received any form of riding instruction.

Table 53 Linear regression analyses for horse owner beliefs about hoof care and horse owner background factors

Horse owner belief	Background factor	Zero-order correlation	β coefficient	Standard error	Change in R^2	p-value
Behavioural belief	Region type	0.35	0.35	0.54	0.11	0.00
	Age	0.43	0.37	0.50	0.12	0.00
Normative belief B30	Age	0.42	0.42	0.74	0.15	0.01
Control belief C30	Age	0.33	0.33	0.59	0.09	0.01
	Hcs Member	0.36	0.29	0.56	0.07	0.03

A30. How often should a horse's hooves be attended to?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **C30**. How often are you able to attend to your horse's hooves?, **Region type** refers to the region type where the horse owner's primary residence is located, **Age** refers to the horse owner's age, **Gender** refers to the horse owner's gender, **Hcs Member** is an abbreviation of horse club and society member, **Ride instruct** refers to riding instruction.

As indicated in Table 53, the horse owner background factors which were predictive of horse owner behavioural beliefs about hoof care behaviour were *Region type* and *Age*. Twenty three percent of the variance in horse owner behavioural belief about hoof care is accounted for by the two variables. *Region type* (β=0.37, $p<0.01$) was of greater importance to a horse owner's behavioural belief about hoof care behaviour, and accounted for twelve percent of the variance. *Age* (β=0.35, $p<0.01$) accounted for eleven percent of the variance in horse owners' behavioural beliefs about hoof care behaviour. These findings indicate that favourable attitudes towards hoof care behaviour in horse owners are associated with an urban region of primary residence and a young age.

The only horse owner background factor which was predictive of horse owner normative beliefs about hoof care behaviour was *Age. Age* (β=0.42, $p<0.01$) accounted for fifteen percent of the variance in horse owner normative beliefs concerning hoof care behaviour. This finding implies that a favourable normative belief about hoof care behaviour is associated with a young age in horse owners.

The horse owner background factors which were predictive of horse owner control beliefs about hoof care behaviour were *Age* and *Horse club and society membership*. Sixteen percent of the variance in horse owner normative beliefs about hoof care behaviour is accounted for by these two background factors. *Age* (β=0.3, $p<0.01$) accounted for nine percent of the variance in horse

owners' perceived behavioural control regarding hoof care behaviour. *Horse club and society membership* (β=0.29, $p<0.03$) accounted for seven percent of the variance in horse owner control beliefs concerning hoof care behaviour. These findings indicate that a young age and membership to a horse club or society are associated with favourable perceived behavioural control regarding hoof care behaviour in horse owners

Predicting horse owner hoof care behaviour from horse owner beliefs about hoof care behaviour

The antecedents of horse owner behaviour are reportedly intention and perceived behavioural control (Ajzen and Fishbein, 1980). Intention is determined by a horse owner's attitude towards horses and their management, which is formed from the three beliefs towards the behaviour in question; behavioural, normative and control. Thus, the relationships between the three horse owner beliefs concerning hoof care behaviour and horse owners' *Hoof care behaviour* were investigated, as described in Figure 31, and are reported in the following section.

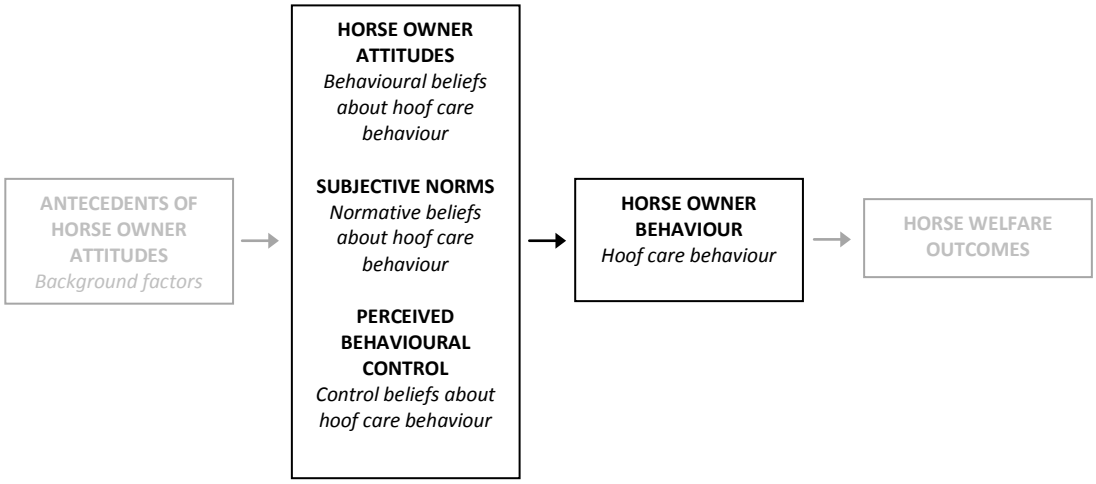


Figure 31 The section of the model that describes the factors concerning the antecedents of horse owner hoof care behaviour. The section of the model that is not greyed out is analysed here

Pearson product-moment correlation analysis was used to examine relationships between horse owner belief variables concerning hoof care behaviour and the horse owner behaviour variable *Timebtwfarrier*, which concerns the length of time between hoof care treatments (Table 54). The horse owner beliefs about hoof care which correlated significantly with horse owner *Hoof care behaviour* were entered into a hierarchical regression analysis to determine the degree of variance

in behaviour which could be accounted for by each of the belief variables. The results are reported in Table 55, for both H1 and H2.

Table 54 Pearson product-moment correlations between hoof care belief variables and horse owner hoof care behaviour (H1 n=57, H2 n=42)

	H1Timebtwfarrier	*H2Timebtwfarrier*
Behavioural belief A30	0.63**	0.63**
Normative belief B30	0.35**	0.33**
Control belief C30	0.64**	0.47**

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05

A30. How often should a horse's hooves be attended to?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **C30**. How often are you able to attend to your horse's hooves?, ***H1Timebtwfarrier*** refers to horse owners' hoof care behaviour in H1, and ***H2Timebtwfarrier*** refers to horse owners' hoof care behaviour in H2.

As shown in Table 54, horse owner beliefs concerning hoof care behaviour were all significantly correlated with horse owner *Hoof care behaviour*. A significant positive correlation was found between the behavioural belief about hoof care behaviour and horse owner *Hoof care behaviour*, in both H1 ($r=0.67$, $p<0.01$) and H2 ($r=0.63$, $p<0.01$). These relationships imply that horse owners who believe that horses should receive frequent hoof care treatment are attending to their horses hooves more frequently than those horse owners who believe that frequent hoof care in horses is not necessary. A significant positive correlation was found between the normative belief and horse owner *Hoof care behaviour*, in both H1 ($r=0.35$, $p<0.01$) and H2 ($r=0.33$, $p=0.03$), which indicate that horse owners who hold favourable normative beliefs concerning frequent hoof care behaviour appear to perform frequent *Hoof care behaviour*. Significant positive relationships were found between the control belief about hoof care behaviour and horse owner *Hoof care behaviour*, in both H1 ($r=0.64$, $p<0.01$) and H2 ($r=0.47$, $p=0.02$). These correlations imply that horse owners who report favourable perceived behavioural control perform *Hoof care behaviour* more frequently than horse owners who lack perceived behavioural control.

Table 55 Linear regression analysis for horse owner hoof care behaviour and horse owner beliefs about hoof care behaviour (H1 n=57, H2 n=42)

Horse owner behaviour	Belief variable	Zero-order correlation	β coefficient	Standard error	Change in R^2	P-value
H1Timebtwfarrier	A30	0.67	0.67	0.87	0.44	0.00
	B30	0.34	0.04	0.88	-0.001	0.72
	C30	0.64	0.28	0.87	0.01	0.96
H2Timebtwfarrier	A30	0.65	0.65	1.12	0.41	0.00
	B30	0.34	0.03	1.13	-0.01	0.82
	C30	0.47	-0.36	1.12	0.002	0.16

A30. How often should a horse's hooves be attended to?, **B30**. How often do other horse owners believe a horse's hooves should be attended to?, **C30**. How often are you able to attend to your horse's hooves?, ***H1Timebtwfarrier*** refers to horse owners' hoof care behaviour in H1, and ***H2Timebtwfarrier*** refers to horse owners' hoof care behaviour in H2.

As shown in Table 55, the only horse owner belief about hoof care behaviour which was predictive of horse owner *Hoof care behaviour* with H1 was the behavioural belief about the husbandry behaviour ($\beta = 0.67$, $p<0.01$), which accounted for forty four percent of the variance in horse owner *Hoof care behaviour* in H1. In H2, the only horse owner belief about hoof care behaviour which was predictive of horse owner *Hoof care behaviour* was also the behavioural belief ($\beta=0.65$, $p<0.01$) which accounted for forty one percent of the variance in horse owner *Hoof care behaviour*. These findings indicate that favourable horse owner attitudes towards hoof care behaviour are associated with the appropriate performance of *Hoof care behaviour*.

Predicting horse welfare outcomes from horse owner hoof care behaviour

According to Ajzen and Fishbein (1980), a horse owner's horse husbandry and management behaviour may be an antecedent of horse welfare outcomes. Furthermore, literature reports that the method in which horse owners manage their horses significantly influences horse welfare. As a result, the relationship between horse owner *Hoof care behaviour* and horse welfare outcomes was examined (Figure 32).

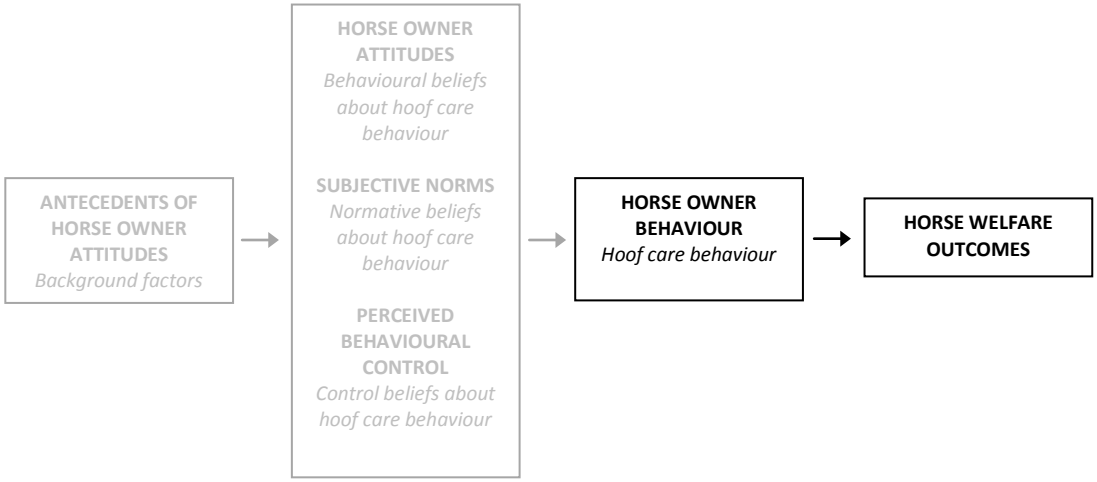


Figure 32 The section of the model that describes the factors influencing horse welfare outcomes. The section of the model that is not greyed out is analysed here

Pearson product-moment correlation analysis was used to examine relationships between *Timebtwfarrier* and horse welfare outcomes (Table 56).

Table 56 Pearson product-moment correlations between horse owner hoof care and horse welfare outcomes (H1 n=57, H2 n=42)

	BCS	**LS**	**HS**	**IS**	**DIIS**
H1Timebtwfarrier			0.29*		
H2Timebtwfarrier	-0.32*		0.50**		

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05.

H1Timebtwfarrier refers to horse owners' hoof care behaviour in H1, ***H2Timebtwfarrier*** refers to horse owners' hoof care behaviour in H2, ***BCS*** refers to horse body condition score, ***LS*** refers to lameness score, ***HS*** refers to hoof score, ***IS*** refers to injury score and ***DIIS*** refers to disease, injury and illness score.

Significant positive correlations were found between horse owner *Hoof care behaviour* and horse welfare outcomes (Table 56). A significant correlation was found between horse owner *Hoof care behaviour* and *HS* (r=0.29, p=0.03) in H1. This relationship implies that horse owners who frequently attend to their horse's hooves own horses with hooves in good condition. The significant negative relationship found between horse owner *Hoof care behaviour* and the horse welfare outcome *BCS* (r=0.32, p=0.04) in H2, indicates that horse owners who frequently attend to their horse's hooves own horses with higher BCS. In H2, a significant positive correlation was

found between horse owner hoof care behaviour and the horse welfare outcome *HS* (r=0.50, p<0.01) which implies that horse owners who frequently attend to their horse's hooves own horses with hooves in good condition.

5.3.3.2 Factors predicting a horse owner's performance of dental care behaviour and subsequent relationship with horse welfare outcomes

The third horse husbandry and management practice investigated concerned dental care, where the regularity with which the horse owner attended to the horse's teeth was examined (Figure 33). As explained in Table 20, *Timebtwdentist* measured the interval between dental treatments. This was measured using two questions, 'When did you last have your horses teeth checked?' and 'When are you next scheduled to have your horses teeth checked?'. The length of time that passed between the two treatments was considered the horse owner's *Dental care behaviour*.

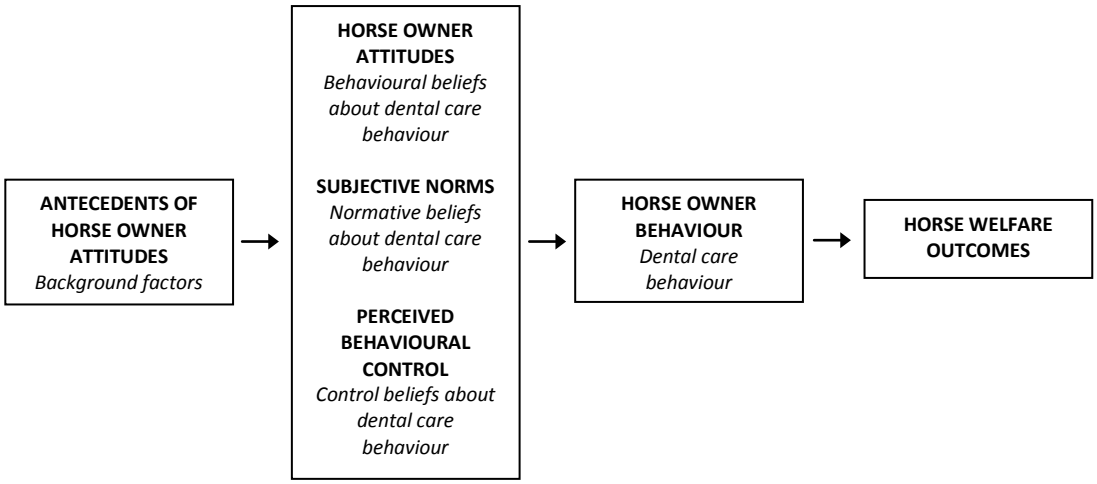


Figure 33 Generic model describing the factors involved with horse owners' dental care behaviour and subsequent relationship with horse welfare outcomes

Predicting horse owner beliefs about dental care behaviour from horse owner background factors

Horse owner background factors are understood to influence horse owner attitude towards behaviour, and thus their relationships with the three horse owner beliefs which underlie a horse owner's attitude towards dental care behaviour were examined (Figure 34).

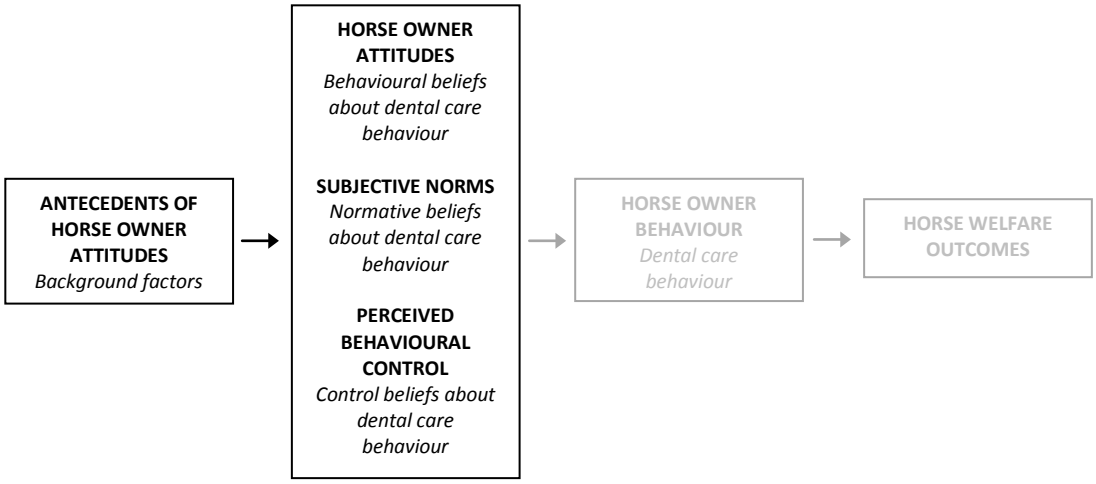


Figure 34 Model describing the factors involved with horse owners' dental care behaviour and subsequent relationship with horse welfare outcomes. The section of the model that is not greyed out is analysed here

Pearson product-moment correlations were used to examine relationships between horse owner background factors and horse owner beliefs concerning dental care behaviour. The significant correlations between the variables are reported in Table 57. The horse owner background factors which correlated significantly with horse owner beliefs concerning dental care behaviour were entered into a series of linear regression analyses to determine the degree of variance in beliefs which could be accounted for by the background factors. The results of these analyses are given in Table 58.

Table 57 Pearson product-moment correlations between horse owner background factors and horse owner beliefs about dental care behaviour variables (n=57)

	Behavioural belief A29	Normative belief B29	Control belief C29
Age			-0.27*
Children			-0.26*
Hcs Member			0.27*
Ride int freq			0.44**

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05, df =55

A29. How important is it to regularly attend to horses' teeth?, **B29**. How important do other horse owners believe it is to attend to horses' teeth?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, **Age** refers to the horse owner's age, **Children** refers to whether the horse owner has children, **Hcs Member** is an abbreviation of horse club and society member, **Ride int freq** refers to the frequency of riding instruction.

As shown in Table 57, there were only limited significant correlations found between horse owner background factors and horse owner beliefs about dental care behaviour. A significant negative correlation was found between the background factor *Age* and the control belief concerning dental care behaviour (r=-0.26, p=0.04), which implies that younger horse owners

reported a greater difficulty providing their horses with regular dental care when compared with older horse owners. A significant negative relationship was found between *Children* and the control belief (r=-0.26, p=0.05) which indicates that horse owners with children reported a greater difficulty providing their horses with regular dental care than horse owners without children. The significant negative correlation found between *Horse club and society membership* and the control belief about dental care behaviour (r=-0.27, p=0.04) implies that horse owners who are members of horse clubs and societies reported a greater ability to provide their horses with regular dental care when compared with horse owners that are non-members. A significant positive relationship was also found between *Riding instruction frequency* and the control belief (r=0.44, p=0.01), indicating that horse owners who have received riding instruction reported an increased ability to provide their horses with regular dental care when compared with horse owner who have not received any form of riding instruction.

Table 58 Linear regression analyses for horse owner beliefs about dental care behaviour and horse owner background factors (n=57)

Horse owner belief	Background factor	**Zero-order correlation**	**β coefficient**	**Standard error**	**Change in R^2**	**p-value**
Behavioural belief A29						
Normative belief B29						
Control belief C29	Age	0.27	0.27	0.84	0.06	0.04

A29. How important is it to regularly attend to horses' teeth?, **B29**. How important do other horse owners believe it is to regularly attend to horses' teeth?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, and **Age** refers to the horse owner's age.

As indicated in Table 58, no horse owner background factors were predictive of horse owner behavioural and normative beliefs concerning dental care behaviour. The only horse owner background factor which was predictive of horse owner perceived behavioural control concerning dental care behaviour was *Age*. *Age* (β=0.27, p=0.04) accounted for six percent of the variance in horse owner control beliefs about dental care behaviour. This finding implies that favourable perceived behavioural control concerning dental care behaviour in horse owners is associated with an older age.

Predicting horse owner dental care behaviour from horse owner beliefs about dental care behaviour

According to Ajzen and Fishbein (1980), horse owner attitudes towards horse husbandry and management, formed by the behavioural, normative and control beliefs, determine intention, which together with perceived behavioural control determine a horse owner's husbandry and management behaviour. Consequently, it was hypothesised that the antecedents of horse owner dental care behaviour are horse owner attitudes towards the behaviour, which are formed from horse owner behavioural, normative and control beliefs concerning dental care behaviour. Thus, the relationships between horse owners beliefs about dental care behaviour and horse owner *Dental care behaviour* were examined (Figure 35).

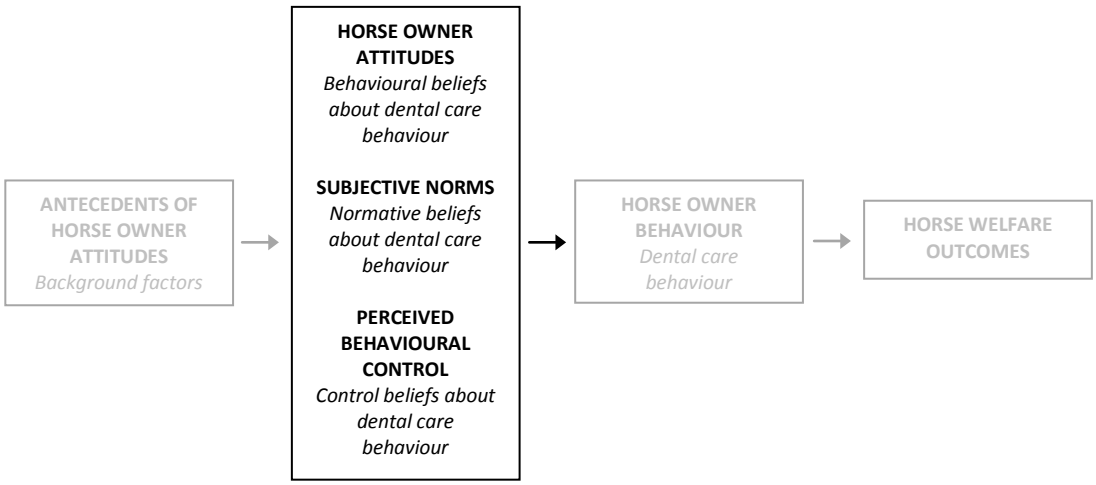


Figure 35 The section of the model that describes the factors concerning the antecedents of horse owner dental care behaviour. The section of the model that is not greyed out is analysed here

Pearson product-moment correlation analysis was used to examine relationships between horse owner belief variables concerning dental care behaviour and T*imebtwdentist*. The results for both H1 and H2 are reported in Table 59. The horse owner beliefs about dental care which correlated significantly with horse owner *Dental care behaviour* were entered into a hierarchical regression analysis to determine the degree of variance in behaviour which could be accounted for by each of the belief variables. The results are reported for both H1 and H2 in Table 60.

Table 59 Pearson product-moment correlations between dental care belief variables and horse owner dental care behaviour (H1 n=57, H2 n=42)

	H1Timebtwdentist	*H2Timebtwdentist*
Behavioural belief A29	0.29**	
Normative belief B29		
Control belief C29	0.49**	0.40**

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05

A29. How important is it to regularly attend to horses' teeth?, **B29**. How important do other horse owners believe it is to regularly attend to horses' teeth?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, and **Age** refers to the horse owner's age. ***H1Timebtwdentist*** refers to horse owners' dental care behaviour in H1, and ***H2Timebtwdentist*** refers to horse owners' dental care behaviour in H2.

Significant correlations were found between horse owner behavioural and control beliefs concerning dental care behaviour and horse owner *Dental care behaviour*, as shown in Table 59. A significant positive correlation was found between the behavioural belief and horse owner *Dental care behaviour* in H1 (r=0.29, p=0.03) which implies that horse owners with favourable behavioural beliefs about regular dental care are attending to their horse's teeth more frequently than horse owners with less favourable behavioural beliefs. Significant positive relationships were found between the control belief concerning dental care behaviour and horse owner *Dental care behaviour*, in both H1 (r=0.49, p<0.01) and H2 (r=0.40, p<0.01). These correlations imply that horse owners who report the ability to provide their horses with regular dental care are performing more frequent regular *Dental care behaviour* than those horse owners who claim they are unable to provide their horses with regular dental care.

Table 60 Linear regression analysis for horse owner *Dental care behaviour* and horse owner beliefs about dental care behaviour (H1 n=57, H2 n=42)

Horse owner behaviour	**Belief variable**	**Zero-order correlation**	**β coefficient**	**Standard error**	**Change in R^2**	**p-value**
H1Timebtwdentist	A29	0.29	0.29	0.78	0.07	0.03
	B29	0.12	-0.02	0.79	-0.01	0.90
	C29	0.48	0.45	0.71	0.18	0.00
H2Timebtwdentist	A29	0.29	0.29	1.00	0.07	0.06
	B29	0.15	0.01	1.01	-0.02	0.94
	C29	0.40	0.35	0.97	0.08	0.02

A29. How important is it to regularly attend to horses' teeth?, **B29**. How important do other horse owners believe it is to regularly attend to horses' teeth?, **C29**. How difficult is it for you to have your horse's teeth regularly attended to?, and **Age** refers to the horse owner's age. ***H1Timebtwdentist*** refers to horse owners' dental care behaviour in H1, and ***H2Timebtwdentist*** refers to horse owners' dental care behaviour in H2.

The horse owner beliefs which were predictive of horse owner *Dental care behaviour* in H1 were the behavioural belief and the control belief concerning dental care behaviour, as indicated by Table 60. Twenty five percent of the variance in horse owner *Dental care behaviour* is accounted for by the two belief variables. The control belief concerning dental care behaviour (β=0.45, $p<0.01$) was of greatest importance to horse owner *Dental care behaviour*, accounting for eighteen percent of the variance. The behavioural belief (β=29, $p=0.03$) accounted for a further seven percent of the variance in horse owner *Dental care behaviour* in H1. These findings indicate that the appropriate performance of *Dental care behaviour* in H1 by horse owners is associated with favourable control and behavioural beliefs.

The horse owner control belief about dental care behaviour which was the only belief predictive of horse owner *Dental care behaviour* in H2. Perceived behavioural control concerning dental care (β=0.35, $p=0.02$) accounted for eight percent of the variance in horse owner *Dental care behaviour* in H2. This finding implies that horse owners' appropriate performance of *Dental care behaviour* in H2 is associated with a favourable perceived behavioural control regarding the husbandry behaviour.

Predicting horse welfare outcomes from horse owner dental care behaviour

The welfare of horses is significantly influenced by the manner in which they are managed by horse owners. The relationship between horse owner *Dental care behaviour* and horse welfare outcomes was therefore examined (Figure 36).

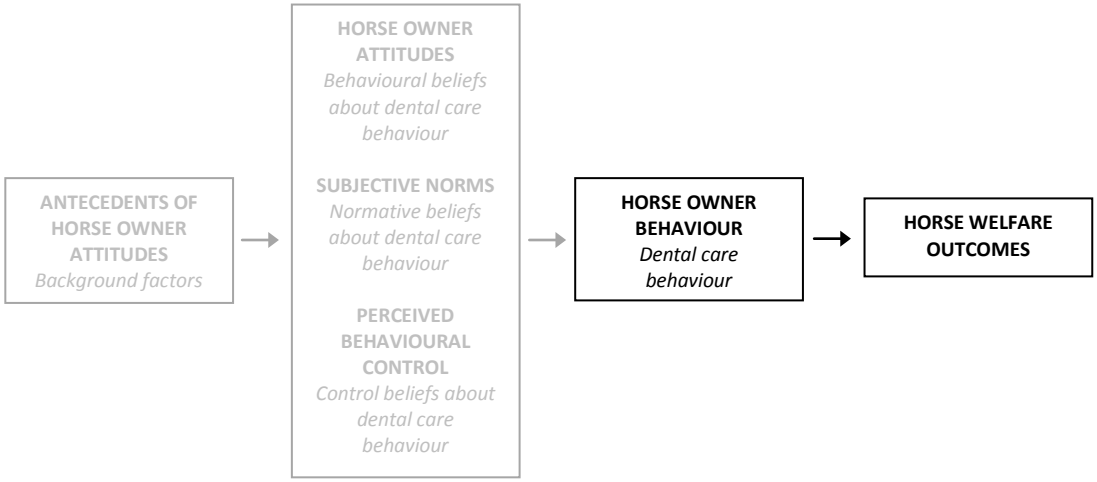


Figure 36 The section of the model that describes the factors influencing horse welfare outcomes. The section of the model that is not greyed out is analysed here

Pearson product-moment correlation analysis was used to examine relationships between *Timebtwdentist* and horse welfare outcomes. The results are given in Table 61, for both H1 and H2.

Table 61 Pearson product-moment correlations between the horse owner dental care behaviour variable and horse welfare outcomes (H1 n=57, H2 n=42)

	BCS	**LS**	**HS**	**IS**	**DIIS**
H!timebtwdentist				0.33**	0.27*
H2timebtwdentist	-0.33*		0.43**		

Note: *p<0.05 **p<0.01, a blank space indicates p>0.05

H1Timebtwdentist refers to horse owners' dental care behaviour in H1, and ***H2Timebtwdentist*** refers to horse owners' dental care behaviour in H2, ***BCS*** refers to horse body condition score, ***LS*** refers to lameness score, ***HS*** refers to hoof score, ***IS*** refers to injury score and ***DIIS*** refers to disease, injury and illness score.

Significant correlations were found between horse owner *care behaviour* and horse welfare outcomes (Table 61). A significant positive correlation was found between horse owner *Dental care behaviour* and *IS* (r=0.33, p<0.01) in H1, which implies that horse owners who regularly attend to their horse's teeth tend to own horses with injuries. The significant positive relationship found between horse owner *Dental care behaviour* and *DIIS* (r=0.27, p=0.04) in H1 indicates that horse owners who regularly attend to their horse's teeth appear to own horses with some form of

disease, injury or illness when compared with horse owners who do not provide regular dental care to their horses.

A significant negative correlation was found between horse owner *Dental care behaviour* and *BCS* (r=-0.33, p=0.04) in H2, which implies that horse owners who regularly attend to their horse's teeth tend to own horses with higher BCS than horse owners who do not provide regular dental care to their horses. The significant positive relationship found between horse owner *Dental care behaviour* and *HS* (r=0.43, p=0.01) indicates that horse owners perform regular dental care behaviour appear to own horses with hooves in good condition when compared with horse owners who do not provide regular dental care to their horses.

5.4 DISCUSSION

It was hypothesised that (i) a relationship exists between horse owner attributes, which predicts horse owner husbandry and management behaviour and, (ii) that these horse owner attributes predict the welfare outcomes of horses in Victoria. It should be noted that these relationships do not demonstrate causality, rather relationships that have been observed. In order to determine causality, manipulation of the relevant variables in a controlled experimental setting would be required. Thus, the significant relationships between horse owner attributes and those between horse owner behaviour and horse welfare outcomes, observed within the recreational horse population in Victoria and their subsequent interpretation are discussed in the forthcoming section.

5.4.1 Demographic profile of the sample

Comparisons between the demographic statistics of participants in the random telephone survey sample (n=206) and those in the on-site inspection sample (n=57) indicate that although the demographic profiles are largely comparable, a number of minor differences exist. Participants who completed the on-site inspection appear more likely to be urban-based, of a younger average age, be members of a horse club or society, have less horse ownership experience (in terms of years) and own fewer horses when compared with the larger random telephone survey sample. A participants' willingness to participate further in the study, that is, complete the on-site

inspection, may in part be associated with an increased level of commitment to horse ownership, as indicated by the high level of horse club and society membership (over 70%). Furthermore, participants' age and region of primary residence have both previously been associated with horse club and society membership, and the increased level of membership in the on-site inspection sample may explain the observed differences in the age and region of primary residence variables between samples. Thus, while the demographic statistics of the two samples are comparable with regard to most variables, the participants who completed the on-site inspection may hold a greater level of commitment to horse ownership.

5.4.2 Relationships between horse owner attributes, horse owner behaviour and horse welfare outcomes

In accordance with the hypothesised human-horse relationship (Figure 24), relationships were found between horse owner attributes and horse husbandry and management behaviour. Furthermore, the husbandry and management behaviour of horse owners was associated with horse welfare outcomes. The observed pattern of relationships between horse owner attributes and horse welfare outcomes will now be discussed.

Factors associated with horse owner attitudes towards horse husbandry and management behaviour

It was hypothesised that the horse owner beliefs which are assumed to underlie horse owner attitudes towards horse husbandry and management behaviour would be associated with a range of background factors. However, only a limited number of relationships were found between background factors and the horse owner beliefs towards horse husbandry and management behaviour. Horse owner attitude subscales and individual belief variables generally correlated significantly with the background factors which were primarily related to horse owner knowledge rather than horse owner demographic variables. Considering human beliefs are formed from the information an individual possesses about themselves and the world around them (Ajzen, 1985), the observed relationships between knowledge-based rather than demographic-based background factors and the horse owner belief variables is to be expected. The knowledge-based background factors, which included *Registered horse ownership*, *Horse club and society membership* and *Riding instruction*, significantly correlated with attitude subscales which concerned horse owner beliefs towards behaviour (behavioural belief) and horse owner perceived behavioural control

about the behaviour (control belief). There appears to be no significant association between background factors and horse owner normative belief subscales, which implies that the factors examined may not influence the social pressure experienced by horse owners with regard to horse husbandry and management behaviour. The behavioural and control belief attitude subscales which were associated with background factors were those relating to the performance of horse husbandry and management practices, and the resources required for appropriate horse management. The positive relationships between the horse owner behavioural belief subscales and knowledge-based background factors indicate that the registration of horse ownership, horse club or society membership and riding instruction are associated with favourable and realistic horse owner attitudes towards appropriate horse husbandry and management practices. Furthermore, the positive correlations between the horse owner control belief subscales and the knowledge-based background factors imply that the registration of horse ownership, horse club or society membership and riding instruction are associated with a greater level of perceived behavioural control concerning the performance of appropriate horse husbandry and management in horse owners.

The positive relationships found between knowledge-based background factors and these favourable horse owner behavioural and control beliefs may be explained by the opportunity such factors afford the horse owner to both improve their knowledge and reduce their ignorance of appropriate horse husbandry and management practices. Registering horse ownership, horse club and society membership, and obtaining riding instruction are all background factors which provide horse owners with the opportunity to access information and support concerning horse husbandry and management practices, and to interact with fellow horse owners and industry personnel. These activities offer the horse owner the opportunity to improve their knowledge of appropriate horse husbandry and management practices (c.f. Section 2.3). Given that the primary cause of horse welfare concerns in Victoria is believed to be mismanagement by the horse owner, due to ignorance rather than intentional abuse, it is unsurprising that knowledge-based rather than demographic-based background factors are associated with horse owner beliefs concerning the appropriate performance of horse husbandry and management behaviour. Importantly, knowledge-based factors are generally under human control and are therefore able to be modified by the horse owner, while the demographic-based factors lack human-control and are consequently difficult if not impossible for the horse owner to modify. For example, horse owners are largely able to choose whether or not they become a member of a horse club or society,

however are unable to change their gender or age. This finding demonstrates the potential to improve horse owner beliefs towards horse husbandry and management practices by encouraging the registration of horse ownership, horse club and society membership and riding instruction in horse owners.

Factors associated with horse owner husbandry and management behaviour

Horse owner attitude subscales were significantly inter-correlated with the exception of *General attitude statements* and the horse husbandry and management subscales concerning normative beliefs. These relationships indicate the presence of an attitude system, in which associated attitudes are consistent (Hemsworth and Coleman, 2010). Consistent responses to belief statements reflect an individual's underlying attitude towards particular types of animal interactions (Hemsworth and Coleman, 2010). This result is consistent with the cognitive-dissonance theory, in which an individual may experience dissonance if two attitudes fail to evaluate a behaviour in the same manner and the individual will consequently respond by modifying the dissonant behaviour or attitude so that they achieve consonance (Festinger, 1957, Fishbein and Ajzen, 1975). The significant inter-correlations between the behavioural and control attitude subscales indicate the presence of a general horse owner attitude towards the performance of husbandry and management behaviours and a general perceived behavioural control concerning the performance of husbandry and management practices. Consequently, favourable behavioural and control beliefs about one type of horse husbandry or management behaviour appear likely to be indicative of similar beliefs concerning other horse husbandry and management practices.

Horse owner husbandry and management behaviour was associated with horse owner behavioural, normative and control beliefs towards horse husbandry and management behaviour, in both H1 and H2. These findings demonstrate that attitude subscales and individual belief variables regarding specific horse owner behaviour, rather than those involving general attitudes towards horses, are associated with horse owner husbandry and management behaviour. This is consistent with Ajzen's (1980) Theory of Planned Behaviour, which states that general attitudes do not predict human behaviour. The relationships observed between horse owner husbandry and management behaviours and horse owner beliefs towards these behaviours were predominantly in

the expected direction, in which the appropriate performance of horse husbandry and management behaviour by the horse owner was associated with favourable horse owner beliefs towards the behaviours. Horse owner behavioural, normative and control beliefs were all predictive of horse owner husbandry and management behaviour, however, a greater number of correlations were found between horse owner behavioural and control beliefs and horse owner husbandry and management behaviours, in comparison to normative beliefs. This finding may indicate that horse owner husbandry and management behaviour is determined primarily by horse owner attitudes towards the behaviour and horse owner perceived behavioural control about the behaviour, rather than their perceived social pressure to perform the behaviour. The degree of variability in horse owner behaviour accounted for by each of the horse owner beliefs was further investigated with regard to three key horse husbandry practices in Section 5.3.3 and will be discussed in Section 5.4.3.

A range of horse owner husbandry and management behaviours, in both H1 and H2, were associated with horse owner behavioural, normative and control beliefs. The horse owner husbandry behaviours were *Resources*, *Ride*, *Compete*, *Shod* or *Barefoot*, *Daily human-horse interaction time*, *Hoof care behaviour*, *Veterinary inspection*, *BC inspection* and *Supplementary feeding*. Although the horse owner husbandry behaviours did not correlate with all forms of horse owner beliefs, the observed relationships were generally in the expected direction and predominantly indicated that the appropriate performance of the horse husbandry behaviour was associated with favourable beliefs towards horse husbandry and management behaviour. The horse owner management behaviours which were significantly correlated with horse owner beliefs included *Summer diet*, *Winter diet*, *Pasture quantity*, *Pasture quality*, and *Water source inspection*. As was found with the horse owner husbandry behaviours, the horse owner management behaviours were not significantly associated with all of the beliefs, however the relationships tended to be in the expected direction. The relationship between horse owner management behaviour and the belief variables predominantly implied that the performance of appropriate horse management behaviour by the horse owner was predicted by favourable beliefs concerning horse husbandry and management behaviours.

The horse owner management behaviours *Horse region type*, *Horse location*, *Distance between the horse owner's primary residence and the location of the horse*, *Housing method* and *Paddock*

size were not associated with any of the horse owner beliefs. These behaviour variables relate to the housing conditions of the horse, and may in fact be determined by the conditions of the property where the horse is housed rather than the behaviour of the horse owner. That is, these types of variables reflect limited opportunity for human-control. Consequently, these variables may be incorrectly labelled as horse owner management behaviours rather than horse property or housing conditions. If horse owners have limited control over a number of aspects of the horse's housing environment due to property limitations or restrictions, the observed lack of correlation between horse owner belief subscales and horse owner management behaviours would be expected. The horse owner husbandry and management behaviours concerning specific horse husbandry practices such as hoof care, dental care and parasite control behaviour lacked association with the attitude subscales. Given that the individual belief variables for each of these behaviours were not included in any of the attitude subscales it is not surprising that relationships were not found.

A considerable number of horse owner belief variables did not form part of one of the attitude subscales. Consequently, these variables were treated individually. The individual horse owner belief variables correlated strongly with horse owner husbandry and horse owner management behaviours, in the expected directions. The relationships primarily indicate that favourable beliefs towards behaviour (be that behavioural, normative or control beliefs) are associated with the appropriate performance of horse owner husbandry and management behaviour. In addition, correlations found between individual belief variables and seemingly unrelated horse health behaviours, for example the horse owner behavioural beliefs towards hoof care behaviour strongly correlated with horse owner parasite control behaviour, supports the presence of the previously discussed attitude system. This positive association between these two variables implies that, due to a general attitude towards horse husbandry and management practices, horse owners who possess favourable beliefs towards hoof care behaviour are likely to hold similar beliefs concerning other horse husbandry behaviours such as parasite control behaviour.

In summary, consistent with the TPB (Ajzen, 1985) a horse owner's husbandry and management behaviour is associated with the behavioural, normative and control beliefs which underlie a horse owner's attitude towards horse husbandry and management behaviour. The relationships predominantly indicate that a horse owner's appropriate performance of horse husbandry and

management behaviour is associated with favourable beliefs regarding horse husbandry and management behaviour. These relationships imply that a horse owner's husbandry and management behaviour may be predicted from their attitudes towards the behaviour in question. Furthermore, these findings indicate the potential to alter the husbandry and management behaviour of horse owners by modifying the beliefs toward these behaviours. In addition, significant inter-correlations between the attitude subscales indicate the presence of an attitude system, which may represent a general horse owner attitude towards the performance of husbandry and management behaviours. Consequently, favourable attitudes toward one type of horse husbandry or management behaviour appear likely to be indicative of similar attitudes concerning other horse husbandry and management practices.

Factors associated with horse welfare outcomes

Horse welfare outcomes were associated with the horse husbandry and management behaviour of horse owners, supporting the hypothesis that the inappropriate performance of horse husbandry and management behaviour is associated with poor horse welfare outcomes. The horse husbandry and management behaviours which were related to horse welfare outcomes include *Supplementary feeding*, *Daily human-horse interaction*, *Horse owner approach*, *Hoof care behaviour*, *Dental care behaviour*, *Parasite control behaviour*, *Resources*, and *Veterinary inspection*. These findings are consistent with the both the horse welfare literature and that concerning human-animal relationships (c.f. Section 2.3)

The negative correlation found between *Supplementary feeding* and *BCS* may be due to the horse owner's feeding behaviour being a direct response to the body condition of the horse, whereby the provision of diet is determined by the horse owner's perception of the horse's BCS. That is, a BCS considered too high results in the horse owner providing a reduced level of supplementary feeding, while a BCS considered too low results in the horse owner increasing the level of supplementary feeding. Results reported in Chapter 4 suggest that Victorian horse owners most commonly determined their horse's diet according to the horse's BCS, supporting the given explanation for the relationship between *Supplementary feeding* and *BCS.*

The positive correlations between *Supplementary feeding* and the horse welfare outcomes *LS* and *HS*, indicate the provision of supplementary feeding is associated with a regular gait and good hoof condition in horses. Although past research suggests that a high level of supplementary feeding may result in an irregular gait and poor hoof condition due to laminitis and founder, the negative relationship between the level of supplementary feeding and *BCS* (discussed above) implies that those horses at risk of these conditions (due to high BCS) are unlikely to be receiving a high level of supplementary feeding. Therefore, those horses receiving supplementary feeding are unlikely to suffer from laminitis or founder, and as a result are likely to possess a regular gait and hooves in good condition. Furthermore, consistency of attitudes towards horse husbandry and management behaviour would suggest that if horse owners are willing to perform one key husbandry behaviour they are likely to perform similar behaviours. Thus, the positive relationship between *Supplementary feeding* and horse welfare outcomes may be further explained by the likelihood that if horse owners are providing an appropriate diet they are also likely to be performing behaviours such as hoof care, condition checks and regular monitoring and supervision, which would explain the relationship between *Supplementary feeding* and soundness of gait and good hoof condition.

The poorer welfare outcomes found in horses that are housed in large paddocks may be a result of inadequate condition checks and monitoring or supervision, possibly due to a lack of interaction between the horse owner and the horse. Correlations between human-horse interaction time and horse welfare outcomes were also found, in which reduced daily human-horse interaction time was associated with poor horse welfare outcomes. Results reported in Chapter 4 suggest that on average Victorian horse owners spend less than thirty minutes per day interacting with their horses. An increased paddock size may further reduce the time or level of this interaction, possibly due to the time required to located the horse in paddock, which may result in horse condition inspections being brief or from a distance. Consequently, the likelihood of welfare concerns such as irregular gait, poor hoof condition, and poor BCS being undetected may increase, and as a result the severity of the welfare outcome may be exacerbated due to a delay in horse owner response or treatment of the welfare concern. A further explanation for the difference in horse BCS according to the size of the horse's paddock may be due to a miscalculation of diet requirements by the horse owner. Compared to those kept in yards and small sized paddocks, horses housed in larger paddocks have a lower BCS. A possible explanation for this finding may be that due to an increased paddock size, horse owners may

overestimate the quantity and nutritional content of the roughage available to the horse. This may have been exacerbated by the severe drought conditions Victoria experienced during the time of data collection (May 2008 through to December 2009). These conditions are likely to have resulted in the roughage quantity and quality of paddock pasture to be significantly less than what would normally be expected for Victoria. Thus, horse owners housing their horses in larger paddocks may have overestimated the quantity and nutritional value of the roughage available to their horse, which may have resulted in the provision of an inadequate diet and the lower BCS observed.

In addition to the correlations found between types of horse husbandry behaviour and horse welfare outcomes, a number of individual horse owner behaviours are correlated with horse welfare outcomes. An increase in the range of resources available to the horse was associated with an increase in gait soundness. If the range of resources (for example, diet, water, shelter, social interaction) provided to the horse by the horse owner is considered an overall indicator of management, the greater the range of resources the better the overall management. Thus, as expected, a high level of overall management appears to be associated with positive horse welfare outcomes.

The manner in which horse owners' approach their horses was correlated with horse welfare outcomes. An abrupt and quick approach is associated with low BCS. This type of approach fails to give the horse time to consider the horse owner's approach, and may be regarded as more confronting than the cautious and slow approach. This finding suggests that horse owner approach behaviour may be a potential indicator of risks to a horse's welfare. Certainly, fast movement has been associated with poor welfare outcomes in some livestock species (Hemsworth and Coleman, 2010)

Hoof condition score is a direct outcome from the horse owner's *Hoof care behaviour*. As expected, horse owners who provided regular hoof care were more likely to have horses with hooves in better condition than those owners who performed irregular hoof care behaviour. The provision of regular dental care was associated with increased BCS in H2. A possible explanation for this finding is that dental care is known to aid in the consumption of feed, particularly in older

horses. The results reported in Chapter 4 indicate that on average H2 tended to be older than H1. Thus, those horses receiving regular dental care may be able to consume their diets more efficiently and therefore have a greater BCS than those horses not receiving regular dental care. Veterinary consultation was correlated with positive horse welfare outcomes in the horse with which the horse owner had the least amount of interaction. The use of veterinary consultation was associated with good hoof condition. The use of a veterinarian in H2 suggests an awareness of appropriate health management and the correlation with good hoof condition may imply an appropriate overall state of health. Furthermore, the relationship between veterinary consultation and appropriate hoof condition again suggests that an owner's performance of one horse husbandry behaviour appears to indicate a willingness to perform other horse husbandry and management behaviours.

Significant correlations were found between the horse owner husbandry and management behaviours *The degree of supervision the horse is housed under* and *Water source inspection*, and both injury score and disease, injury and illness score. The counter-intuitive relationships imply that horses with owners providing a high level of supervision and performing frequent water source inspection behaviour are at risk of injury, illness and disease. However, these relationships are more likely to indicate that the presence of an injury, illness or disease results in an increase in the level of monitoring the horse owner performs on the horse and its environment due to its impaired state. Findings such as these demonstrate that horse welfare outcome measures such as *IS* and *DIIS* may simply describe the presence or absence of an injury, illness or disease. Although an injury, illness or disease is a welfare concern, their mere presence or absence should not solely be considered a direct indication of horse owner behaviour. For example, hoof score is a welfare outcome that provides an assessment of horse hoof condition which is considered a direct indicator of horse owner *Hoof care behaviour*. Alternatively, while welfare outcomes such as *IS* and *DISS* are indicators of a welfare concern in horses, additional information is required to determine both the severity of the welfare concern and its origin, i.e., whether it is a result of horse owner behaviour or an incident outside the control of the horse owner. Furthermore, welfare concerns of this nature may require treatment and on-going management, and therefore a horse owner's response to an injury, illness or disease and their intended behaviour are important when considering the degree of welfare compromise. These findings emphasise that careful consideration is required when selecting the welfare outcome measures to be used in horse

welfare assessments to ensure that valid, relevant, reliable and informative measurements are being recorded.

In summary, horse welfare outcomes are associated with horse owner husbandry and management behaviour. The horse husbandry behaviours which are associated with horse welfare outcomes include the provision of diet, housing method, hoof care, and the level of interaction and supervision. Furthermore, the appropriate performance of horse husbandry and management behaviour by the horse owner was commonly associated with positive horse welfare outcomes. In addition, the association between horse owner behaviour and apparently unrelated horse welfare outcomes implies that a horse owner's performance of one husbandry behaviour may be indicative of their performance of other similar behaviours. The observed relationships between horse owner husbandry and management behaviour and horse welfare outcomes lacked consistency across H1 and H2. Although this finding implies a difference between the two horses, the results reported in Chapter 4 indicate that, other than the difference in human-horse interaction, horse owners do not employ different husbandry and management strategies in different horses, as was hypothesised. The greater number of correlations found between horse husbandry and management behaviour and horse welfare outcomes in H2 compared with H1, may indicate that a reduction in human-horse interaction strengthens the association between horse owner behaviour and horse welfare outcomes. That is, as the level of interaction between horse and horse owner decreases, the influence horse owner husbandry and management behaviour has on horse welfare outcomes appears to increase. In addition, the degree of relationship between behaviour and welfare outcome variables was expected to differ according to the horse (i.e. H1 or H2), however an overall lack of variation in horse owner husbandry behaviour due to an absence of extreme cases, may result in the relationships between the variables only being observed in H2 because the behavioural variation is likely to be greater than that in H1, due to the difference in human-horse interaction.

In conclusion, the findings discussed in Section 5.4.2 support the hypothesised relationships between horse owner attributes and the ensuing horse welfare outcomes, portrayed in Figure 24. The observed relationships indicate that knowledge-based background factors are associated with both horse owner beliefs about the performance of appropriate horse husbandry and management behaviour, and their perceived behavioural control concerning the appropriate performance of

these behaviours. In turn, the antecedents of horse owner husbandry and management behaviour appear to be the behavioural, normative and control beliefs which underlie horse owner attitudes towards horse husbandry and management behaviour. Finally, horse welfare outcomes are associated with the performance of horse owner husbandry and management behaviour. The direction of the observed relationships were predominantly as expected, and imply that background factors which improve horse owner knowledge are associated with favourable horse owner beliefs about horse owner husbandry and management behaviour, which in turn appear to be predictive of the appropriate performance of husbandry and management behaviour by the horse owner, which appears to encourage positive horse welfare outcomes. These findings are in accordance with the TPB (Ajzen, 1985), and indicate the potential to predict a horse owner's husbandry and management behaviour from their beliefs towards the behaviours. This will be elaborated in the following section of the chapter.

5.4.3 Factors predicting horse welfare outcomes from a horse owner's performance of key horse husbandry and management practices

The observed pattern of relationships between horse owner attributes and the ensuing horse welfare outcomes, discussed in Section 5.4.2, are consistent with the TPB (Ajzen, 1985) model to identify the attitudinal antecedents of horse owner husbandry behaviour. Consequently, the antecedents of horse owner husbandry behaviour with regard to the performance of three key husbandry practices and the subsequent impact on horse welfare outcomes were investigated, using *Parasite control behaviour*, *Hoof care behaviour* and *Dental care behaviour* as target behaviours.

Correlation analyses identifed relationships between variables. These relationships were further examined using bivariate regression analyses, which identified the independent variables which make a significant contribution to the prediction of the dependent variable (i.e. the horse owner husbandry behaviour). If an independent variable correlates with the dependent variable but does not significantly contribute to prediction (i.e. is non-significant in the regression analyses), it implies that an alternative independent variable with which that variable correlates has already made a larger contribution to the prediction of the dependent variable.

5.4.2.1 The factors predicting a horse owner's performance of parasite control behaviour and subsequent relationship with horse welfare outcomes

Antecedents of horse owner attitudes regarding parasite control behaviour

Regression analyses confirm that *Age, Riding instruction frequency* and *Region type* contributed to the variation in horse owners' beliefs about parasite control behaviour. *Age* and *Riding instruction frequency* accounted for thirty one percent of the variation in the behavioural belief. Of the two variables, *Age* was the most important determinant of a horse owner's behavioural belief about the parasite control behaviour. *Age* and *Region type* were predictive of both a horse owner's normative and control beliefs about parasite control behaviour. The two background factors account for thirteen percent of the variance in normative beliefs, with *Region type* being the primary determinant. *Age* and *Region type* accounted for forty one percent of the variance in participants' perceived behavioural control concerning parasite control behaviour, with *Age* being the predominant determinant of the behavioural variation.

There are a number of possible explanations for the predictive nature of the variable *Age*, whereby young horse owners appear more likely than older horse owners to possess favourable beliefs about regular parasite control behaviour. When compared to younger horse owners, older horse owners may have greater interests or commitments outside of horse ownership that result in the need to place less importance on the management of their horses and thus the performance of husbandry behaviours. Furthermore, the horse ownership of older individuals may be the legacy of their adult offspring's childhood ownership, that is, older horse owners are left to care for their children's horses after they have lost interest or left home. Results reported in Chapter 4, suggest that an increase in horse owner's age corresponds to an increase in horse ownership history and experience. Due to their greater past experience, older horse owners may believe they are more able to independently determine the husbandry and management needs of their horses, and as a result not abide by the recommended frequency of parasite control treatments as stringently as those younger horse owners. Consequently, older horse owners may place less importance on the performance of regular parasite control behaviour, may experience less normative pressure, and report a greater inability to perform frequent parasite control behaviour, when compared with horse owners of a younger age. In addition, horse owners of a younger age are more likely than older horse owners to be members of horse clubs and societies which is likely to increase their opportunity for interaction with other horse owners and industry personnel. Research reports the

positive effect these types of interactions can have on horse welfare due to the opportunity for horse owners to improve their knowledge via increased access to information and support (Leckie, 2002; Pearson, 2004). The opportunity for interaction between horse owners and industry personnel may also explain the predictive nature of *Riding instruction frequency*. As discussed, the interaction with industry personnel gained through frequent riding instruction may provide horse owners with another opportunity to improve their knowledge of horse husbandry and management, and as such increase the importance they place on the performance of frequent parasite control behaviour. It appears that the opportunity for knowledge improvement, associated with both *Age* and *Riding instruction*, may promote favourable horse owner attitudes towards parasite control behaviour and increase both the perceived social pressure and perceived volitional control concerning parasite control behaviour.

As was reported in Chapter 4, urban horse owners are more likely than regional horse owners to house their horses at a location separate from their primary residence. The resultant spatial separation between horse and horse owner may explain the relationship found between *Region type* and horse owners' beliefs about parasite control behaviour. Urban horse owners appear to possess more favorable beliefs concerning appropriate parasite control behaviour when compared with horse owners residing in regional Victoria. A possible explanation for this finding could be that urban horse owners are adopting a more pro-active approach to horse management and the performance of appropriate husbandry behaviours than regional horse owners, due to the constraints associated with their type of horse ownership. The opportunity for regional horse owners to house their horses in close proximity to their primary residence is likely to allow for unrestricted access to their horses and a prompt rate of response to a health or management problem. Alternatively, the spatial separation often associated with urban ownership may restrict a horse owner's access to their horses and potentially delay their response to any horse health or welfare problems. As a result, urban horse owners may be more willing to perform frequent husbandry and management practices in order to prevent or limit the occurrence of potential problems, while regional horse owners may be more prepared to respond to problems if and when they arise. Furthermore, compared with horse owners residing in regional Victoria, urban horse owners are more likely to be of a younger age, have less horse ownership experience, be a member of a horse club or society, and receive frequent riding instruction. The reported association between these types of factors and the opportunity for knowledge gain has been discussed in detail. An urban horse owner's increased level of interaction with other horse owners

may explain the significant normative pressure they experience with regard to parasite control behaviour. In addition, the increased access to information and/or support and the opportunity to improve their knowledge may account for urban horse owner's increased perception of their volitional control over parasite control behaviour. Additionally, if the urban horse owner is housing their horse at an agistment property parasite control may be enforced.

In summary, horse owner behavioural, normative and control beliefs concerning parasite control behaviour all appear to be predicted to some degree by the background factors *Age*, *Region type* and *Frequency of riding instruction*. A factor common to each of these background factors appears to be the opportunity a horse owner is afforded to interact with other horse owners and improve their knowledge regarding horse husbandry and management. Given that an individual's salient beliefs are believed to form from the information they possess about themselves and their environment (Ajzen, 1985), the relationship between background factors associated with knowledge and horse owner beliefs about parasite control behaviour is to be expected. The speculative nature of the explanations provided indicates that further research is required to continue examining the relationship between background factors and knowledge and the subsequent associations with horse owner beliefs about horse husbandry behaviours.

Antecedents of horse owner parasite control behaviour

Regression analyses imply that horse owner behavioural, normative and control beliefs concerning parasite control behaviour each contribute to the variation in horse owner parasite control behaviour. Attitude towards parasite control behaviour and perceived behavioural control concerning the behaviour were predictive of horse owner parasite control behaviour in both H1 and H2. In both cases the horse owner beliefs account for a considerable degree of the variation in the husbandry behaviour (in the vicinity of or in excess of thirty percent), indicating that behavioural and control beliefs appear to be reasonable predictors of parasite control behaviour in horse owners. In both instances a horse owner's positive or negative evaluation of the performance of parasite control behaviour was the greatest determinant of behavioural expression. Appropriate parasite control behaviour in participants appeared to be determined by positive attitudes towards the husbandry behaviour and a high perception of perceived behavioural control over the behaviour. Normative beliefs regarding parasite control behaviour

appear to have a limited role in determining the parasite control behaviour of horse owners. Thus, horse owner behavioural and control beliefs concerning parasite control behaviour appear to be predictive of horse owner parasite control behaviour. These findings are in accordance with the human attitude-behaviour relationship theorized by Ajzen's Theory of Planned Behaviour (Ajzen, 1985).

Antecedents of horse welfare outcomes

The relationship between horse owner parasite control behaviour and horse welfare outcomes was examined. The only significant relationship was found between horse owner parasite control behaviour and *LS*, which implied that the appropriate performance of parasite control behaviour by the horse owner was associated with a regular gait in horses. The performance of parasite control behaaviour may not be directly responsible for gait soundness in horses, however as previously mentioned, horse owners' appropriate performance of one husbandry practice may be indicative of their performance of other husbandry practices, such as those concerned with maintaining gait soundness in horses, due to an underlying general attitude system concerning horse husbandry and management.

Inappropriate parasite control behaviour is known to increase horse parasite loads, which could potentially result in morbidity and morality (Proudman and Matthews, 2000). The lack of association between the behaviour and outcome variables may not be due to a lack of relationship between parasite control behaviour and horse welfare outcomes, but rather a lack of variation in the husbandry behaviour of the horse owners sampled (i.e. a lack of extreme cases) and/or the use of an assessment tool which failed to detect the welfare outcomes associated with the performance of this husbandry behaviour. Body condition scoring is often considered a method of determining parasite loads in horses, and while parasite load is known to interfere with feed intake and metabolism, an observable change in BCS generally only occurs when parasite loads are high and have been sustained over a considerable period of time. That is, body condition scoring may only identify inappropriate parasite control behaviour which has occurred over a significant period of time. A more appropriate measure of parasite load may be a faecal sample, however for on-site horse welfare assessments the collection and analysis of this type of measure may not be feasible.

5.4.2.1 Factors predicting a horse owner's performance of hoof care behaviour and the subsequent relationship with horse welfare outcomes

Antecedents of horse owner attitudes regarding hoof care behaviour

Regression analyses revealed that *Region type*, *Age* and *Horse club and society membership* contributed to the variation observed in horse owner behavioural, normative and control beliefs concerning hoof care behaviour. Behavioural beliefs about hoof care behaviour are predicted by *Region type* and *Age*, and both background factors contribute equally to the degree of variation in the observed belief. These findings indicate that a positive self-evaluation towards hoof care behaviour is associated with a younger age and an urban primary residence in horse owners. Normative beliefs about hoof care behaviour are only predicted by *Age*, and indicate that a young age is generally associated with strong horse owner subjective norms with regard to the husbandry behaviour. Control beliefs concerning hoof care behaviour are predicted by *Age* and *Horse club and society membership*, implying that a favourable perceived behavioural control regarding hoof care is associated with both a younger age and membership to a horse club or society in horse owners. Consequently, these findings imply that an increased age, regional primary residence and a lack of membership to a horse club or society may encourage unfavorable horse owner beliefs concerning appropriate hoof care behaviour.

As discussed in Section 5.4.2, the background factors *Age*, *Region type* and *Horse club or society membership* all appear to be associated with a horse owner's degree of interaction with fellow horse owners and industry personnel, and their opportunity for knowledge improvement. These factors have been associated with the improved horse husbandry and management practices of horse owners (c.f. Section 2.3). In addition, the results reported in Chapter 4 indicate that an increased age and a regional primary residence could potentially limit horse owners' opportunity for both interaction and knowledge improvement, when compared with a younger age and a primary residence in urban areas. Consequently, the reported association between a young age and an urban primary residence in horse owners may result in the observed development of positive behavioural beliefs about hoof care behaviour. The regular interaction with other horse owners and the opportunity for knowledge enhancement previously linked with a younger age may also increase the normative pressure experienced by horse owners with regard to the appropriate performance of hoof care behaviour. Furthermore, the opportunity for information

and knowledge gain purportedly associated with a young age and membership to a horse club or society could potentially instill a confidence in horse owners regarding their ability to appropriately manage their horses hoof care and therefore increase their perception of perceived behavioural control about hoof care behaviour.

Horse owner behavioural, normative and control beliefs about hoof care behaviour are predicted to some degree by *Age*, *Region type*, and *Horse club and society membership*. The limited degree of variation in all three horse owner beliefs accounted for by the background factors implies that factors not investigated during the current study may be functioning as antecedents to horse owner beliefs concerning hoof care behaviour. Additional knowledge-based background factors could be examined as potential antecedents of horse owner beliefs given that Ajzen (1985) reports that information and knowledge are key determinants of an individual's salient beliefs about behaviour. In addition, the speculative nature of the role of knowledge and knowledge improvement assigned to the observed relationships between background factors and horse owner beliefs concerning hoof care behaviour, again indicates that further research is warranted with regard to knowledge-based background factors and the relationship between horse owner knowledge and demographic factors such as horse owner age and region of primary residence.

Antecedents of horse owner hoof care behaviour

Regression analyses revealed that the only horse owner belief which significantly contributes to the variation in horse owner hoof care behaviour is a horse owner's behavioural belief concerning hoof care behaviour. Attitude toward hoof care behaviour was found to account for forty four percent of the variation in horse owner hoof care behaviour in H1, and forty one percent of the variation in horse owner hoof care behaviour in H2. Both figures are substantial, which indicates that horse owner behavioural beliefs concerning hoof care behaviour are major determinants of a horse owner's performance of the husbandry behaviour. Horse owner normative and control beliefs concerning the husbandry behaviour are both associated with the performance of the horse owner hoof care behaviour, however neither belief account for any additional variation observed in the hoof care behaviour of participants. In addition, the determinants of horse owner hoof care behaviour are consistent across the different horses that they own, thus, implying that a horse owner's hoof care behaviour is likely to be determined primarily by their attitude towards the husbandry behaviour.

Antecedents of horse welfare outcomes

A horse owner's performance of hoof care behaviour was associated with horse welfare outcomes concerning hoof condition, in both H1 and H2. These findings indicate that the performance of regular hoof care behaviour by horse owners corresponds to appropriate hoof condition in horses. Furthermore, this finding supports the earlier assumption that the welfare outcome measure hoof score directly reflects a horse owner's hoof care behaviour. Consequently, horse owner hoof care behaviour is predictive of horse hoof condition.

Horse owner hoof care behaviour was also associated with BCS, whereby the performance of irregular hoof care behaviour by the horse owner corresponds to a low BCS in H2. A direct link between hoof care behaviour and BCS is not expected, however this finding provides further evidence of a general horse owner husbandry and management behaviour attitude system, which results in the performance of one key husbandry practice being indicative of a horse owner's performance of other key husbandry practices. Thus, the irregular performance of hoof care behaviour is likely to indicate the inappropriate performance of other husbandry behaviours, such as those concerning the provision of diet.

5.4.2.2 Factors predicting a horse owner's performance of dental care behaviour and the subsequent relationship with horse welfare outcomes

Antecedents of horse owner attitudes concerning dental care behaviour

Regression analyses indicate that the only horse owner background factor which is predictive of a horse owner's perceived behavioural control concerning dental care behaviour is *Age*, which accounts for six percent of the variance in horse owner control beliefs about dental care behaviour.

The predictive nature of age with regard to horse owner perceived behavioural control has been discussed with regard to horse owner parasite control and hoof care behaviour. The nature of the relationship between *Age* and horse owner control beliefs concerning dental care behaviour is the opposite of that reported in the other husbandry behaviours. Despite the factors which appear to

encourage appropriate husbandry behaviour in younger horse owners, in this case a young age appears to be predictive of a reduced horse owner perceived behavioural control concerning the performance of regular dental care. A possible explanation for this finding may be the costs associated with providing dental care to horses. The provision of dental care requires a dentist or veterinarian to administer the treatment, and as a result the associated costs are substantially greater that those involved with regular parasite control or hoof trimming and shoeing. A younger age may be associated with a lower financial status or discretion in expenditure, and as a result limit a horse owner's ability to provide regular dental care.

The lack of association between investigated horse owner background beliefs and horse owner beliefs concerning dental care behaviour indicates that alternative background factors need to be examined. As discussed for both parasite control and hoof care behaviour, the literature suggests that knowledge-based background factors shape an individual's beliefs about behaviour, and thus additional knowledge-based horse owner background factors need to be investigated with respect to their potential association with horse owner beliefs about dental care behaviour.

Antecedents of horse owner dental care behaviour

Attitude towards dental care behaviour and perceived behavioural control concerning the husbandry behaviour both contribute to the prediction of horse owner dental care behaviour in H1, accounting for twenty five percent of the variation in the horse owner husbandry behaviour. Horse owner dental care behaviour in H2 is predicted solely by perceived behavioural control regarding the husbandry behaviour, accounting for eight percent of the variation observed in the performance of dental care behaviour by horse owners. Normative beliefs concerning the husbandry behaviour do not account for any of the observed variation in horse owner dental care behaviour, in H1 or H2. In both horses, the primary determinant of the performance of dental care behaviour by a horse owner is their perceived behavioural control concerning the husbandry behaviour.

According to the TPB (Ajzen, 1985), perceived behavioural control has both a direct and indirect (via intention) relationship with behaviour, and the direct relationship tends to emerge when the levels of perceived behavioural control and actual behavioural control are comparable (Ajzen,

2005). A horse owner's perceived behavioural control concerning dental care behaviour may therefore be congruent with the actual level of their behavioural control. An explanation for the primary role that perceived behavioural control plays in the determination of dental care behaviour in horse owners may involve the costs incurred when the behaviour is performed. When compared with other husbandry behaviours such as hoof care and parasite control, the outlay required by the horse owner in order to perform dental care behaviour is often considerable. Dental care in horses is reasonably expensive to perform, requires a greater time commitment in order to apply the treatment, necessitates the use of an equine dentist or veterinarian to perform the husbandry practice, and can often result in no further treatment required beyond the initial inspection. Consequently, dental care behaviour may be considered costly by the horse owner. Furthermore, the substantial length of time recommended between treatments (generally anywhere between 6 to 18 months depending on the horse) could potentially reduce the importance horse owners place on dental care behaviour in comparison to other husbandry behaviours. This may result in the lower degree of variance in dental care behaviour accounted for by a horse owner's attitude towards the behaviour. In addition, the time taken for inappropriate dental care behaviour to become apparent in terms of horse welfare outcomes (i.e. deterioration in BCS) is often considerable, which may further reduce the level of priority a horse owner places on performing the behaviour.

A horse owner's dental care behaviour appears to be primarily predicted by their perceived behavioural control regarding the husbandry behaviour. However, a horse owner's dental care behaviour in the horse with which they have the greatest level of interaction is also reliant on their attitude towards dental care behaviour. The degree of variance in dental care behaviour accounted for by horse owner beliefs may be considered limited, and implies that other factors may significantly influence a horse owner's performance of this husbandry behaviour. Although these findings still indicate the presence of an attitude-behaviour relationship in the dental care behaviour of horse owners, they also demonstrate the need for further examination of this husbandry behaviour and its antecedents.

Antecedents of horse welfare outcomes

The performance of dental care behaviour by a horse owner was found to be associated with horse welfare outcomes. Horse owner dental care behaviour was associated with the presence of

injury, illness or disease. These findings could be considered counter-intuitive, as it would be reasonable to assume that an injury, illness or disease (i.e. to the mouth or throat area of the horse) would be more likely to be associated with the inappropriate rather than appropriate performance of dental care behaviour. However, as discussed previously, the presence or absence of an injury, illness or disease, as indicated by the outcome variables *IS* and *DIIS*, can not solely be considered a direct indication of horse owner behaviour. As a result, when examining the relationship between horse owner dental care behaviour and horse welfare outcomes, further information in addition to that provided by welfare outcome measures is required in order to associate regular dental care behaviour with poor welfare outcomes.

Irregular dental care is known to cause poor dental condition which could potentially result in the horse experiencing injuries and infections in the mouth and difficulties performing feeding and grazing behaviour (Lane, 1994). Consequently, the welfare concerns associated with poor dental condition may potentially include mouth injuries and malnutrition or weight loss. Therefore, theoretically the welfare outcome variables *BCS*, *IS* and *DIIS* should all identify horse welfare concerns resulting from irregular dental care. However, due to the nature of dental care and the length of time before inappropriate behaviour is evident in terms of poor welfare outcomes, the welfare outcomes variables measured during the study may lack sensitivity and as a result be an inappropriate assessment tool to assess welfare outcomes which result from horse owner dental care behaviour.

Horse owner dental care behaviour was associated with the horse welfare outcome variables *BCS* and *HS*, in H2. These findings imply that irregular horse owner dental care behaviour is associated with inappropriate body and hoof condition in horses. The lack of significant relationship between these horse welfare outcomes and horse owner dental care behaviour in H1 may result from a lack of variation in horse owner dental care behaviour in the horse with which they have the greatest degree of interaction. Alternatively, the degree of supplementary feeding provided by the horse owner to H2 is generally less than that given to H1, and therefore H2 is likely to be more dependent on grazing than H1 (c.f. Chapter 4). Inappropriate dental care has been shown to result in poor dental condition and injuries to the horse's mouth which has the potential to limit normal feeding and grazing behaviour, and therefore restrict a horse's dietary consumption. The restriction of a horse's diet may lead to malnutrition and weight loss which is

likely to be identified by a low BCS during a welfare assessment, as found in H2. Horse owner dental care behaviour was not directly related to horse hoof condition, however the observed association between the two variables in H2 may be due to a general attitude system, where by a horse owner's performance of one husbandry practice (i.e. dental care) is likely to be predictive of their performance of other husbandry practices (i.e. hoof care behaviour). Accordingly, horse owners who provide regular dental care to the horse they have the least amount of contact with appear likely to perform other husbandry practices such as hoof care behaviour appropriately. The relationship between horse owner dental care behaviour and horse hoof condition observed in H2 may not be evident in H1 due to the difference in the type of hoof care treatment provided to the two horses, that is, the observed tendency for H1 to be shod and H2 to be barefoot trimmed. Findings reported in Section 5.4.2 indicate that barefoot trimming is more likely to be associated with poor hoof condition than shoeing. Horse shoeing generally needs to be performed more frequently than barefoot trimming and consequently the hoof condition of shod horses may be more appropriate than that of horses receiving barefoot trimming.

5.5 SUMMARY AND CONCLUSIONS

It was the aim of this study to investigate the association between horse owner attributes within the context of the human-horse relationship and the subsequent association with horse welfare outcomes. The findings demonstrate that horse welfare outcomes are associated with horse owner husbandry and management behaviour. Furthermore, relationships were found between horse owner attributes, in accordance with the hypothesised human-horse relationship described in Figure 24. A horse owner's husbandry and management behaviour appears to be predicted by the behavioural, normative and control beliefs underlying their attitudes towards the behaviour in question. The observed relationships largely imply that horse owner beliefs about horse husbandry and management behaviour are influenced by knowledge-based background factors. Furthermore, a horse owner's appropriate performance of horse husbandry and management behaviour appears to be predominantly associated with favourable horse owner beliefs about the behaviours. In addition, positive horse welfare outcomes are associated with the appropriate performance of horse husbandry and management behaviour by the horse owner. These findings are in accordance with the literature and the TPB (Ajzen, 1985), and indicate the potential to predict a horse owner's husbandry and management behaviour from their beliefs towards the husbandry behaviour.

The pattern of relationships identified between horse owner attributes supported the investigation of the antecedents of horse owner husbandry behaviour by examining the performance of three specific horse owner husbandry behaviours, *Parasite control behaviour*, *Hoof care behaviour* and *Dental care behaviour*, according to the hypothesised human-horse relationship (Figure 24). According to the findings, horse welfare outcomes are influenced by a horse owner's performance of the husbandry behaviour. In accordance with the TPB-based model, a horse owner's husbandry behaviour was predicted by their beliefs towards the husbandry behaviour. These results are consistent with previous reports which suggest that mismanagement by the horse owner may be detrimental to a horse's health and welfare (c.f. Section 2.3). The current findings indicate that variability in horse owners' husbandry behaviour is primarily accounted for by the horse owner's behavioural and control beliefs towards the behaviour. Normative beliefs appear to provide little if any significant contribution to the variation in horse owners' husbandry behaviour. Horse owners therefore appear to experience limited social pressure when performing horse husbandry behaviours such as parasite control, hoof care and dental care behaviour. For routine husbandry practices such as parasite control and hoof care, a horse owner's attitude towards the husbandry behaviour appears to be the major determinant of the behaviour. However, for a more complex and less routinely performed husbandry practice like dental care, the chief determinant of the behaviour appears to be a horse owner's perception of their volitional control regarding the behaviour. As explained by the TPB, the increased complexity associated with the performance of dental care behaviour is likely to result in the horse owner's perceived behavioural control moderating the attitude-behaviour relationship to become the primary determinant of the behavioural response. In addition, the infrequent nature of its performance may reduce the horse owner's perception of this type of husbandry behaviour and as a result its subsequent performance is reliant predominantly on the horse owner's perceived behavioural control.

These findings therefore indicate that a positive self-evaluation of the behaviour (attitude towards behaviour) and the belief that the behaviour can be realised (perceived behavioural control) are predictive of the appropriate performance of parasite control, hoof care and dental care behaviour by a horse owner. The appropriate performance of each of the husbandry behaviours is associated with positive horse welfare outcomes. In addition, knowledge-based background factors appear to

influence the behavioural and control beliefs of horse owners with regard to husbandry behaviours. The nature of the observed relationships between horse owner attributes and the subsequent impact on horse welfare outcomes, with regard to *Parasite control behaviour*, *Hoof care behaviour* and *Dental care behaviour* are illustrated below in Figures 37, 38 and 39 respectively.

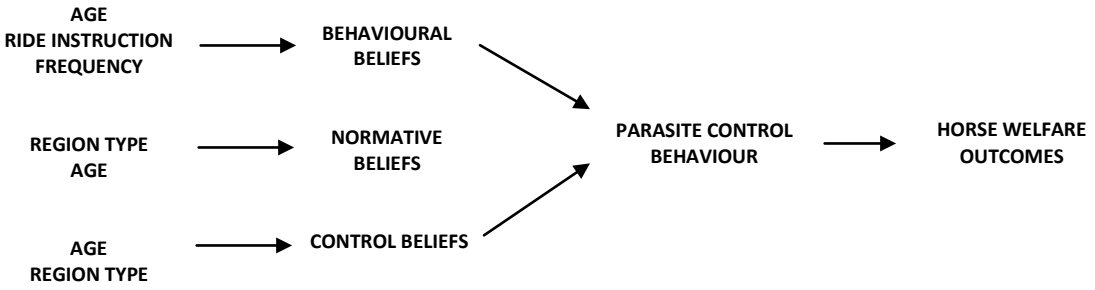


Figure 37 The proposed sequential relationships between horse owner attributes and the ensuing relationship with horse welfare outcomes with regard to *Parasite control behviour*

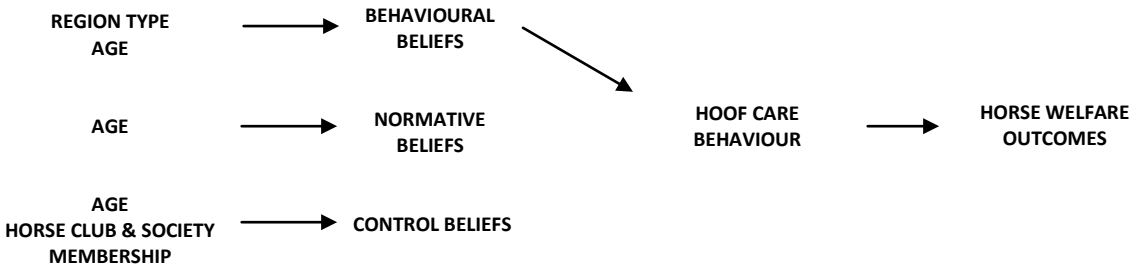


Figure 38 The proposed sequential relationships between horse owner attributes and the ensuing relationship with horse welfare outcomes with regard to *Hoof care behaviour*

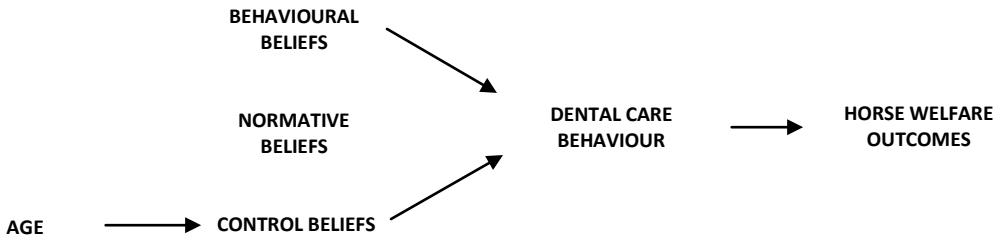


Figure 39 The proposed sequential relationships between horse owner attributes and the ensuing relationship with horse welfare outcomes with regard to *Dental care behviour*

The relationships identified between horse owner attributes demonstrate the potential to change the husbandry and management behaviour of horse owners by modifying the beliefs underlying their attitudes towards the behaviour, and subsequently promote positive horse welfare outcomes. Research within the pork and dairy industries reports that targeted education and training programs can successfully alter the attributes of stockpeople and reduce animal health and welfare concerns (Hemsworth and Coleman, 2010). Furthermore, the relationship between knowledge-based background factors and horse owner beliefs concerning horse husbandry and management behaviour strengthens the association between education and human behaviour. Therefore, a practical recommendation for modifying horse owner attributes may be the implementation of education and training programs which would aim to improve horse owner knowledge on effective horse husbandry and management practices in order to promote horse health and welfare. Given the current findings, the provision of educational material intended to improve the horse owner's evaluation of the behaviour (behavioural beliefs) and their perceived volitional control regarding the behaviour (control beliefs) would be recommended. Furthermore, evidence of a potential general attitude towards horse husbandry and management behaviour indicates that a horse owner's attitude towards one horse husbandry and management behaviour is likely to be indicative of their attitude towards similar types of behaviours. Consequently, it may be possible to increase an education program's validity while still retaining its effectiveness by targeting key types of horse husbandry behaviour, such as those pertaining to horse health and welfare, housing and diet practices, rather than each individual horse husbandry and management behaviour.

Potential education strategies targeting horse owner beliefs in order to modify the husbandry and management behaviour of horse owners and subsequently improve the welfare of horses are likely to require both the provision of education and information to horse owners, and the implementation of a targeted training program. According to the results reported in Chapter 4, the distinction between competitive and non-competitive horse ownership is likely to require the provision of education and information to occur via a range of distribution methods, which could potentially include veterinary practices and surgeries, stockfeed stores, saddleries, horse clubs and societies, internet and local municipal councils. The information provided to horse owners should pertain to horse health and welfare, relevant horse husbandry and management practices, horse health and welfare monitoring, current scientific knowledge, points of contact to obtain information and support, regulations and current welfare codes of practice, and contact details for industry personnel, advisory and regulatory agencies. This information could potentially be presented in glossy handouts with dot-points covering the major issues and relevant contacts, small handbooks covering the material in greater detail and with references to detailed source material, videos, DVDs, seminars covering a number of the main issues, and a centralised website. Additionally, a potential education strategy may involve a targeted training program similar to the cognitive-behavioural intervention programs successfully employed in a number of livestock industries (Coleman et al., 2000; Hemsworth et al., 2002; Hemsworth and Coleman, 2010), which could include both a voluntary and compulsory component. The voluntary training program could be made available to interested horse owners and those who may have been nominated by industry personnel such as veterinarians, horse club and society officials, auditors and horse welfare inspectors. The compulsory training program could potentially be completed by horse owners identified by auditors and horse welfare investigators in breach of horse welfare standards as either an outcome of conviction (i.e. sentence) or as a requirement to avoid a conviction.

The observed relationships between horse owner attributes and the ensuing horse welfare outcomes provides the opportunity to influence the human-horse relationship and potentially reduce the incidence of welfare concerns in Victorian horses through the promotion of appropriate horse husbandry and management behaviour in horse owners. Although the current findings provide evidence of relationships between horse owner attributes, experimental work is required to not only demonstrate the sequential nature of the human-horse relationship and provide evidence of causation, but to also determine whether education and training programs

could be developed and employed to improve the quality of the relationship, and thus the husbandry and management behaviour of horse owners and the welfare of horses. In addition, the current study possessed a number of methodological limitations which could potentially be rectified through further human-horse relationship research. These methodological limitations include the examination of interrelationships between variables using structural equation modelling as a result of a small sample size, a potentially reduced variability in the measured variables due to an absence of extreme cases, and the use of participant-reported behaviour responses rather than direct observation of horse owner behaviour.

Clearly further research is required to examine the human-horse relationship, as indicated by both the reported findings and the methodological weaknesses of the present study. The reported relationships may be considered conservative due to the random sampling method. The random sample is likely to have resulted in both a limited sample size and a reduced variable variation due to the difficulty in recruiting horse owners with horses experiencing severe welfare concerns (inappropriate horse husbandry and management). Although the relationships between the variables are likely to have been maintained, the reduced variation in horse owner attributes and horse welfare outcomes is likely to have resulted in weaker correlations between the independent and dependent variables and therefore more conservative results. Unlike the present study, a completely random sample is not likely to be necessary for future human-horse relationship research. Therefore a combination of random and targeted recruitment may be appropriate when examining the human-horse relationship with regard to all potential forms of horse ownership. The random telephone survey conducted during the current study would be an appropriate method of random recruitment, while targeted recruitment could potentially occur through the horse welfare investigations, veterinary practices and surgery and horse clubs, organisations and societies.

The findings of the current study indicate that horse owner husbandry and management behaviour influences horse welfare outcomes. However, horse owner behavioural responses were determined via participant responses rather than direct observation of horse owner husbandry and management behaviour. Further research examining the human-horse relationship requires the direct observation of horse owner behaviour. Horse owner husbandry and management behaviours are often routine and not all performed on a daily basis, making direct behavioural

observation difficult and time consuming. During future research, direct observations of horse owner behaviour could potentially be performed at a number of pre-determined times, scheduled to coincide with the performance of specific husbandry and management behaviours, over a certain period of time. In addition, horse owners' could keep a detailed diary of all human-horse interactions to allow for further measurement and understanding of horse owner behaviour. Obtaining a greater understanding of the behavioural aspect of the human-horse relationship will enable appropriate education and training programs to be developed and employed in order to effectively modify horse owner behaviour and promote positive horse welfare outcomes.

In order to demonstrate the sequential influence of horse owner attributes within the human-horse relationship (i.e. causal effects) an intervention study needs to be performed. This research could potentially involve the implementation of a targeted education and training program, and the examination of their effect on the human-horse relationship, the horse husbandry and management practices of horse owners, and the horse welfare outcomes. This would enable both the examination of causation and the investigation of potential education and training programs. This type of research could potentially be conducted in a manner similar to that of the cognitive-behavioural intervention programs used in the livestock industries (Hemsworth et al., 1994; Coleman et al., 2000, Hemsworth et al., 2002), where two groups of horse owners would be examined; a control and an intervention group. The intervention group would participate in a training session/workshop which would involve the provision of information and education pertaining to the importance of the human-horse relationship for horse welfare, the opportunities to improve the human-horse relationship by modifying horse owner behaviour, and evidence for how such behavioural change can be beneficial to both the relationship and horse welfare. This form of education and training would aim to modify the attitudes and beliefs of horse owners and thus improve the human-horse interactions. A practical training session demonstrating appropriate human-horse interactions may also be employed. The human-horse relationship (horse owner knowledge, attitudes and behaviour and horse welfare outcomes) would be assessed prior to the implementation of the education and training program, and then again following its application after a pre-determined length of time has passed. The results between groups would be compared. The length of time between completion of the education and training program and the re-assessment of the human-horse relationship would need to allow the changes in attributes and their subsequent impact on horse welfare to have come into effect, in order to obtain an accurate determination of the validity of such programs for horse owner education.

Finally, the often speculative nature of explanations for relationships observed between horse owner attributes indicates that qualitative research investigating horse owner viewpoints and experiences may provide further insight into the nature of these relationships. This will be the subject of the next chapter.

CHAPTER 6
RECREATIONAL HORSE OWNERS' VIEWPOINTS REGARDING HORSE OWNERSHIP IN VICTORIA

6.1 INTRODUCTION

During the on-site inspections reported in the previous chapter, horse owners sought an opportunity to express their views and opinions on a range of issues concerning recreational horses in Victoria. These issues included, but were not limited to, regulation of horse welfare and horse identification and registration. As a result, horse owners were invited to participate in an in-depth discussion of these and other issues during a qualitative interview.

Qualitative analysis is commonly employed in anthropology and psychology to explore the life world of the participant and to allow the development of a detailed explanation from an individual's reported experiences (Willig, 2001; Patton, 2002). Qualitative analysis allows the researcher to understand social reality in a subjective yet systematic manner. While quantitative analysis is deductive and intended to test hypotheses or questions generated from theories or previous empirical research, qualitative research is primarily inductive and examines the data in regards to topics and themes, in addition to any inferences that may be drawn from them.

Qualitative information is generally collected using one of four methods; interviews and focus groups, questionnaires consisting of open-ended questions, observations, and document analysis (c.f. Section 3.4). The most common means of gathering qualitative information is through in-depth interviewing involving open-ended questions, which allow participants to answer the question on their own terms and in as much detail as they wish. The degree of structure to the interview and the type of questions used depend on the purpose behind gathering information. Typically interviews can be structured, semi-structured or unstructured, and may consist of questions regarding knowledge, experience, practices, opinions, beliefs, and feelings. The aim of a qualitative interview is to obtain detailed information pertaining to participant's experiences and

viewpoints concerning a particular topic. All qualitative research is characterised by a search for meaning and understanding, the researcher as the primary instrument for data collection and analysis, an inductive investigative strategy, and a detailed descriptive end product.

The lack of available information pertaining to recreational horse ownership in Victoria includes data concerning horse owners' viewpoints on a range of subjects including horse ownership, horse identification and registration, and the welfare of horses in Victoria (c.f. Section 1.4). While the research conducted in the earlier parts of the study collected substantial quantitative data regarding the Victorian horse and horse owner populations, horse ownership and management and the relationships between horse owner attributes and horse welfare outcomes, it failed to gather any qualitative information which had previously been lacking. The qualitative interview investigated four main topic areas, focusing both on the perspective and experience of participants with regard to their involvement with horses in Victoria, the Victorian horse industry, the welfare concerns associated with horses in Victoria, and horse identification and registration in Victoria. The aims of this study were;

i. To examine horse owners' viewpoints regarding the welfare issues and concerns in the Victorian horse population, why these issues and concerns arise and possible measures necessary to manage and prevent them, and
ii. To investigate horse owners' viewpoints regarding possible systems of registration and identification of horses in Victoria, in addition to a regulatory framework that may be appropriate for these horses.

6.2 METHOD

6.2.1 Study design

Data were collected during qualitative interviews using the semi-structured interview guideline between September 2009 and June 2010. The sample consisted of 12 Victorian horse owners. The selection criteria required participants to be Victorian recreational horse owners over 12 years of age.

6.2.2 Participant recruitment

Participant recruitment is detailed in Section 3.2.3 and 4.2. At the conclusion of the on-site inspections (c.f. Chapter 5) participants were invited to participate in an in-depth discussion during a qualitative interview. If participants agreed to further participation, they were re-contacted by the researcher at a pre-determined time and a convenient time for the qualitative interview was determined. In the days prior to the interview the researcher again contacted the participant to confirm the interview details.

6.2.3 The qualitative interview

The recorded qualitative interviews employed a semi-structured interview guide to examine the viewpoints of participants regarding horse ownership in Victoria. The four main topics examined during the interview are listed in Table 10. The rationale behind the interview guide is described in Section 3.4, and a copy is located in Appendix 4. The qualitative interviews were conducted by the researcher at a time and location convenient to the participant.

Although the qualitative guide was employed, the semi-structured nature of the interviews allowed any issues raised by the participant to be addressed and questions to be modified according to the participant's responses. As a result participants were able to elaborate on their responses and comment on other issues they deemed relevant to horse ownership in Victoria. Consequently, the interviews developed a conversational atmosphere (Patton, 2002). Qualitative research employing this type of open-ended format has been shown to successfully examine novel areas and to produce detailed data (Smith and Osborn, 2003). The interviews commenced with an informal conversation, and before the interview topics were broached, participants were again informed of the objectives of the study and the interview procedure was described. Permission was sought from the participant to record the interview using a Sony IC Recorder (ICD-B500) to enable verbatim interview transcripts to be produced. During the course of the interview, the researcher also took written notes of key themes and topics raised by the participant in response to the questions posed. The interviews were, on average, 120-180 minutes in length. Qualitative interview data were collated and analysed in a thematic manner.

6.2.4 Statistical analysis

Thematic analysis was utilised to analyse the interview transcripts in a manner recommended for qualitative data (Maxwell, 1996; Holliday, 2002). All statements made by the participant during the course of the interview were classified into both primary themes based on the four topic areas of the interview guide, and secondary themes consisting of specific issues which were discussed within the context of the primary themes. Table 62 provides an overview of the participants' perceptions of each theme. Quantitative statistical analyses were not performed on the interview data, however in order to distinguish widely-held perceptions from rare accounts, frequency statistics were obtained for participants' comments in relation to each theme. The frequency data are reported in Table 62 and the forthcoming section.

6.3 RESULTS

The opportunity to complete the qualitative questionnaire was offered to forty two participants. The forty two participants included all horse owners who completed the on-site inspection following the development of the studies qualitative component in August 2008. While twenty eight participants indicated their interest, only twelve horse owners were able to commit the time required for the qualitative interview. The reasons given by participant's who declined further participation included insufficient time, lack of interest in the qualitative research, and no further information to provide. The interviewed participants consisted of eleven female horse owners and one male horse owner, with a mean age of 38.58 years (SD = 13.04). Seventy five percent of the horse owners interviewed resided primarily in regional Victoria. The participants had a mean number of 4.25 horses (SD = 4.4) and had owned horses for a mean number of 23.83 years (SD = 15.83).

6.3.1 Thematic analysis of data

Table 62 reports the thematic analyses of the qualitative data collected during the qualitative interviews.

Table 62. Thematic analysis of qualitative interview data: Emergent primary and secondary themes, the number of respondents commenting on the respective secondary themes, and examples of horse owner statements.

Primary themes	Secondary themes	Number of respondents	Horse owner statements and comments (P = participant)
Participants' involvement with recreational horses in Victoria			
Origin of interest in horses	• Personal interest in horses • Family history with horses	9 of 12 7 of 12	– I think I've always been interested in horses… I didn't have horses when I was young but the interest was always there (P848) – My daughter developed an interest in horses. We bought her first pony about 4 years ago. Prior to that I had no real interest or experience with horses (P888) – My mum had horses when I was little, I think that is probably how I became interested in them (P1035)
Initial involvement with horse ownership	• Childhood involvement • Adulthood involvement	9 of 12 3 of 12	– I have always had an interest in horses, however there was not the opportunity to have one of my own until later in my life (P853) – I always wanted a pony as a kid. My parents had no interest in horses... I bought my first horse when I was in high school, from someone I knew and we agreed on a payment plan (P983)
Acquisition of first horse	• Parent purchased participant's first horse • Family member purchased participant's first horse • Participant purchased their first horse	6 of 12 2 of 12 4 of 12	– I bought my first horse when I was in my mid thirties…he's a standard bred who came off the track, he won a lot of races (P853) – My parents bought my first pony, I'm not sure how old I was, but I was quite young (P881) – I bought my first horse 4 years ago, when I bought a pony for my daughter (P888) – My first interactions were with my neighbour's pony when I was a child…My grandfather bought my first pony (P952)

Current equine discipline/area of interest	• Non-competitive recreation • Competitive recreation • Breeding • Family interest	12 of 12 5 of 12 5 of 12 4 of 12	– I used to compete, a lot of show jumping and some showing. I stopped competing when I had children… My daughter now rides…Oh, I was also Chief instructor at my daughters Pony Club (P845). – I guess my interest in horses is quite extensive, both a personal and professional interest … I have my own horses for recreational purposes, then I have the horses that are part of my business… an Equestrian Centre (P881) – I support my daughter's interest in horses and riding…this usually involves taking her out to where we agist the pony 3-4 times a week, and her monthly pony club meets (P888) – I'm interested in most areas, but my main interest lies in breeding. I've been breeding with my Irish Sport Horses for a couple of years now…One of my mares is due to foal in about 4 weeks which is exciting (P978) – Um, I tend to do a lot of trail riding, there are some really good tracks through the forest that we are able to use. The forest tracks are nicer than riding on the road, and they are hilly so it keeps him quite fit. Ah, I am also eventing, so I have a flat work lesson every week and I try and have a show jumping lesson every couple of weeks. My instructor also teaches at pony club, which I have once a month (P1035)
Interaction with other horse owners	• Frequent (daily) interaction • Regular (weekly) interaction	6 of 12 6 of 12	– I usually see other horse owners most weekends and sometimes during the week. Friends and other pony club members (P190). – Outside of my family I would probably interact with other horse owners most weekends (P845) – I interact with horse owners and people in the industry everyday through my business… owners who agist their horses at the Centre, people who come here

			for riding lessons and discussion groups, the farrier… I also have friends that own horses and Ill talk with them regularly (P881) – Every day. I work as a stable hand (P983)
Horse club and society membership	• Horse club and society member • Non-horse club and society member	6 of 12 6 or 12	– I hold memberships to EA and Calligne Adult Riders. My daughter is a member of Calligne Pony Club… My reasons for membership were for interest, to compete, to work and now for my daughter (P845). – I used to be a member of Macedon Ranges Pony Club and Novelties club when I was competing… now that I don't have the time to compete I don't really need any memberships (P190) – I am not a member, but my daughter is a member of Ballarat Polo cross Club. Being a member allows her to play, she competes most weekends…Its not cheap but our whole family gets a lot of enjoyment from it (P952) – I'm a member of the Irish Sport Horse Society. This is mainly due to my interest in the breed, but it also helps with breeding (P978) – I'm a member of Smythsdale Pony Club… I had to wait 18 months before I could join. It's a large Pony Club and there is a waiting list before you can become a member (P1035) – Yes… HRCRV, PCAV, Geelong Show Jumping Club, Sport Horse Club, EA, and now my son is a member of Little River Pony Club (P1107)
Intentions for future horse involvement	• Non-competitive recreation • Competitive recreation • Breeding • Companionship • Family interest	12 of 12 3 of 12 5 of 12 1 of 12 4 of 12	– Now I can't imagine not having horses, my horses are very important to me. I think I will always be involved with horses in some way… Yes, probably always in a recreational manner (P853) – Obviously I plan to continue running the Centre... providing instruction and lessons, the riding school, some natural horsemanship, agistment, and

	• Business/profession	4 of 12	discussion groups for new horse owners which I think is important…I want to also continue to use the natural horsemanship methods with my own horses, there is still a lot to learn there (P881) – I plan to continue supporting my daughter and her riding…I also need to keep learning about horses so I can teach and support my daughter properly (P888) – When I was younger I competed heavily in both show jumping and eventing, most of my weekends involved some form of competition…As I've gotten older I have competed less and now I guess you would say my interest lies in non-competitive recreation…I'm studying Microbiology with an interest in equine diseases… As far as the future goes, I plan to continue riding although I don't think I will complete, and also hopefully now I will also have some involvement with horses through my work (P1022) – My focus at the moment is eventing…I usually have a lesson once a week and my monthly Pony Club meetings. I'm also doing my Certificate 2 Equine Industry at Ballarat Uni on one day a week, and working at the Vet on the weekend…I would like to still be eventing in the future and I would like to have a career with horses… I'm thinking of Vet Science but I would also like to ride track work
Participants' views on the recreational horse industry and horse ownership in Victoria			
Current horse ownership	• Previously unconsidered • Some issues/concerns • Positive view • Confident in own ownership	2 of 12 2 of 12 12 of 12 4 of 12	– I think it is fairly positive overall, but there are some concerns…ignorance and a lack of knowledge or maybe commitment (P845) – I guess I have a favourable view of horse ownership in Victoria, although like anything there are some problems… I really enjoy my involvement with horses, both as my job and as a horse owner. I can't imagine not having horses in my

			life (P881) – I'm not sure… I guess I haven't thought of other people's ownership, just ours really. We enjoy owning horses and do what we think is appropriate, I guess everyone is different though (P952) – My horses are a big part of my life, I love my involvement with them (P978) – I think horse ownership in Victoria is quite positive…most owners are doing the right thing, but you will always have a small group that aren't… I think there is a reasonably high standard here (P1107)
Important issues facing horse industry	• Uncertain • Ignorance • Lack of knowledge • Lack of commitment • Inappropriate management	1 of 12 4 of 12 12 of 12 7 of 12 5 of 12	– I think it all comes down to knowledge or I guess a lack of knowledge… Commitment is also important, owners need to be committed to their horses otherwise they will not manage them properly and then they will get into trouble (P881) – I think that safety is an issue…People don't have the appropriate equipment. That's one of the good things with polo cross, its regulated and safety is a priority (P952) – Obviously you have the issues which involve peoples' knowledge and skills, as well as their willingness to properly care for their horses…I think people also need to consider health and disease more than they currently do…people started to think about disease when we had EI, although maybe not as much as those in Queensland or New South Wales, as EI didn't really have a large affect on Victoria (P1022)
Accessibility and value of information available to horse	• Available if sought/ valuable	12 of 12	– Information is available, but you do have to look for it… There are a range of people that I know I can seek advice from...the farrier, stock feed store (P848) – I can get access to information and support if I need it. It's not always easy, but

owners			I now know where to get it. I tend to look on the internet and in books and magazines. I will also talk to other agistees and people at Adult Riders. Oh, and I can always call the vets…I can call and they will answer questions over the phone, they are good like that (P853) – I guess I am usually the one providing advice and support, but I do still seek some advice when I need it (P881) – The information is there, but you generally have to search for it….I get most of my information or advice from horse people, books and a little from the internet…I only really call the vet if I have no other option…they are expensive and most of the time they don't actually fix the problem or they tell you to just continue treating the horse the way you already were (P983) – There is information available if you look…I tend to use the internet, books and magazine, oh and people within the industry…I'm lucky as I already have a lot to do with people in the industry so its quite easy for me to get help or advice, and I like to keep learning (P1035) – At the moment the information is available but it is spread out over too many locations… It needs to be centralised, where horse owners can access it in one place (P1107)
Problems associated with horse ownership	• Space/land availability • Money • Time • Environmental constraints	6 of 12 12 of 12 8 of 12 2 of 12	– Obviously land, I live on a suburban block so I have no option but to agist my horses. This also can be expensive (P853) – Land, money, time, safe fences…there are a lot of challenges that you face when owning horses, but I guess that I'm willing to overcome them to have our horses (P952) – I'm sure there the same things as most people, having land to house my horses,

			finding the time to put into them and money…There are a lot of costs associated with owning horses (P1022) – I'm still at school and only work on weekends so my parents have to pay most of the costs for my horses…We have land but are lucky that our neighbour lets us keep our horses at his place so our paddocks can have a rest. That helps with hay and feed (P1035)
Benefits gained from horse ownership	• Interest • Enjoyment • Social interaction • Education	12 of 12 12 of 12 10 of 12 4 of 12	– I had no real interest in horses before my daughter started riding and we bought her pony…I now find horse ownership both enjoyable and rewarding…I gain a lot of pleasure from watching my daughter's enjoyment (P888) – I think I'm pretty much interested in everything do with horses, and I enjoy it all…I have made good friends that ride, and its something we do together…I even like to keep learning about horses and how I should be managing them (P1035) – Horses are my interest…I get a lot of enjoyment from my involvement with horses and now from my son's involvement…It is an expensive interest though (P1107)
Improvements to horse ownership	• Previously unconsidered • Satisfied with current ownership • Reduce associated costs • Land availability • Education	1 of 12 8 of 12 4 of 12 2 of 12 4 of 12	– Available land. We live in Williamstown and agist my daughters pony at a friend's property about 45 minutes from home. Because of the distance we only see the pony 3-4 times a week...Very difficult to find agistment closer to home (P888) – I'm not sure that my own ownership needs to be improved, though maybe I should be more aware of others…Report problems if I see them (P952) – I enjoy my involvement with my horses; however I would like to be able to ride again. My back injury now prevents me from riding my horses (P983)

			– I think we do need more knowledge…Maybe a central Vet directory (P1107)
Participants' views on the welfare issues and concerns in recreational horses in Victoria			
Current horse welfare concerns	• Inappropriate husbandry practices • Inappropriate management • Unsafe environment • Poor health outcomes • Ignorance and lack of knowledge	6 of 12 10 of 12 2 of 12 4 of 12 12 of 12	– I think a lot of the problems are because the horse owners don't know how to look after their horses properly, and don't know what they should or shouldn't be doing… I think overweight and underweight horses are a big problem (P853). – Main welfare concerns, um probably poor knowledge, mismanagement, underweight and overweight horses, and maybe horse owners are not committed enough (P978) – Knowledge…I don't think it's that people don't want to look after their horses correctly, I think it is just they don't know how to… They may not know where to get help from (P1035)
Causes of main welfare concerns	• Horse owners unprepared for requirements of horse ownership • Lack of commitment to horse ownership • Ignorance and lack of knowledge • Mismanagement	2 of 12 7 of 12 12 of 12 4 of 12	– I think that the main causes would involve mismanagement. I know that I have a limited knowledge of horses and am therefore always trying to learn more so that we make sure we can manage Fubbels (the pony) properly (P888) – One thing is that I think people buy horses without the proper preparation and knowledge…they then have a horse and they don't really know how to care for it (P952) – The main problem is owners that don't have enough knowledge (P983)
Potential measures to limit/prevent welfare concerns	• Uncertain • Education • Legislation	3 of 12 9 of 12 4 of 12	– Education…people need to be taught how to look after their horses properly… not sure how you can make them learn though (P853) – This is where it is hard, obviously you need to educate people on how to

	• Registration	1 of 12	properly manage horses, but you also need to have some legislation in place… Basic horse ownership classes should be compulsory, but I don't know they would be enforced (P881) – I don't know, maybe the RSPCA…but I'm not sure they can really do anything (P952) – It is difficult to know how to tackle the problem…Probably education and some form of legislation…. Legislation, um maybe a type of registration, but I'm not too sure (P978) – Education and legislation could be used, but who would be responsible? (P1107)
Ability to determine horse welfare status	• Lacks confidence • Confident • Very confident	1 of 12 7 of 12 4 of 12	– I'm pretty confident in my own ability, but if I'm uncertain I will ask for help… I would normally speak to a few other experienced horse owners that I know…I wouldn't normally go to a vet unless the problem was really bad… I think they are really just a waste of time and money, and I know other people who would be more help (P190) – Very confident. I'm very confident of my ability to determine my horse's welfare, however I will seek advice if I feel like I need it (P845) – I guess that I lack confidence in my knowledge about horses and horse welfare… I am aware of my limitations though, so I'm confident in my ability to seek help (P888) – I'm very confident, but I think you have to be…I try and make sure that I am aware of the conditions and change my management accordingly (P952) – I am fairly confident that I have a good knowledge for what is required…I have a good knowledge for basic and daily management, and I will call the vet for

			any concerns or issues (P1107)
Participants' views on the registration and identification of Victorian recreational horses			
Horse identification	• Identification is beneficial • Identification is of no benefit	9 of 12 3 of 12	– I'm not sure if there is any benefit to horse identification. Maybe it would make registration easier or help if you lost your horse. But not everyone will use it (P190). – I think horse identification can be helpful, like in situation with fires or environmental problems… micro-chipping is available but I'm not sure that it is necessary for all horses (P881) – Look I can see the benefits of having your horse identified, I had my horses micro-chipped…horses are identified, owner is known…but it is expensive, so is it feasible for all horse owners? (P1107)
Horse identification status	• Horses are identifiable • Horses are not identifiable • Some horses are identifiable and some are not	5 of 12 3 of 12 4 of 12	– Some of my horses are branded, they were branded when I bought them… the costs are quite high, and I have no real reason to brand or microchip my other horses (P881) – My horses are branded. This allows them to be identifiable, my ownership to be known, and it allows me to register them with the Irish Sport Horse Society…You cant register Irish Sport Horses without the appropriate branding (P978) – My horse was branded and micro-chipped when I bought him…He is identifiable and my ownership is known (P1022)
Horse registration	• A registration system is important • A registration system would be of no benefit	9 of 12 3 of 12	– I think a registration system is a good idea… I'm not sure how it would work. Good for competition horses but not sure if it is needed for other horses (P845) – I don't see the need to register recreation horses. What would the benefits be?... I think it would just be a revenue raiser (P848)

	• Will support a registration system • Will support registration if required to • Will not support registration system	6 of 12 4 of 12 2 of 12	– I think a registration system could be very important, but I don't know how you would create one that is useful (P881) – No benefit. I don't think it will make any difference. We will have an added expense for no advantage (P952) – I think an appropriate registration system is required…something is needed to ensure horses in Victoria are protected (P978) – I'm uncertain if a registration system is necessary…What are the reasons for a registration system?. Is it for money? Pedigree for when people breed? Making horses identifiable? To have information or some form of protection?...Really, I'm not sure (P1107)
Horse registration levy	• A registration levy is warranted • Would support a registration levy if it was warranted • A registration levy is not warranted	1 of 12 8 of 12 3 of 12	– Horses need to be protected; maybe a registration system is a way of doing this…I guess a levy would be expected, maybe it could go towards the welfare groups that work with horses (P853). – I would assume that as with most things horse registration would involve a levy… I hope it would be reasonable, oh and it has to be for the right reasons not just to raise revenue…Important if it will fund education and protection, it should benefit horses and horse owners in Victoria… I'm concerned how it would work for people who own multiple horses. Or those like myself who own horses for business purposes (P881) – I guess, but the decision is probably up to my parents (P1035) – I think it is just another way to make money. It already costs people to micro-chip their horses so they shouldn't have to pay to then register them with a central body (P1107)
Horse registration	• Horses are registered	2 of 12	– Neither of my horses are registered, but my details are registered as a horse

status	• Horses are not registered • Some horses are registered and some are not	6 of 12 4 of 12	owner. I would though register both horses if a registration system was introduced (P853). – My horses are registered with the Irish Sport Horse Society. The benefits I gain are knowledge and personal interest, I get to have contact with other owners and I am able to breed with my horses (P978) – My horse isn't registered, but he is micro-chipped…At the moment I use my horse in a non-competitive recreational manner, so I don't really have a need to register him with a club or society…I would have him registered if a system was available (P1022) – One of my horses is registered with the breed society…This allows me to be eligible to compete and have insurance coverage (P1107)
Possible regulatory frameworks	• Previously unconsidered • Uncertain • Registration system is warranted, but uncertain of framework • One central horse registration body • Registration for competitive horses but not for non-competitive horses • Registration system for recreational horses is not warranted	2 of 12 6 of 12 8 of 12 3 of 12 2 of 12 2 of 12	– I can appreciate that registration can be beneficial in terms of breeding and competing, but is it necessary for all recreational horses?... Honestly I have no idea how you could bring in a system that is suitable for all horses in Victoria… And then how do you enforce it? (P881) – I'm not really sure…Maybe they would be better to register properties that have horses rather than individual horses (P952) – I really have no idea how to develop an appropriate registration system. I guess that's why we don't have one…how do you combine all the individual clubs and societies that people are already a member of? (P978) – Maybe horse owners could have a license like those required to own wildlife (P983) – One central body…All societies databases combined and one central levy…We do need to determine why though… Is it for disease control, identification or

	knowledge, or to allow competition? (P1107)

When enquiring about participants' awareness of the proposed EADRA agreement between the Victorian government and the Victorian recreational horse industry, 58% of participants had prior knowledge of the proposal. Once informed of the details surrounding the EADRA agreement, three out of four participants claimed they would support the proposal, while the remaining participants claimed there was no need for such an agreement in the recreational horse industry

6.4 DISCUSSION

The interview data concerns the viewpoints of horse owners with regard to their ownership. These findings will be interpreted in terms of horse owners' past, current and intended horse ownership, and the important primary themes will be discussed.

Initial horse ownership

The findings of the qualitative interview indicate that participants' origin of interest in horse ownership appears to stem from either a personal attraction and/or through a family interest or involvement. Horse owners largely report an initial involvement with horse ownership originating in childhood. Furthermore, when horse ownership commenced in adulthood, participants generally report that despite their desire, a childhood involvement had not been an option available to them. A horse owner's first horse was predominantly purchased by a parent or family member when ownership commenced in childhood and by the participant themselves when ownership began in adulthood. According to these findings the formation of participants' beliefs about horses and horse ownership are likely to begin early in life.

Industry reports suggest that the high representation of horses in Victorian animal welfare investigations results from horse owner mismanagement associated with ignorance or lack of knowledge (c.f. Section 3.2). The findings from the on-site inspections, reported in Chapter 5, indicate that poor horse welfare outcomes are associated with the inappropriate performance of horse owner husbandry and management behaviour. In accordance with the TPB (Ajzen, 1985), the antecedents of horse owner husbandry and management behaviour appear to be the horse

owner's beliefs about the behaviour in question. Furthermore, horse owner beliefs about horse husbandry and management behaviour appear to be associated with a number of knowledge-based background factors including membership to horse clubs and societies and horse riding instruction. According to Ajzen (1985), human beliefs are formed from the information an individual possesses about themselves and the world around them. Thus, with an initial involvement commonly commencing in childhood through a family interest, horse owners' initial beliefs about horse husbandry and management may be predominantly influenced by their parents and family members.

These findings suggest that appropriate horse husbandry and management should be encouraged by horse owners with young children or family members involved with horse ownership in order to support the formation of favourable beliefs about these behaviours in young horse owners. Membership to a horse club or society such as Pony Club could also be a means of educating young horse owners about appropriate horse husbandry and management behaviour. Pony Club is an international voluntary youth organisation, aimed at providing members with instruction on all aspects of horse ownership including horse riding, health, husbandry and management. It has now become the largest association of horse riders in the world. As with other horse clubs and societies, Pony Clubs provide their members with an opportunity to improve their knowledge through education, instruction and interaction with fellow horse owners and industry personnel. As discussed previously, the opportunity for knowledge improvement has been linked with both improved horse owner husbandry and management behaviour and reduced horse welfare concerns (c.f. Section 3.2). Thus, potential education strategies should include a section concerning young horse owners, and the provision of education in relation to appropriate horse health, husbandry, management and overall ownership.

Current horse ownership

All interviewed horse owners cited non-competitive recreational use as a current area of involvement in their horse ownership. Other reported areas of involvement included competitive recreational use, breeding, and family involvement. Furthermore, it was common for participants to describe multiple areas of interest, as described by participant P1022 'I used to do a lot of show jumping, we would be at competitions most weekends. I don't really compete much any more,

but occasionally if there is a local competition and I've got the time I will compete, but it's not really serious anymore. Um, now I really just do what I think you would call recreational use… I usually ride once or twice a week at home or around the local area'. Competitive-recreational horse use was reported by almost half of the interview participants, whereby competition occurred in equine disciplines including show-jumping, dressage, eventing, polo cross and showing. Horse breeding was cited by a number of participants as a current area of horse ownership interest, however only two participants were actively breeding horses. Although breeding horses is a practice most horse owners expressed an interest in during the interviews, the majority appeared to have given little consideration to its realities and as such seem unprepared with regard to the knowledge and resources required for such an undertaking. If this interest were to become an actual involvement in horse breeding, the horse owners' apparent lack of knowledge is likely to constitute a horse welfare risk. Participants also reported the support of their childrens' interaction with horses when discussing current areas of horse involvement. The importance of appropriate education for young horse owners and the associated responsibility of the horse owner overseeing this form of horse ownership were discussed in the previous section of the chapter. These findings indicate that Victorian horse owners' current horse ownership interests and involvement appear quite varied. In addition, horse owners commonly cite multiple areas of current interest, which could potentially provide the horse industry with multiple points of contact for these horse owners. Given the difficulties reportedly associated with contacting horse owners (c.f. Section 3.2), additional points of contact are likely to have positive implications for the implementation of future policy, education and training programs. Furthermore, multiple areas of horse ownership interests indicate that future policy and education programs require a broad scope to ensure a relevant range of horse ownership types are included. For example, non-competitive and competitive recreation, horse breeding and young horse ownership.

All horse owners citing a current involvement in competitive recreational horse ownership also reported membership to a horse club or society. This finding supports the earlier assumption that a horse owner's incentive for horse club and society membership is likely to involve the ability to compete in equine competitions rather than the opportunity to improve knowledge. In addition to the opportunity to compete, the most commonly cited factors influencing a horse owner's membership were personal interest, enjoyment, social interaction and the opportunity for education and instruction. Given the reported association between horse club and society

membership and improved horse management practices and horse welfare outcomes, and the opportunity to identify horse owners, the promotion of horse club and society membership is frequently included in discussions concerning potential education and training strategies aimed at combating horse owner mismanagement. Although the benefits of such membership are not disputed, the current findings indicate that non-competitive recreational horse owners, who the industry reports are at greatest risk of horse welfare concerns due to mismanagement, appear unlikely to undertake horse club and society membership, and consequently fail to receive the associated educational gains. Thus, for future policies aimed at improving the husbandry and management practices of non-competitive recreational horse owners, the promotion of horse club and society membership does not appear to be a valid strategy.

The lack of a compulsory horse registration system in Victoria is commonly cited as a primary reason for the lack of available information concerning the recreational horse population (c.f. Section 3.2). In addition to its ability to identify and contact horse owners, horse registration may also provide horse owners with a source of information and advice to aid in horse husbandry and management, in a manner similar to that associated with horse club and society membership. Consequently, horse registration is likely to form part of future strategies designed to improve the husbandry and management of Victorian horses and reduce the horse welfare concerns commonly observed. The results obtained during the qualitative interviews indicate that horse registration is an emotive issue. Although horse owners largely support the general idea of horse registration, considerable uncertainty and scepticism exists regarding both the rationale and the application of a regulatory framework appropriate for Victorian conditions. Participant responses commonly consisted of statements such as 'I think a registration system is a good idea… I'm not sure how it would work. Good for competition horses but not sure if it is needed for other horses' (P845), 'I think a registration system could be very important, but I don't know how you would create one that is useful' (P881), 'I think an appropriate registration system is required…something is needed to ensure horses in Victoria are protected' (P978), and 'I'm uncertain if a registration system is necessary…What are the reasons for a registration system?. Is it for money? Pedigree for when people breed? Making horses' identifiable? To have information or some form of protection?...Really, I'm not sure' (P1107). Furthermore, although participants' understanding of horse registration systems was quite varied, it appeared to also generally be quite limited. This finding suggests that horse owners may be forming beliefs about horse registration based on limited and potentially incorrect information.

During discussions on the subject of horse registration the factor which appeared to be of most concern to participants was the possibility of a registration levy. All participant responses inevitably turned to the possibility of an associated registration levy without any query by the researcher. The general consensus amongst interviewed horse owners was that a registration levy would be supported if it was warranted. When an acceptable justification for a levy was sought by the researcher, participant responses generally implied that any levy should be used to protect horse health and welfare rather than as a source of revenue. Participants also commonly reported that a registration levy was likely to be inevitable, but that they hoped the fee would be reasonable (i.e. $50 per horse). The application of the levy was also frequently queried, as shown by P881 response 'I would assume that as with most things horse registration would involve a levy… I hope it would be reasonable, oh and it has to be for the right reasons not just to raise revenue…Important if it will fund education and protection, it should benefit horses and horse owners in Victoria… I'm concerned how it would work for people who own multiple horses. Or those like myself who own horses for business purposes'. Thus, these findings suggest opposition to a registration levy could potentially be reduced by ensuring the justification for its application is warranted and clearly communicated, and that a percentage of the money raised is used to fund the promotion and protection of horse health and welfare.

The findings of the qualitative interviews and the greater study indicate that approximately half of the participants currently register their horses with some form of horse club, society or organisation. Furthermore, interviewed horse owners most commonly reported the non-competitive recreational nature of their current horse involvement as the basis for their lack of registration. Participants' responses regarding their registration status frequently consisted of statements such as 'My horses are registered with the Irish Sport Horse Society. The benefits I gain are knowledge and personal interest, I get to have contact with other owners and I am able to breed with my horses (P978)'and 'My horse isn't registered, but he is micro-chipped…At the moment I use my horse in a non-competitive manner, so I don't really have a need to register him with a club or society…I would probably have him registered if a system was available (P1022)'. The most commonly cited incentives for registration are identification of ownership, requirement of horse club or society membership, and competition eligibility. Although this type of horse registration is different from compulsory horse registration, these findings indicate that horse

owners' appear agreeable to the implementation of a horse registration system, if the rationalisation is reasonable. Furthermore, given these findings it appears likely that in order to be effective any horse registration program would need to be compulsory rather than voluntary.

Although participants largely acknowledged the need for a horse registration system, they reported a high degree of uncertainty regarding the framework for a potential system appropriate for Victorian conditions. Suggestions for possible regulatory frameworks were varied and generally indecisive. The most common proposal involved the idea of one central horse registration body, incorporating all current horse clubs and societies, and therefore requiring only one data base and levy. These finding again indicate that horse owners appear willing to consider the application of a horse registration system, albeit with clear and detailed justification. Furthermore, any information concerning potential horse registration systems should be detailed and both clearly and widely communicated.

A common feature of horse registration is a form of horse identification. The interview findings suggest that the majority of participants own horses that are identifiable, commonly through brands and micro-chips. In addition, the most commonly cited reasons for horse identification were that it had occurred prior to current ownership, and in order to identify ownership. Although there appears to be general support amongst horse owners for the use of identification in Victorian horses, the need for all horses to carry some form of identification was frequently queried. Responses commonly contained statements such as those made by P881 'I think horse identification can be helpful, like in situation with fires or environmental problems… micro-chipping is available but I'm not sure that it is necessary for all horses' and P1107 'Look I can see the benefits of having your horse identified, I had my horses' micro-chipped…horses are identified, owner is known…but it is expensive, so is it feasible for all horse owners?'. Furthermore, while horse owners recognise that horse identification is advantageous, a perceived lack of relevance to their ownership suggests that participnants generally have no intention of identifying their horses in the future. These findings indicate that for horse owners, particularly those involved with non-competitive recreational horse ownership, horse identification is more likely to occur if the associated cost is included in the horse registration levy.

As discussed with regard to horse club and society membership and horse registration, interaction with fellow horse owners and industry personnel has been shown to potentially improve a horse owner's husbandry and management practices through the improvement of knowledge (c.f. Section 2.3). All horse owners interviewed reported some form of interaction with fellow horse owners. This interaction was either considered extensive and generally occurred on a daily basis, or regular which consisted of weekly interaction that often occurred on weekends. All participants cited contact with other non-competitive horse owners, friends and acquaintances who owned horses, and industry personnel. Participants primarily reported interaction with other horse owners in order to facilitate the discussion of topics concerning horses, horse ownership and general horse husbandry and management. Other commonly cited reasons for interacting with fellow horse owners included a desire to seek advice, to seek instruction and education, to provide advice, to ride with, and to provide instruction and education. Consequently, through their interactions all interviewed horse owners appear to have the opportunity to improve their knowledge and subsequent horse husbandry and management behaviour. Given the relationship between inappropriate horse husbandry and management behaviour and poor horse welfare outcomes reported in Chapter 5, these findings indicate positive implications for the welfare of Victorian horses.

The interview findings indicate that although horse owners generally have a positive view of horse ownership in Victoria, there is the acknowledgement that issues or concerns exist. When participants' opinions of horse ownership were sought, responses included references to their love for their horses, the enjoyment their ownership brings to their life, and their intention to always maintain some form of involvement with horses. These responses demonstrate the importance with which horse owners hold their horses, and support the widely held industry belief that it is horse owner ignorance rather than intentional abuse which is largely responsible for the observed horse welfare concerns. General agreement appeared to exist amongst horse owners that the major issues currently challenging horse ownership in Victoria concerned a horse owner's lack of knowledge and commitment. Responses commonly included statements such as 'I think it all comes down to knowledge or I guess a lack of knowledge… Commitment is also important, owners need to be committed to their horses otherwise they will not manage them properly and then they will get into trouble' (P881). Reports such as these imply that horse owners appear to have a reasonable awareness of current concerns, as evident by the recognition of two key issues which according to the literature contribute to horse welfare concerns. This apparent

acknowledgement of the important association between horse owner knowledge, commitment and horse management and welfare, appears to translate into some form of active knowledge improvement by all interviewed horse owners.

Participants reported unanimous agreement that although information and advice regarding horses and horse husbandry and management is available, it is not readily accessible. Past research and the data reported in previous chapters (c.f. Section 2.3) suggest that access to information and advice may improve horse owner husbandry and management behaviour, which is subsequently associated with positive horse welfare outcomes. The current nature of the information and support available to Victorian horse owners may not only prevent willing horse owners from obtaining it, but could also deter future attempts at knowledge improvement. This may explain results reported in Chapter 4 which indicate that a considerable proportion of horse owners make no attempt to actively improve their knowledge. All horse owners interviewed obtained information and support from industry personnel. This finding implies that despite the differences in ownership, horse owners sought out industry personal such as farriers, instructors and employees at stockfeed stores, for information, advice and support. Consequently, an opportunity may exist to supply a wide range of horse owners with educational resources via a number of key sources. In addition, participants also sought information and support from sources which included the internet, family, friends and acquaintances, and literature. Similar findings were reported by Buckley (et al. 2004) who found that Pony Club members obtained information and advice from a friend or knowledgeable person. Consequently, while the information and support available to horse owners may be of benefit, if it is not readily accessible the opportunity to promote appropriate horse management and welfare in Victoria may be limited. Thus, both the nature and method of the provision of educational material and resources needs to be given appropriate consideration when developing future education strategies.

Financial constraint was a challenge common to all interviewed participants. Responses to questions concerning challenges associated with horse ownership commonly included statements such as ‘Land, money, time, safe fences…there are a lot of challenges that you face when owning horses, but I guess that I’m willing to overcome them to have our horses’ (P952) and ‘I’m sure there the same things as most people, having land to house my horses, finding the time to put into them and money…There are a lot of costs associated with owning horses (P1022). All

interviewed horse owners identified the high costs associated with horse ownership when questioned about the problems they encountered owning horses in Victoria. The use of veterinarians was often raised when discussing the nature of the financial pressures experienced by horse owners. Participants' references to veterinarians were largely of a negative nature. Some of the references included 'I only really call the vet if I have no other option…they are expensive and most of the time they don't actually fix the problem or they tell you to just continue treating the horse the way you already were (P983)', 'I can always call the vets…I can call and they will answer questions over the phone, they are good like that (P853)', and 'I wouldn't normally go to a vet unless the problem was really bad… I think they are really just a waste of time and money (P190)'. The majority of responses appeared to indicate that veterinary consultation was generally considered a last resort, apparently due to both the associated expense and a perceived inability to rectify the problem. A similar finding was reported by Buckley (et al. 2004) who found that Pony Club members and their families often referred to veterinarians in a negative context. Consequently, the financial pressure experienced by Victorian horse owners may limit the management they provide their horses, through a potential inability to perform required husbandry and management practices and/or a possible reluctance to seek veterinary consultation.

Responses to the challenges reportedly faced by Victorian horse owners also include time and land or space availability. Participants repeatedly reported both a lack of time to interact with their horses and a shortage of space or land to house their horses, as problems they encounter in their ownership. A lack of interaction between horse and horse owner, and limited land/space availability are both factors which have been associated with inappropriate management on the horse owner's part (c.f. Section 5.3.2). Furthermore, findings reported in Chapter 5 indicate that limited daily human-horse interaction appears to be associated with poor horse welfare outcomes. It is therefore not surprising that horse owners consider these issues to be challenging their ownership. In addition, recognition of valid challenges may be considered the first step towards obtaining potential resolution of these problems. Although the general agreement amongst horse owners regarding the effort required to locate information and support has been discussed, the availability of information and advice was not cited when discussions focused on the problems experienced in participants' current horse ownership. A possible explanation for this finding is that although horse owners acknowledge that information and support may not be readily available, the challenges they experience due to this issue may be insignificant compared with that which they are subjected to due to issues such as money, time and space/land availability.

Thus, these findings provide insight into the primary challenges experienced by interviewed participants. This type of information may be considered when determining the type of educational material to be made available to horse owners in order to improve the husbandry and management of Victorian horses.

All participants cited enjoyment and an interest when discussions focused on the benefits gained from horse ownership. Furthermore, a commonly reported benefit was the social interactions involved with horse ownership. The fact that interviewed horse owners consider interactions of this nature beneficial is a positive finding given that interaction with other individuals within the recreational horse industry is known to promote appropriate horse management. Thus, the benefits of the social aspect of horse ownership could potentially be experienced by both the horse owner and the horse (through improved management). Given industry reports which suggest that the use of horses as a companion animal is increasing (c.f. Section 3.2) and the current findings which indicate non-competitive recreational horse ownership is highly represented in Victoria, the lack of mention of companionship as a participant response to the benefits experienced through horse ownership may be considered unexpected. Although there appears to be a lack of understanding with regard to the definition of horses in a companionship role, previous research implies that horse owners who consider their horses as a companion animal may be associated with poor welfare outcomes. Consequently, the definition of horses as a companion animal and their subsequent husbandry and management warrants further investigation. Participants' responses to how their horse ownership could be improved were quite varied. The most common response referred to a horse owner's satisfaction with the current state of their horse ownership. Interestingly, while all participants reported the financial constraints associated with owning horses as a problem they experienced, only four of the twelve horse owners interviewed cited a reduction in the cost associated with horse ownership as a potential improvement. Similar findings were reported with regard to time and land or space availability. One may therefore question the extent of the problem financial, time and land or space constraints truly represent for horse owners. According to these findings however, horse owners appeared to be reasonably satisfied with their current horse ownership.

When the interview discussions turned to current horse welfare concerns, participants reported horse owner ignorance and lack of knowledge as the main welfare concerns affecting Victorian

horses. Inappropriate horse husbandry and management practices were also a commonly cited horse welfare concern. Participant responses included those such as 'Main welfare concerns, um probably poor knowledge, mismanagement, underweight and overweight horses, and maybe horse owners are not committed enough' (P978) and 'Knowledge…I don't think it's that people don't want to look after their horses correctly, I think it is just they don't know how to… They may not know where to get help from' (P1035). Furthermore, only four of the twelve participants reported horse health concerns as opposed to horse owner attributes which may affect horse health and welfare. The most commonly cited welfare concern which involved a horse health outcome was inappropriate body condition (overweight and underweight horses). Buckley (et al. 2004) cited similar findings, where participants reported that a horse's body condition was an important indicator of health. These findings indicate that interviewed horse owners believe the main horse welfare concerns in Victoria involve horse owner attributes. Furthermore, participants' responses imply a level of recognition regarding responsibility for horse welfare, and an awareness of the current risks to horse welfare as reported by both the limited literature and industry personnel. Participants' responses regarding the main causes of horse welfare concerns were very similar to those pertaining to current horse welfare concerns. Ignorance and a lack of knowledge on behalf of the horse owner were cited as the main causes of horse welfare concerns by interviewed participants. Participant responses generally consisted of statements similar to 'I think that the main causes would involve mismanagement. I know that I have a limited knowledge of horses and am therefore always trying to learn more so that we make sure we can manage Fubbels (the pony) properly' (P888) and 'The main problem is owners that don't have enough knowledge' (P983). A horse owner's lack of commitment to horse ownership was also commonly reported as a primary cause of the welfare concerns in Victorian horses. These responses further indicate that horse owners appear to be able to both recognise and acknowledge key issues associated with horse welfare concerns in Victoria.

Horse owner responses to queries concerning current horse welfare issues and concerns demonstrated a reasonable understanding of the current situation with regard to the welfare of Victorian horses. When questioned about potential strategies to manage these issues and concerns, participants predominantly cited education as a means to reduce and/or prevent horse welfare concerns. However, their responses were often vague and accompanied by uncertainty when the details of potential education programs were queried. Participant responses commonly included statements such as 'Education…people need to be taught how to look after their horses

properly… not sure how you can make them learn though (P881)', 'This is where it is hard, obviously you need to educate people on how to properly manage horses, but you also need to have some legislation in place… Basic horse ownership classes should be compulsory, but I don't know how they would be enforced (P853)', and 'Education and legislation could be used, but who would be responsible? (P1107)'. An additional means to limit horse welfare concerns commonly reported by interviewed horse owners was legislation, however when further questioned participants were again uncertain of any details outside the idea itself. Participants appear to believe that horse welfare concerns are largely due to horse owner ignorance and insufficient knowledge. It is therefore not unexpected that education is identified as a possible solution to limit or prevent these welfare concerns. The vague nature of participants' responses to enquires regarding the form and application of potential education programs implies that while horse owners may recognise the problem they have yet to give proper consideration to potential solutions. These findings indicate positive implications for reducing the welfare concerns observed in Victorian horses. Horse owners identify education and legislation as possible means of addressing current horse welfare concerns, which indicates that any future policy and/or education strategies aimed at addressing these concerns appear likely to be supported by Victorian horse owners.

The final area of discussion concerning participants' current horse ownership centred on their ability to determine their horse's welfare status. A horse owner's perception of their ability to manage the health and welfare of their horses is likely to have important implications for horse welfare. Participants commonly reported a high degree of confidence in their own ability to determine their horse's welfare status and manage accordingly. Responses included 'I'm very confident of my ability to determine my horse's welfare, however I will seek advice if I feel like I need it (P845)'and 'I'm very confident, but I think you have to be…I try and make sure that I am aware of the conditions and change my management accordingly (P952)'. Interviewed horse owners also cited an ability and willingness to seek assistance when they felt it was required. These findings indicate that participants generally have a high level of confidence in their ability to manage their horses and will seek assistance if they believe it is required. If horse owners are over-estimating their ability, as a result of the high level of confidence reported, they may lack the knowledge required to adequately recognise and identify the signs of ill-health in horses, and therefore fail to respond appropriately to equine health and welfare threats. In addition, while participants reported a willingness to seek assistance from industry personnel and fellow horse

owners when necessary, they demonstrate a reluctance to obtain assistance from veterinarians. These findings indicate a potential risk to horse welfare, and further examination of horse owner perception with regard to horse health and welfare status appears warranted.

Intended horse ownership

The interview findings indicate that horse owners' intentions for future horse ownership involvement are very similar to their current areas of interest. The future use of horses in a non-competitive recreational manner is an intention identified by all participants. Furthermore, horse owners report that competitive recreational horse use is likely to decrease in the future. As discussed with regard to current horse ownership, a high incidence of non-competitive recreational horse ownership is likely to indicate that strategies other than horse club and society membership and horse registration will be required for the successful provision of educational resources to horse owners in Victoria. In addition to the participants who are currently interacting with horses in a professional role, a number of additional horse owners report aspirations for a career involving horses. The participants who reported their family's interactions with horses as a current equine interest also report an intention for it to continue in the future. An intention of this nature is not cited by any other participants suggesting their focus lies in their own intentions toward future equine interactions. Those participants who reported a current interest in breeding horses also described an intention to do so in the future. Perhaps the current involvement in breeding horses reported by participants who were not actively breeding represented an interest rather than an actual involvement, which may be further evident by their intention for future involvement. Despite non-competitive recreational horse ownership being cited as a future intention for all interviewed horse owners, only one participant reported the intention for their horses to occupy a companionship role. Again, this finding suggests that further definition of what constitutes a horse as a companion animal and the management of horses used in this capacity is required. Furthermore, the similar nature of horse owners' current involvement with horses and their intentions for future involvement appears to imply a certain degree of satisfaction by horse owners with regard to their horse ownership.

6.5 CONCLUSIONS

The findings of the qualitative investigation provide further insight into the relationships observed between horse owner attributes and horse welfare outcomes reported in Chapter 5.

Horse owners largely reported an initial interest and involvement with horse ownership that originated in childhood, and was associated with a prior family interest. These findings suggest that the formation of horse owner beliefs about horses and horse ownership may begin early in life, through knowledge and experiences gained from their home environment. Although multiple areas of current horse ownership interest were reported, all participants cited a current non-competitive recreational horse interest. The use of horses in a competitive-recreational manner was reported by almost half of the interviewed participants. These horse owners also cited membership to a horse club or society, which supports the assumption that the motivation for horse club and society membership is likely to be the opportunity to compete in equine competitions rather than improve knowledge. Consequently, the educational benefits associated with this type of membership are likely to be obtained predominantly by competitive rather than non-competitive recreational horse owners.

Horse registration appeared to an emotive issue for horse owners. Participants often reported varied and limited information on horse registration and potential frameworks. Findings did however indicate that the application of a horse registration system would require clear justification in order to obtain the support of horse owners. Approximately half of the participants currently register their horses with some form of horse club, society or organisation, and a failure to register horses was predominantly associated with the non-competitive recreational nature of horse use. The most commonly reported motives for registration included equine competition eligibility and a requirement of horse club or society membership. Given these findings any effective horse registration system would need to be compulsory rather than voluntary.

All interviewed horse owners reported some form of interaction with fellow horse owners, and despite the differences in horse ownership, all participants obtained information and support from industry personnel. Given the association between horse owner interactions and knowledge gain,

these findings indicate that most horse owners have the opportunity to improve their knowledge and subsequently their horse husbandry and management practices. General agreement existed amongst participants that the major issues challenging horse ownership are a horse owner's lack of knowledge and commitment. This belief appeared to translate into some form of active knowledge improvement by all interviewed horse owners. Although a number of sources of information and advice are available to horse owners, participants commonly report that accessing these resources requires considerable effort. This apparent inaccessibility of information and advice could potentially limit and discourage horse owners' attempts to improve their husbandry and management behaviour.

Participants reported horse owner ignorance and lack of knowledge as both the main cause of horse welfare problems and the main horse welfare concerns in Victoria. Given industry reports, these findings imply that participants had a reasonable understanding of the current situation with regard to the welfare of Victorian horses. Education and legislation were commonly identified by participants as possible means of addressing current horse welfare issues and concerns. Reports indicat that participants generally possess a high level of confidence in their ability to manage their horses and are willing and able to seek assistance from fellow horse owners and non-veterinary industry personnel if they believed it is required. Veterinary consultation was generally cited as a last resort by participants, due to both the associated expense and a perceived inability to rectify the problem. Given the relationship between horse owner mismanagement, ignorance and poor horse welfare outcomes, participants reported reluctance to seek veterinary assistance when responding to horse health concerns represents a considerable horse welfare risk.

Horse owners reported intentions for future horse involvement were similar to their current areas of interest. The future use of horses in a non-competitive recreational manner was identified by all participants. Alternatively, horse owners reported a decline in their intention for future competitive recreational horse use.

In conclusion, the results of the qualitative interviews report defined opinions on the key issues associated with recreational horse ownership in Victoria. Findings such as the distinction between competitive and non-competitive recreational horse ownership and the associated factors, an

initial childhood horse ownership, the multiple areas of current horse ownership involvement, the interaction between horse owners and industry personnel, and horse owners' viewpoints on horse welfare and horse registration systems have a number of implications for the welfare of horses in Victoria. These findings provide further insight into the relationships between horse owner attributes and horse welfare outcomes, and may assist in the development and implementation of potential legislation, policy and provision of educational resources aimed at improving the husbandry and management behaviour of horse owners in order to reduce the horse welfare concerns observed in Victorian horses.

CHAPTER 7
GENERAL DISCUSSION

7.1 REVIEWING THE AIMS OF THE THESIS

It will be recalled that the primary aims of this research were:

i. To investigate recreational horse ownership and the recreational horse population in Victoria, by specifically:
    a. investigating the incidence of recreational horse ownership in Victoria,
    b. developing a profile of the recreational horse population and the ownership associated with it, and
    c. characterizing recreational horse owners by comparing demographic differences between horse owners and non-horse owners in Victoria.
ii. To investigate the human-horse relationship by examining the relationships between;
    a. the husbandry and management behaviour of recreational horse owners and horse welfare outcomes,
    b. recreational horse owner attitudes towards horses, horse husbandry and management, and horse ownership and the husbandry and the management behaviour of recreational horse owners, and
    c. recreational horse owner background factors and recreational horse owner attitudes towards horses, horse husbandry and management, and horse ownership.
iii. To investigate recreational horse owner viewpoints on horse ownership in Victoria, specifically investigating:
    a. recreational horse owner views about the welfare issues and concerns in the Victorian recreational horse population, why they arise and possible measures required to manage and prevent them.
    b. recreational horse owner views regarding possible systems of registration and identification of recreational horses in Victoria, as well as the regulatory framework that may be appropriate for recreational horses.

The first area of research was addressed by the random telephone survey reported in Chapter 4, which provided an overview of recreational horse ownership and the horse and horse owner

populations in Victoria. The second component of research was explored through on-site inspections with horses and horse owners throughout Victoria, as described in Chapter 5. Relationships were found between horse owner attributes, such as background factors, beliefs towards horse owner husbandry and management behaviour, and horse owner husbandry and management behaviour. In addition, the husbandry and management behaviour of horse owners was associated with horse welfare outcomes. The final section of research was conducted through qualitative interviews with horse owners, reported in Chapter 6, in which participants reported defined opinions on the key issues associated with recreational horse ownership in Victoria.

While the results of this thesis are particularly relevant to Victoria, they are also highly relevant to recreational horse ownership elsewhere. As in Australia, these findings have implications for recreational horse welfare in countries such as the USA, Europe, the UK, Canada and New Zealand where recreational horse owners provide the primary care for their horses. The results of this study are summarised in the forthcoming section of the chapter.

7.2 MAJOR FINDINGS

Recreational horse ownership in Victoria

The results of the survey presented in Chapter 4 provide what is believed to be the first description of recreational horse ownership in Victoria, Australia. The results afford both an estimate of the incidence of horse ownership in Victoria and a depiction of the Victorian horse and horse owner populations. The observed incidence of horse ownership in Victoria is 3.5%, suggesting that as many as 176,000 people in Victoria may own horses. Furthermore, on average each horse owner owns four horses, which implies there could potentially be in excess of 600,000 horses in Victoria. Horse owners typically provide their horses with their daily primary care. Consequently, it is the horse owner who is responsible for the welfare of these horses. Horse owners predominantly reside in regional areas of Victoria, are female and aged between 36-55 years of age. They most commonly classify their occupation as other, and occupy the higher brackets of annual household income, appearing to have a higher annual income than the population average. Approximately half of all horse owners are members of a horse club and/or society. The most highly represented horse breed is the Thoroughbred, generally with some form of horse racing history, and on average they are aged between 5-15 years of age. These horses are

most commonly housed in a paddock environment at the primary residence of the horse owner, as a result of horse owner preference and convenience. Horse owners predominantly report the appropriate performance of horse husbandry and management practices and a low incidence of horse injury and illness. Less than half of all horses are registered with an equine organisation. On average, horse owners spend less than 30 minutes per day interacting with their horses. Furthermore, at least one quarter of horse owners who provide the daily primary care, do not interact with their horses on a daily basis.

Differences were found between horse owners and non-horse owners with regard to the region of primary residence, the type of primary residence, occupation and annual household income. Non-horse owners were typically female, aged between 36-45 years of age and resided in urban areas of Victoria on small land blocks. They most commonly described their occupation as professional, and were most highly represented in the annual household income bracket of below $20,000. Horse owners were characteristically female, aged between 36-55 years of age and resided on acreage in rural areas of regional Victoria. Their field of occupation was most frequently listed as other and they generally occupied the higher brackets of annual household income. Different 'types' of horse owners were also able to be identified according to difference demographic and behavioural factors. Horse owners are predominantly female. When compared to male horse owners, female horse owners were more likely to be members of a horse club or society, to actively improve their knowledge about horses and their husbandry and management, and to seek veterinary consultation and treatment for their horses. With regard to horse club and society membership, comparisons between members and non-members indicated a number of demographic differences. Both members and non-members of horse clubs and societies were primarily female, however when compared to members, a higher percentage of non-members were male. When compared to non-members, horse owners that were members of horse clubs or societies were more likely to reside primarily in urban areas of Victoria, register their horses, be registered horse owners, compete in horse competitions, actively improve their knowledge and be aware of the Code of Practice pertaining to the welfare of recreational horses in Victoria. Differences were also found between regional and urban horse owners. Urban horse owners were more likely than regional horse owners to be registered horse owners, register their horses, and be a member of a horse club or society. When compared to urban horse owners, horse owners who resided in regional Victoria were more inclined to house their horses at their primary residence and interact with their horses on a daily basis.

Relationships between horse owner attributes and horse welfare outcomes

The results reported in Chapter 5 demonstrate relationships between horse owner attributes and horse welfare outcomes. In accordance with the hypothesised relationship portrayed in Figure 24, the observed pattern of relationships between horse owner attributes indicates that horse owner background factors are associated with horse owner beliefs towards horse husbandry and management behaviour, which in turn are associated with the horse owners' performance of husbandry and management behaviour. Furthermore, the husbandry and management behaviour of the horse owners appears to be related to the welfare outcomes of the horse. In general the observed relationships largely imply that knowledge-based background factors are related to favourable horse owner beliefs about horse owner husbandry and management behaviour. Favourable horse owner beliefs concerning horse husbandry and management behaviour appear to be predominantly associated with the appropriate performance of the behaviour by the horse owner. Positive horse welfare outcomes were associated with the horse owners' appropriate performance of horse husbandry and management behaviour. These findings are in agreement with Ajzen's (1985) Theory of Planned Behaviour (TPB) and indicate the potential to predict a horse owner's husbandry and management behaviour from their beliefs towards the behaviour in question.

The significant inter-correlation between horse owner attitude subscales indicates an attitude system (Hemsworth and Coleman, 2010) which may reflect the presence of a general horse owner attitude towards the performance of husbandry and management behaviours. Consequently, favourable horse owner beliefs about one type of horse husbandry or management behaviour would be indicative of similar beliefs concerning other horse husbandry and management practices. According to the findings, a favourable general attitude towards husbandry and management behaviour would be associated with the appropriate performance of general husbandry and management behaviours by the horse owner. A general husbandry and management attitude system may explain the observed relationships between horse owner husbandry and management behaviours and seemingly unrelated horse welfare outcomes, such as the relationship identified between the appropriate performance of parasite control behaviour and appropriate hoof condition. In this instance, a horse owner's appropriate performance of parasite control behaviour is likely to be indicative of their appropriate performance of other husbandry

practices such as hoof care behaviour, and subsequently result in the appropriate hoof condition which was observed.

Factors predicting horse welfare outcomes from a horse owner's performance of key horse husbandry practices

The pattern of relationships identified between horse owner attributes, consistent with the TPB, support the hypothesised human-horse relationship described in Figure 24. As a result, the attitudinal antecedents of horse owner husbandry and management behaviour were investigated by examining the performance of three key horse husbandry behaviours; parasite control, hoof care and dental care. The hypothesised relationship between horse owner attributes (Figure 24) was based on the TPB model (Ajzen, 1985) and formed the basis for the current investigation into the factors influencing horse owner husbandry behaviour. The results of the field work reported in Chapter 5 indicate that the husbandry behaviour of horse owners predicts horse welfare outcomes. Furthermore, in accordance with the TPB model, horse owner beliefs towards horse husbandry behaviour appear predictive of the husbandry behaviour of horse owners. These relationships are observational and should not be interpreted as causal. They do however provide a basis for further experimental research examining the human-horse relationship which may determine causality.

The appropriate performance of parasite control, hoof care and dental care behaviour by the horse owner was associated with positive horse welfare outcomes. These findings are consistent with the literature indicating that inappropriate horse husbandry and management by the horse owner may be detrimental to a horse's health and welfare (c.f. Section 2.3). The current results suggest that horse owners' husbandry behaviour is predominantly determined by the horse owners' attitude towards the behaviour (behavioural belief) and their perceived behavioural control concerning the behaviour (control belief). Subjective norms (normative beliefs) do not appear to provide any significant contribution to the variance in horse owner husbandry behaviour. This finding implies that horse owners experience limited social pressure when performing horse husbandry and management behaviours. In routine husbandry practices such as parasite control and hoof care, a horse owner's attitude towards the husbandry behaviour appears to be the major determinant of the behaviour. However, for less routinely performed and somewhat more

complex husbandry practices such as dental care, the primary determinant of the behaviour appears to be a horse owner's perception of their volitional control regarding the behaviour. The increased complexity associated with the performance of dental care behaviour may result in the horse owner's perceived behavioural control moderating the attitude-behaviour relationship. Consequently, perceived behavioural control becomes the primary determinant of the horse owner's behavioural response, as described by the TPB. Furthermore, the infrequent nature of this type of behaviour may reduce the horse owner's regard for its performance and as a result behavioural expression becomes reliant predominantly on their perception of their ability to execute the horse husbandry behaviour.

The present findings indicate that a positive self-evaluation of the behaviour (attitude towards behaviour) and the belief that the behaviour can be realised (perceived behavioural control) are predictive of the appropriate performance of horse husbandry behaviours by a horse owner. The appropriate performance of horse owner husbandry behaviour is associated with positive horse welfare outcomes. In addition, knowledge-based background factors appear to influence the behavioural and control beliefs of horse owners. The nature of the proposed sequential relationships between horse owner attributes and the subsequent association with horse welfare outcomes, with regard to these findings are given in Figure 40.

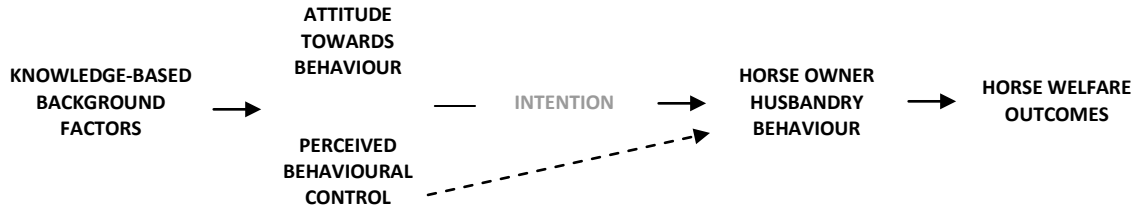


Figure 40 The proposed sequential relationships between horse owner attributes in the human-horse relationship, and the ensuing relationship with horse welfare outcomes

The relationships described in Figure 40 demonstrate the potential to modify the husbandry and management behaviour of horse owners by targeting their beliefs concerning the behaviour, and subsequently promote positive horse welfare outcomes. Research has shown that targeted training programs can successfully improve the attitudes and behaviour of stockpeople in the pork (Coleman et al., 2000) and dairy (Hemsworth et al., 2002) industries. Furthermore, the relationship between knowledge-based background factors and horse owner beliefs towards horse

husbandry and management behaviour demonstrates the key role of education in human behaviour. Thus, according to the current findings and reports from the literature, strategies to modify the husbandry and management behaviour of horse owners and improve the welfare outcomes of horses should focus on horse owner education and training.

Recreational horse owners' viewpoints on recreational horse ownership in Victoria

Whilst participating in the on-site inspections (c.f. Chapter 5), horse owners were found to repeatedly initiate discussions with the researcher which concerned their views and opinions regarding the issues and experiences relevant to their horse ownership. Thus, the qualitative interview component of the study was developed. The data collected during the qualitative interviews describes the experiences and viewpoints of a small sample of 12 Victorian horse owners. This should not be considered a representative sample, due to the sample size and the likelihood that participation in this additional component of the study may indicate a higher level of commitment to horse ownership than the average horse owner. Additional participants were not sought after the twelfth interview due to time restrictions and the inability of participants to commit to further participation. The qualitative data collected during the 12 interviews can however be considered relevant for two reasons. Firstly, according to the qualitative methodological concept of saturation, when ideas start repeating, and no, or very little, new information is being obtained, further data collection is not required (Charmaz, 2003; Guest et al., 2006). Furthermore, Guest et al. (2006) states that assuming some structure in data collection and some homogeneity of participants, 12 participants are usually enough to achieve saturation. The researcher was able to form codes and identify trends following the completion of the interviews as per qualitative methodology (Punch, 2005), and thus it is likely that saturation may have been reached following the 12 interviews.

The qualitative investigation focused on four main topic areas: participants' involvement with horses, the horse industry and horse ownership today, current welfare issues and concerns relating to horses and the registration and identification of horses in Victoria. When investigating horse owners' involvement with horses, the findings indicate that an interest and subsequent involvement with horse ownership generally occurred in childhood, and is commonly associated with a prior family interest. These findings imply that horse owners obtain at least their initial

knowledge concerning horses and horse husbandry and management from those they are closest to. Horse ownership which commenced in adulthood also tended to involve a childhood interest however lacked the opportunity for childhood horse ownership. All horse owners interviewed cited non-competitive recreational use as both a current and intended area of involvement in their horse ownership. Furthermore, it was common for horse owners to describe multiple areas of interest including competitive recreational use, breeding, and family involvement. Only half of the sampled horse owners were members of a horse club or society. All horse owners citing a current competitive recreational horse involvement also reported membership to a horse club or society. This finding supports the earlier assumption that a horse owner's incentive for horse club and society membership is likely to be the ability to compete in equine competitions rather than the opportunity to improve their knowledge. These findings indicate that non-competitive recreational horse owners, reportedly at greatest risk of horse welfare problems due to mismanagement, are unlikely to hold memberships to horse clubs and societies and as a result fail to receive the reported educational gains. Consequently, the promotion of horse club and society membership does not appear to be a valid strategy for improving the husbandry and management practices of non-competitive recreational horse owners.

All participants reported some form of interaction with fellow horse owners. This interaction involved other non-competitive horse owners, friends and acquaintances who owned horses, and industry personnel, primarily to hold discussions concerning horses, horse ownership and general horse husbandry and management. Given previous reports (c.f. Section 2.3) this finding suggests that most horse owners have the opportunity to improve their knowledge and subsequently their horse husbandry and management practices throught these interactions. Despite the differences in ownership, all participants obtained information and support from industry personnel. This finding could potentially represent an opportunity to supply a wide range of horse owners with educational resources via a number of key sources. Notwithstanding the issues and areas of concern reported, horse owners generally held a positive view of their ownership. A lack of knowledge and commitment on the horse owners' part were identified as the major issues currently challenging horse ownership in Victoria. This belief appears to translate into some form of active knowledge improvement by all interviewed horse owners, which suggests that participants may believe that issues involving a lack of knowledge and commitment apply to other horse owners rather than themselves. Although information and advice are available to horse owners via a number of sources, participants commonly report that accessing these

resources requires considerable effort. The apparent inaccessibility of information and support may limit horse owners' ability to improve their equine management and consequently represent a risk to the welfare of their horses.

The most commonly reported problems associated with horse ownership involved the associated costs, that is, money, time and land/space. Furthermore, discussions involving the financial pressures associated with horse ownership frequently raised the use of veterinarians. Horse owners' references to veterinarians were generally of a negative nature, and implied that veterinary consultation is commonly deemed a final option, due to both the associated expense and a perceived inability of veterinarians to resolve the problem. The potential reluctance of horse owners to seek veterinary assistance when dealing with horse health concerns constitutes a considerable risk to the welfare of horses. The main welfare concerns affecting horses were reportedly horse owner ignorance and lack of knowledge. Although education was most commonly identified as the means to lessen and alleviate these concerns, suggestions for potential education programs were often vague and uncertain. Horse owners reported a high level of confidence in their own ability to manage the heath and welfare of their horses. They also reported a willingness to seek information and assistance where required, most commonly from other horse owners and non-veterinary industry personnel. When considering the high representation of horses in Victorian welfare investigations, these findings indicate that a horse owner's perception of their ability to appropriately manage the health and welfare of their horses could potentially be exaggerated. The potential variation between horse owners' perceived and actual ability to provide appropriate horse husbandry and management poses a risk to their horses' welfare, and therefore warrants further investigation.

Horse registration is clearly an emotive issue. Although horse owners generally support the idea of horse registration, considerable uncertainty and scepticism exist regarding both the rationale and the application of a regulatory framework appropriate for the Victorian horse population. The major concern with horse registration centres on the potential levy and the associated justification. Participants implied that a registration levy would be supported if the justification for its application is warranted and if a percentage of the money raised is used to fund the promotion and protection of horse health and welfare. Only approximately half of the sampled horse owners currently register their horses, with failure to register horses primarily associated

with the non-competitive recreational nature of horse use. The reported incentives for horse registration include identification of ownership, requirement of horse club or society membership, and competition eligibility. Horse owners acknowledged the benefits of a registration system, however were generally unable to identify an appropriate system for horses in Victoria. These findings identify the main issues which require consideration when developing any future horse registration systems for Victoria, and indicate that the application of such a system would need clear justification in order to obtain the support of Victorian horse owners.

7.3 IMPLICATIONS AND RECOMMENDATIONS

The current investigation of recreational horse ownership in Victoria provides an increased understanding of the human-horse relationship and its possible influence on recreational horse owner behaviour and horse welfare. The key implications of these findings on the relationships between the attitudes of horse owners, their husbandry and management behaviour and the welfare of horses will now be discussed. Furthermore, the recommendations arising from this research to improve horse welfare through legislation, policy, education and further research are also discussed.

Implications for recreational horse owners and horses in Victoria

When the project commenced, little was known about recreational horse ownership in Victoria, other than the consistently high representation of recreational horses in welfare investigations conducted by the Victorian RSPCA. The present research on horse ownership indicates that the Victorian recreational horse owner population is considerable. The lack of available information regarding both the horse and horse owner populations has previously been attributed to the absence of a compulsory horse registration system and the difficulty associated with contacting horse owners who are not members of a horse club or society. The low horse registration rate amongst horse owners (<50%) together with the low incidence of horse club and society membership (50%) support these suggestions. Furthermore, these findings indicate that, without intervention, both the low rates of registration and horse club and society membership will continue to limit the availability of information regarding horse ownership in Victoria, which has consequences for the government's ability to identify and contact horse owners.

Horse owners provide the daily primary care for horses in Victoria, and clearly any attempt to improve the welfare of these horses needs to focus on the horse owner. This view is recognized and accepted by both industry personnel and horse owners, as evident by the attitude and qualitative data collected during this study. These results (c.f. Chapters 4 and 5) indicate that the welfare concerns observed in horses are largely due to mismanagement by the horse owner as a result of ignorance rather than intentional abuse. Furthermore, the findings imply that horse owners perform general horse husbandry and management practices in accordance with the recommendations in the Victorian Code of Practice pertaining to the welfare of recreational horses, however there appears to be limited owner-horse interaction. While the routine performance of fundamental equine husbandry behaviours may be regarded as preventative measures protecting the health and welfare of the horse, the limited owner-horse interaction represents a significant health and welfare risk to horses due to the potential for delays in identifying and responding to developing or existing health and welfare problems.

The main study in this project provides evidence for relationships between horse owner attributes and horse welfare outcomes. Horse owner knowledge-based background factors influence horse owner beliefs concerning horse husbandry and management behaviour, which were associated with horse owner husbandry and management behaviour. Importantly, horse owner husbandry and management behaviour was associated with horse welfare outcomes. This is an important finding in that it demonstrates the potential to reduce the risk of poor horse welfare by modifying horse owner attributes. The husbandry and management behaviour of horse owners was associated with their beliefs concerning the behaviour (behavioural, normative and control beliefs). Consequently, favourable beliefs (positive attitude towards the behaviour, strong subjective norms, and high perceived behavioural control) are expected to result in the appropriate performance of horse husbandry and management behaviour. Furthermore, a number of background factors, primarily concerning a horse owner's opportunity for knowledge gain, appear to be predictive of a horse owner's beliefs which underlie their attitude towards the behaviour. These findings indicate that improving horse owners' knowledge and beliefs regarding horse husbandry and management behaviour may reduce the inappropriate management and welfare concerns found in Victorian horses. Targeted training programs, similar to those successfully employed in livestock industries, have the potential to modify recreational horse

owner attributes in order to improve the management and subsequent welfare of recreational horses. Recommendations for identifying and educating horse owners in order to reduce inappropriate management and welfare concerns in Victorian horses will now be discussed.

Implications for recreational horse legislation and policy

Victorian horses are highly represented in animal welfare investigations conducted by the Victorian RSPCA, but there is neither legislation nor a specific provision in the Prevention of Cruelty to Animals Act 1986 to protect the welfare of recreational horses in Victoria. The results of this study demonstrate that poor horse welfare outcomes may be targeted through the implementation of legislation imposing a mandatory minimum standard for the health, husbandry and management of all horses in Victoria. These minimum standards could potentially be derived from guidelines developed in documents such as the Code of Practice pertaining to the welfare of recreational horses, or from the Australian Horse Welfare Protocol recently drafted by the Australian Horse Industry Council to provide standards and guidelines for horse welfare and promote positive horse health and well-being via industry collaboration. Furthermore, qualitative data indicates that horse owners are likely to support the implementation of legislation which protects the welfare of horses in Victoria.

Any attempt to improve the management of Victorian horses and consequently reduce horse welfare concerns requires recreational horse owners to be identified so that a method of contact is established. At present this is not possible in Victoria and elsewhere in Australia due to the low rates of horse registration and horse club and society membership, particularly amongst non-competitive recreational horse owners. The implementation of a compulsory equine registration system, similar to those found in other livestock and companion animal settings, may provide both a means to identify and contact horse owners. This development would not only provide an on-going description and understanding of horse ownership, but would enable the delivery of information, education, and training programs (see later) and the possible monitoring of compliance with future equine welfare legislation through audits.

A potential regulatory framework for a Victorian compulsory horse registration system may involve one central regulatory body (and database) through which all horses are registered. Included in this registration could be a description of the horse (including some basic demographics, health, husbandry, and management information), any affiliation with equine clubs, organisations and societies, and a single annual registration levy. The registration levy may depend on the horse's discipline, that is, whether the horse is kept as a companion animal, a juvenile/mature animal, a non-competitive recreational horse, a competitive recreational horse, or a breeding animal, etc. This single registration levy would remove the need for multiple registrations with other equestrian organisations. Furthermore, the funds collected through the registration levy could potentially be distributed to a number of sources such as the registration body and other equine organisations to fund their operations, and to efforts aimed at protecting the welfare of horses in Victoria. This type of regulatory program would require the alliance and collaboration of all current equine industry bodies and organisations in order to operate appropriately and ensure compliance. The qualitative findings (c.f. Chapter 6) demonstrate that although compulsory equine registration is an emotive issue for horse owners, if the proposed rationale and regulatory framework are justified as described above, Victorian horse owners may not oppose the implementation of a compulsory equine registration system.

Implications for recreational horse owner education and training

The evidence of relationships between owner attributes, such as knowledge-based background factors, horse owner beliefs about husbandry and management behaviour, horse owner husbandry and management behaviour and recreational horse welfare outcomes found in the current research demonstrate the potential to reduce welfare concerns in Victorian horses by modifying the attributes of horse owners. A practical recommendation for modifying horse owner attributes is the implementation of education and training programs targeting improvement in horse owner knowledge on effective husbandry and management practices to safeguard horse health and welfare. The results of the current research indicate that an education strategy aimed at changing the husbandry and management behaviour of horse owners is likely to require a multi-faceted approach. One potential strategy would involve a two-tiered approach, incorporating both the provision of educational material and advice to horse owners, and a targeted training program based on the cognitive-behavioural intervention programs successfully employed in a number of livestock industries to improve key attributes of stockpeople and reduce animal welfare concerns

(Coleman et al., 2000; Hemsworth et al., 2002; Hemsworth and Coleman, 2010). This type of targeted training program could potentially have both a voluntary and compulsory component. The voluntary training program may be offered to horse owners interested in completing the training and those who may have been identified and recommended as 'at risk' by industry personnel such as veterinarians, horse club and society officials, auditors and horse welfare inspectors. The compulsory training program could potentially be completed by horse owners identified by auditors and horse welfare investigators in breach of horse welfare standards as either an outcome of conviction (i.e. sentence) or as a requirement to avoid a conviction.

The results reported in Chapter 5 indicate that the appropriate performance of horse husbandry and management behaviour is associated with positive horse welfare outcomes. Furthermore, a positive self-evaluation of the behaviour (attitude towards behaviour) and the belief that the behaviour can be realised (perceived behavioural control) are predictive of the appropriate performance of horse husbandry behaviours by the horse owner. Consequently, appropriate horse husbandry and management education strategies need to target horse owners' behavioural and control beliefs concerning horse husbandry and management behaviour. The information provided by potential education programs would need to both emphasise the relevance and importance of the behavioural performance in order to encourage favourable horse owner attitudes towards the behaviour, and specify the method of implementation of the husbandry and management behaviour to increase a horse owner's perceived behavioural control. Education strategies need to include behaviours relevant to the implementation of health and husbandry practices, housing and resource provision, and the degree of human-horse interaction, and the appropriate performance of these behaviours may be guided by the best practice standards portrayed by the Code of Practice pertaining to the welfare of recreational horses. Furthermore, the presence of an attitude system which indicates a consistency of horse owner attitudes towards horse husbandry and management behaviours suggests that education and training programs potentially do not need to target each individual husbandry and management behaviour but rather 'types' of behaviour, in order to alter the beliefs and in turn the husbandry and management practices of horse owners. Reducing the number of individual beliefs and therefore behaviours which require attention will reduce the size of the education and training program, and potentially increase the likelihood of its success when implemented.

Participants report that education is necessary to improve horse husbandry, management and welfare. This finding would be expected to translate into a willingness to engage in activities that afforded knowledge gain and education opportunities. However, the incidence of active knowledge improvement amoungst participants appears to contradict this expectation. A possible explanation may involve the horse owner view that while available, information and advice provided by the equine industry needs to be actively sought and is often difficult to obtain. Consequently, in order to capitalise on horse owners' positive opinions of education and training and for the provided resources to be of benefit to horse owners, information and advice needs to be made more accessible. Mass communication strategies, often employed when distributing information to the general community, are generally unable to provide individuals involved in the animal industries with sufficiently detailed information. In these cases, people such as horse owners require both information at a level suitable for their immediate needs, and a readily accessible source of more detailed information and assistance for future reference (pers. comm., G. J. Coleman, Monash University). These findings indicate that several methods of education or information distribution would be recommended for horse owners.

According to both the quantitative and qualitative results, the distinction between competitive and non-competitive horse ownership requires the provision of education and information relevant to a wide range of horse ownership interests to occur via a number of distribution methods. It would be recommended that the educational information provided to horse owners should pertain to horse health and welfare, relevant horse husbandry and management practices, horse health and welfare monitoring, current scientific knowledge, points of contact to obtain information and support, regulations and current welfare codes of practice, and contact details for industry personnel, advisory and regulatory agencies. This information and advice could potentially be presented in glossy handouts with dot-points covering the major issues and relevant contacts, small handbooks covering the material in greater detail and with references to detailed source material, videos, DVDs and seminars covering a number of the main issues, and a single centralised website containing all the relevant information. Furthermore, this information could be distributed to horse owners via veterinary practices and surgeries, industry personnel (such as farriers, dentists and physiotherapists/chiropractors), stockfeed stores, saddleries, horse clubs and societies, and local municipal councils. In addition, an education 'pack' containing the handouts, handbooks, videos and DVDs and reference sources for seminars and the website could also be sent to horse owners following the registration of their horses.

Implications for future research

The observed relationships between horse owner attributes and horse welfare outcomes provides the opportunity to influence the human-horse relationship and potentially reduce the incidence of welfare concerns in Victorian horses through the promotion of appropriate horse husbandry and management behaviour in horse owners. Sequential human-animal relationships have been established and modified in a number of livestock industries. Although the results of the current study demonstrate relationships between horse owner attributes, experimental work is required to not only demonstrate the sequential nature of the human-horse relationship and provide evidence of causal relationships, but to determine the effectiveness of potential education and training programs in improving the welfare of horses. While the research presented in this thesis has identified many opportunities for future investigation, the main research areas will now be discussed.

Further research is required to examine the human-horse relationship, as indicated by both the findings and the methodological weaknesses of the present study. Although the current research identified relationships between horse owner attributes, and the subsequent influence on horse welfare outcomes in Victorian horses, the relationships may be conservative due to the small sample size and the potentially limited variation in the variables as a result of the random sampling method employed during participant recruitment. The reduced variation associated with the random sample is a consequence of the difficulty involved in obtaining a suitable sample size, and the inability to sample the extreme individuals. In this instance, the extreme cases may be horse owners with horses experiencing severe welfare concerns (inappropriate horse husbandry and management). When recruited via random sampling, these individuals are unlikely to voluntarily participate in a study such as the present one. Although the relationships between the variables are likely to have been maintained, the reduced variation in horse owner attributes and horse welfare outcomes may have resulted in weaker correlations between the variables and therefore more conservative results. The random sampling method was employed in the current study in order to determine the incidence of recreational horse ownership in Victoria, and to obtain what was hoped to be an accurate representation of the greater population. In future research, a completely random sample is unlikely to be required, therefore to sample all forms of horse ownership and thoroughly investigate the relationship between horse owner attributes and horse welfare outcomes, a combination of random and targeted recruitment may be appropriate.

The random telephone survey conducted during the current study would be an appropriate method of random recruitment, while targeted recruitment could potentially occur through horse welfare investigations, veterinary practices and surgeries, stockfeed stores and saddleries, and horse clubs, organisations and societies.

The second area of research requiring further investigation involves the human behavioural aspect of the human-horse relationship. The findings of the current study indicate that horse owner husbandry and management behaviour are associated with horse welfare outcomes. However, the horse owner behavioural variables were determined via participant responses rather than direct observation of horse owner husbandry and management behaviour. It would be recommended that further research examining the human-horse relationship involves the direct observation of horse owner behaviour. Horse owner husbandry and management behaviours are not all performed on a daily basis, resulting in direct behavioural observation becoming difficult and time consuming. For future research, direct observations of horse owner behaviour could be conducted on a number of different pre-determined times, scheduled to coincide with the performance of specific husbandry and management behaviours, over a certain period of time, i.e. 12 months. Furthermore, the horse owner could keep a detailed diary of all human-horse interactions to allow for further measurement and understanding of horse owner behaviour. A greater understanding of the behavioural aspect of the human-horse relationship will aid in determining appropriate education and training programs to modify horse owner behaviour and promote positive horse welfare outcomes.

The third area of research warranting investigation concerns a horse owner's perception of their ability to manage the health and welfare of their horses. A vital component of horse welfare is a horse owner's perception of their ability to identify and assess developing and/or developed horse health and behavioural changes, and their ability to then respond appropriately. Inaccurate horse owner perception or 'self-assessment' has the potential for severe consequences on the health and welfare of their horses. Kerswell et al. (2009) investigated dog owners and their self-reported comprehension ratings of dog behaviour. It was found that reports of a good understanding were generally associated with a low level of actual comprehension by the dog owner. The present research indicates that horse owners generally have a high level of confidence in their ability to manage their horses. Although horse owners reported a willingness to seek assistance from

industry personnel and fellow horse owners where necessary, the low membership rates in horse clubs or societies, reported difficulty in horse owners accessing information and advice and an apparent reluctance by horse owners to seek assistance from veterinarians clearly represent a significant risk to horse welfare. Evidently further research appears warranted to investigate horse owners' comprehension of horse behaviour, health and welfare.

The fourth area of research which warrants examination is the implementation of targeted training programs, and their effect on the human-horse relationship, the horse husbandry and management practices of horse owners, and the horse welfare outcomes. This type of research could potentially be conducted in a manner similar to that of the cognitive-behavioural intervention programs used in the livestock industries (Hemsworth et al., 1994; Coleman et al., 2000; Hemsworth et al., 2002) in which a cognitive-behavioural intervention technique was employed to induce behavioural change in individual stockpeople. Bringing about behavioural change not only involves imparting knowledge and skills, but also changing established habits, altering well-established attitudes and beliefs, and preparing the person to handle reactions from others towards the change (Hemsworth and Coleman, 2010). Consequently, the process of inducing behavioural change is a comprehensive procedure in which all of the personal and external factors relevant to the behavioural situation are explicitly targeted. Thus, to target horse owners' attitudes and behaviour utilizing the TPB, behavioural change will ultimately result from changes in beliefs about interacting with and owning horses and the outcomes resulting from these interactions. This, in turn, implies that in order to influence behaviour, horse owners need to be exposed to information which will produce changes in their beliefs.

Therefore, research examining the effectiveness of this type of training program to improve human-horse interactions and consequently horse welfare outcomes may for example involve two groups of horse owners, a control and an intervention group, and the effects of a cognitive-behavioural intervention program targeting the key horse owner attitudes and behaviours would be evaluated. The horse owners in the intervention group would participate in a training session/workshop which would involve the provision of information and education pertaining to the importance of the human-horse relationship for horse welfare, the opportunities to improve the human-horse relationship by modifying horse owner behaviour, and evidence for how such behavioural change can be beneficial to both the relationship and horse welfare. A practical

training session demonstrating appropriate human-horse interactions may also be of benefit. The effectiveness of this training on horse owner attributes and their subsequent impact on horse welfare would be evaluated.

7.4 CONCLUSIONS

The results reported in this thesis provide what is believed to be the first comprehensive account of recreational horse ownership anywhere in the world. It offers a valuable insight into the relationships between human management of horses and the welfare of these horses. Horse owners provide the primary care for their horses and consequently are the major determinants of the welfare of these horses. Although the results of this study are particularly relevant to Victoria and Australia in general, they are also highly relevant to horse ownership elsewhere, particularly in Western society in which there are many commonalities in recreational horse ownership.

These findings are in accordance with the literature and the TPB (Ajzen, 1985), and indicate the potential to predict a horse owner's husbandry and management behaviour from their beliefs towards the behaviour in question, and consequently to predict horse welfare outcomes. Furthermore, they demonstrate the opportunity to manipulate the human-horse relationship via targeted education and training programs in order to improve the husbandry and management behaviour of recreational horse owners and potentially reduce the incidence of poor welfare in recreational horses.

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APPENDICES

APPENDIX ONE – THE RANDOM TELEPHONE SURVEY

Good morning/afternoon/evening my name is (I-view EMPLOYEE) and I am calling from I-view on behalf of Lauren Hemsworth, a PhD student at Monash University. We are currently carrying out a random telephone survey regarding the welfare of recreational horses in Victoria. The information collected in this survey will be used by Lauren to write her thesis and complete her doctorate.

The project involves collecting information and opinions from horse owners in an effort to identify horse numbers in Victoria and details about their ownership and should take approximately 20 minutes.

Would you be willing to take part in the survey?

IF RESPONDENT IS BUSY SAY:

If now is not a convenient time to do the survey, I am happy to call back at a time that suits you.

IF RESPONDENT IS WILLING TO TAKE PART PROCEED WITH SECTION A.

[IF NECESSARY SAY: We are able to provide you a contact at Monash University after the survey if you wish to verify the validity of the study.]

[IF NECESSARY SAY:
Participants have been selected randomly from the white pages (a public domain source)].

RANDOM TELEPHONE SURVEY QUESTIONNAIRE

Section A

A1. Do you or someone in your household own a horse?

☐ *Yes*

☐ *No*

A2. Are you the primary carer of at least one horse?

☐ *Yes, please continue questionnaire*

☐ *No, please complete section G*

PRIMARY CARER: the person who is responsible for providing a horse with its primary care on a day to day basis.

A3. Are over 18 years of age?

☐ *Yes,* participants over 18 years of age: Questionnaire to be completed at the point of first contact

☐ *No,* participants under 18 years of age: Questionnaire to be completed at the point of re-contact after consent has been received.

Consent

Participants over 18 years of age: Implied consent.

- The participant will be read the prepared consent statement (see attached statement) by the pollster and will then be asked for their consent to carryout the questionnaire. A completed questionnaire, returned to the researcher will be considered implied consent.

Participants under 18 years of age: Parental/Guardian consent.

- The participation of a minor will require a parent or legal guardian to provide consent. I-view will need to collect the contact details of minor participants and forward them on to researcher. A parental consent form will then be sent via mail to the parent or legal guardian with a return addressed and postage paid envelope for completion and return to researcher, if they are willing to consent to the minor taking part in the survey. Once the researcher has received parental consent, I-view will be informed and will then re-contact participant and carryout questionnaire.

ONCE CONSENT IS OBTAINED PROCEED WITH SECTION B

Section B

B1. How many horses are under your primary care? _____

NOTE: If more than 1 horse is under your PRIMARY CARE please complete the survey for 2 horses, the horse that you have the most interaction with (Horse 1) and the horse that you have the least interaction with (Horse 2) – both must be under your PRIMARY CARE.

B2. What is the registered (preferred) or stable name of your horse(s)?

Horse 1 (most interaction) _____

Horse 2 (least interaction) _____

B3. Is your horse(s) a race horse currently racing?

Horse 1	**Horse 2**	
☐	☐	*No, please continue questionnaire*
☐	☐	*Yes, please complete section G*

B4. What is the age (yrs) of your horse(s)?

Horse 1 _____

Horse 2 _____

B5. How long (yrs) have you had the horse(s)?

Horse 1 _____

Horse 2 _____

B6. What is the horse(s) sex?

Horse 1	**Horse 2**	
☐	☐	*Mare/Filly*
☐	☐	*Gelding*
☐	☐	*Stallion/Colt*

B7. Is your horse(s) uniquely identified in any way? (please tick where appropriate)

Horse 1	**Horse2**	
☐	☐	*No*
☐	☐	*Brand*
☐	☐	*Microchip*
☐	☐	*Horse/owner detailed*
☐	☐	*Registration papers*

B8. Is the horse(s) registered in any way?

Horse 1	**Horse 2**	
☐	☐	*No*
☐	☐	*Yes*

NOTE: If you answered YES to question B8 please answer B9

B9. How is your horse registered? (please tick where appropriate)

Horse 1	**Horse 2**	
☐	☐	*Local council*
☐	☐	*Breed organisation*
☐	☐	*Equestrian organisation*

☐ *Other, please specify:* Horse 1 _____

Horse 2 _____

B10. Are your details as an owner/carer registered?

☐ *No* ☐ *Yes*

B11. From where did you acquire the horse(s)?

Horse 1	**Horse 2**	
☐	☐	*Bred myself*
☐	☐	*Breeder*
☐	☐	*Advertisement*
☐	☐	*Dealer*
☐	☐	*Yearling sale*
☐	☐	*Instructor*
☐	☐	*Saleyards*
☐	☐	*Friend/acquaintance*
☐	☐	*Family*
☐	☐	*Shelter/rescue/found*
☐	☐	*Came with property*
☐	☐	*Word of mouth*
☐	☐	*Inherited*
☐	☐	*Gift/present*
☐	☐	*Off the track*

☐ *Other, please specify:* Horse 1 _____

Horse 2 _____

B12. What is the breed of your horse(s)?

Horse 1	**Horse 2**	
☐	☐	*Andalusian*
☐	☐	*Arabian*
☐	☐	*Appaloosa*
☐	☐	*Australian Stock Horse*

☐	☐	*Brumby*
☐	☐	*Clydesdale*
☐	☐	*Miniature Pony*
☐	☐	*Paint*
☐	☐	*Pinto*
☐	☐	*Pony*
☐	☐	*Quarter Horse*
☐	☐	*Shetland*
☐	☐	*Standardbred*
☐	☐	*Thoroughbred (unraced)*
☐	☐	*Thoroughbred (ex-racehorse)*
☐	☐	*Warmblood*
☐	☐	*Crossbreed*
☐	☐	*Unknown*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

Section C

C1. In what region is your horse(s) kept?

Horse 1	**Horse 2**	
☐	☐	*Melbourne (inner city)*
☐	☐	*Outer/surrounding city suburbs*
☐	☐	*Daylesford & Macedon Ranges*
☐	☐	*Gippsland*
☐	☐	*Goldfields*
☐	☐	*Grampians*
☐	☐	*Bellarine Peninsula*
☐	☐	*High Country*
☐	☐	*Mornington Peninsula*
☐	☐	*Murray*
☐	☐	*Phillip Island*
☐	☐	*Yarra Valley & Dandenong Ranges*

C2. Briefly describe where your keep your horse(s)?

Horse 1	**Horse 2**	
☐	☐	*Home/primary residence*

☐	☐	*Own land, away from residence*
☐	☐	*Leased land*
☐	☐	*Commercial agistment property*
☐	☐	*Private agistment*
☐	☐	*Family property*
☐	☐	*Friends property*
☐	☐	*Riding school*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

C3. Approximately how far (kms) from where you live is your horse(s) kept?

Horse 1 _____

Horse 2 _____

C4. What is the size (hectares) of the property on which your horse(s) is kept?

Horse 1 _____

Horse 2 _____

C5. How is your horse(s) housed?

Horse 1	**Horse 2**	
☐	☐	*Full time paddock*
☐	☐	*Full time stable*
☐	☐	*Mainly paddock/ some stable*
☐	☐	*Mainly stable/ some paddock*
☐	☐	*Paddock-day/ stable-night*
☐	☐	*Paddock-night/ stable-day*
☐	☐	*Yards*
☐	☐	*Yard day/stable night*
☐	☐	*Yard night/stable day*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

NOTE: If your horse is at any time housed in a paddock please answer questions C6, C7 and C8.

C6. What is the size (hectares) of the paddock in which your horse(s) is housed?

Horse 1 _____

Horse 2 _____

C7. What type of fencing is used where your horse(s) is kept? (please tick where appropriate).

Horse 1	**Horse 2**	
☐	☐	*Barbed wire*
☐	☐	*Non- barbed/plain wire*
☐	☐	*Wood/plastic post and rail*
☐	☐	*Electric (with posts/picket)*
☐	☐	*Wooden paling (residential)*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

C8. What is the usual pasture condition in the paddock where your horse(s) is kept?

Horse 1	**Horse 2**	
☐	☐	*Bare (no pasture)*
☐	☐	*Scarce (under 50% pasture)*
☐	☐	*Good (over 50 % pasture)*
☐	☐	*Abundant (100% pasture)*

NOTE: If your horse is at any time stabled please complete questions C9.

C9. What is the size (square meters) of the stable your horse is housed in?

Horse 1	**Horse 2**	
☐	☐	*< 3 squared meters*
☐	☐	3-*3.6 squared meters*
☐	☐	*> 3.6 squared meters*
☐	☐	*Unknown*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

C10. With regards to access to animal contact, how is your horse(s) housed (please tick where appropriate)?

Horse 1	**Horse 2**	
☐	☐	*Alone*
☐	☐	*Alone, in sight of other animals*
☐	☐	*With other horses*
☐	☐	*With cattle*
☐	☐	*With sheep*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

C11. What is the water source available to your horse(s)? (please tick where appropriate)

Horse 1	**Horse 2**	
☐	☐	*None*
☐	☐	*Automatic water troughs*
☐	☐	*Hand-filled water troughs*
☐	☐	*Dam*
☐	☐	*Creek*
☐	☐	*Bucket*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

C12. Why is your horse(s) kept in this manner? (Please tick appropriate option)

Horse 1	**Horse 2**	
☐	☐	*Property restrictions/limitations*
☐	☐	*Horses preference*
☐	☐	*Safety of horse*
☐	☐	*Health of horse*
☐	☐	*Climate/conditions*
☐	☐	*Financial*
☐	☐	*Convenience*
☐	☐	*Advice of vets/ professionals*
☐	☐	*Advice of others*
☐	☐	*Problems when in paddock*

☐ ☐ *Problems when stabled*

☐ ☐ *To allow natural behaviour*

☐ ☐ *Personal preference/belief*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

C13. Your horse(s) has access at all times to (please tick appropriate option)

Horse 1 **Horse 2**

☐ ☐ *Water*

☐ ☐ *Pasture*

☐ ☐ *Shelter*

☐ ☐ *Hay*

☐ ☐ *Feed*

☐ ☐ *Rugs*

☐ ☐ *Other horse's*

☐ ☐ *Company of other animals*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

C14. On the property where the horse is kept, how would you describe the general supervision provided? (please tick most appropriate option)

Horse 1 **Horse 2**

☐ ☐ *At all times*

☐ ☐ *Majority of the day*

☐ ☐ *A few hours a day*

☐ ☐ *Only at night and early morning*

☐ ☐ *Only during daylight hours*

☐ ☐ *Once daily*

☐ ☐ *Once every 2-3 days*

☐ ☐ *Weekly*

☐ ☐ *Fortnightly*

☐ ☐ *Monthly*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

Section D

D1. Do you interact with your horse(s) each day?

Horse 1	**Horse 2**	
☐	☐	*Yes*
☐	☐	*No*

D2. On average how much time (minutes) do you spend interacting w
.ith your horse(s) each day?

Horse 1 _____

Horse 2 _____

D3. Do other people interact with your horse(s)? (please tick where appropriate)

Horse 1	**Horse 2**	
☐	☐	*No*
☐	☐	*Yes, to groom*
☐	☐	*Yes, to feed*
☐	☐	*Yes, to ride*
☐	☐	*Yes, to check*

NOTE: If you answered YES to question D3 please complete question D4.

D4. On average how much time do other people spend interacting with your horse(s)?

Horse 1	**Horse 2**	
☐	☐	*< 30 minutes / day*
☐	☐	*1-2 hours / day*
☐	☐	*2-4 hours / day*
☐	☐	*> 4 hours / day*
☐	☐	*2-3 times / week*
☐	☐	*Weekly*
☐	☐	*Monthly*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

D5. Does your horse(s) have any behavioural problems during handling? (please tick appropriate options)

Horse 1	**Horse 2**	
☐	☐	*No*
☐	☐	*Biting*
☐	☐	*Kicking*
☐	☐	*Pushy*
☐	☐	*Rearing*
☐	☐	*Difficult to catch*
☐	☐	*Difficult to lead*
☐	☐	*Difficult to float*
☐	☐	*Difficult to worm*
☐	☐	*Difficult to attend to hooves*
☐	☐	*Difficult to attend to teeth*
☐	☐	*Difficult to transport*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

D7. On average how often do you ride your horse(s)?

Horse 1	**Horse 2**	
☐	☐	*Never*
☐	☐	*Not any more*
☐	☐	*Daily*
☐	☐	*4-6 times / week*
☐	☐	*2-3 times / week*
☐	☐	*Weekly*
☐	☐	*Fortnightly*
☐	☐	*Monthly*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

D8. Do other people ride your horse(s)?

Horse 1	**Horse 2**	
☐	☐	*No*
☐	☐	*Yes*

NOTE: If you answered YES to question D8 please answer question D9.

D9. How often do other people ride your horse(s)?

Horse 1	**Horse 2**	
☐	☐	*Daily*
☐	☐	*4-6 times / week*
☐	☐	*2-3 times / week*
☐	☐	*Weekly*
☐	☐	*Fortnightly*
☐	☐	*Monthly*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

D10. Does your horse(s) have any behavioural problems during riding?

Horse 1	**Horse 2**	
☐	☐	*No*
☐	☐	*Rarely*
☐	☐	*Sometimes*
☐	☐	*Often*
☐	☐	*Not applicable*

NOTE: If you answered YES to question D10, please complete question D11 and D12

D11. What types of behavioural problems does your horse(s) have during riding (please tick appropriate options)

Horse 1	**Horse 2**	
☐	☐	*Rearing*
☐	☐	*Bucking*
☐	☐	*Pulling*
☐	☐	*Frequent shying*
☐	☐	*Bolting*
☐	☐	*Biting*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

D12. Do you seek professional advice about behavioural problems? (please tick where appropriate)

☐ *No*

☐ *Trainer*

☐ *Lessons*

☐ *Clinics*

☐ *Other, please specify* _____

D13. Do you participate in any horse competitions?

☐ *No*

☐ *Yes, please state discipline and level* _____

Section E

E1. Do you have a farrier attend to your horse's feet?

Horse 1	**Horse 2**	
☐	☐	*Yes*
☐	☐	*No, I attend to them myself*
☐	☐	*No*

E2. How often do you have your horse(s) feet attended to?

Horse 1	**Horse 2**	
☐	☐	*Monthly*
☐	☐	*Once every 6-8 weeks*
☐	☐	*Once every 3 months*
☐	☐	*Once every 6 months*
☐	☐	*Yearly*
☐	☐	*Never*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E3. How often do you treat your horse(s) for worms?

Horse 1	**Horse 2**	
☐	☐	*Monthly*
☐	☐	*Once every 6-8 weeks*
☐	☐	*Once every 3 months*
☐	☐	*Once every 6 months*
☐	☐	*Yearly*

☐ ☐ *Never*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E4. How often do you have the dental technician/vet attend to your horses' teeth?

Horse 1 **Horse 2**

☐ ☐ *Once every 3 months*

☐ ☐ *Once every 6 months*

☐ ☐ *Yearly*

☐ ☐ *Once every 2 years*

☐ ☐ *Yearly*

☐ ☐ *Never*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E5. Has your horse(s) had its regular tetanus/strangles vaccinations?

Horse 1 **Horse 2**

☐ ☐ *Yes*

☐ ☐ *No, only tetanus*

☐ ☐ *No, only strangles*

☐ ☐ *No*

☐ ☐ *Uncertain*

E6. Have you had the vet attend to your horse(s)?

Horse 1 **Horse 2**

☐ ☐ *No*

☐ ☐ *Yes*

NOTE: If you answered YES to question E6 please answer question E7.

E7. In the past 12 months on how many occasions has the vet attended to your horse(s)?

Horse 1 _____

Horse 2 _____

E8. Has your horse(s) had any health problems in the past 12 months (please tick appropriate options)?

Horse 1	**Horse 2**	
☐	☐	*No*
☐	☐	*Lameness*
☐	☐	*Laminitis/founder*
☐	☐	*Colic*
☐	☐	*Open wounds/lacerations*
☐	☐	*Diarrhoea*
☐	☐	*Bruising*
☐	☐	*Broken bones*
☐	☐	*Weeping eyes*
☐	☐	*Running nose*
☐	☐	*Splints*
☐	☐	*Mud fever*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E9. What does your horses' diet in summer generally consist of (please tick appropriate options)?

Horse 1	**Horse 2**	
☐	☐	*Pasture*
☐	☐	*Hay*
☐	☐	*Oaten chaff*
☐	☐	*Lucerne chaff*
☐	☐	*Grain*
☐	☐	*Processed food (e.g. pellets)*
☐	☐	*Supplements*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E10. What does your horses' diet in winter generally consist of (please tick appropriate options)?

Horse 1	**Horse 2**	
☐	☐	*Pasture*
☐	☐	*Hay*
☐	☐	*Oaten chaff*

☐ ☐ *Lucerne chaff*

☐ ☐ *Grain*

☐ ☐ *Processed food (e.g. pellets)*

☐ ☐ *Supplements*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E11. If you're supplementing pasture, how do you judge the amount to feed your horse(s)?

Horse 1 **Horse 2**

☐ ☐ *Weigh feed, estimate horses' weight*

☐ ☐ *Change in horses' body condition (i.e. fatter or thinner)*

☐ ☐ *Amount of feed that looks right*

☐ ☐ *Advised by nutritionist/vet*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E12. How would you rate your horse's body condition?

Horse 1 **Horse 2**

☐ ☐ *Very thin*

☐ ☐ *Thin*

☐ ☐ *Correct weight*

☐ ☐ *Overweight*

☐ ☐ *Very overweight*

☐ ☐ *Uncertain*

E13. What are the reasons for your horse's current body condition? (please tick appropriate options)

Horse 1 **Horse 2**

☐ ☐ *Correct care and feeding*

☐ ☐ *Sick*

☐ ☐ *Old*

☐ ☐ *Good doer*

☐ ☐ *Little available feed*

☐ ☐ *Too much available feed*

☐ ☐ *Too little exercise*

☐ ☐ *Too much exercise*

☐ ☐ *Uncertain*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E14. How often would you inspect your horse(s) for foot condition, body condition, wounds, lameness or illness?

Horse 1 **Horse 2**

☐ ☐ *Twice daily*

☐ ☐ *Daily*

☐ ☐ *2-3 times / week*

☐ ☐ *Weekly*

☐ ☐ *Fortnightly*

☐ ☐ *Monthly*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

E15. What would you do if you couldn't keep or don't need your horse(s) any longer? (please tick where appropriate)

Horse 1 **Horse 2**

☐ ☐ *Sell through the paper, magazines or internet*

☐ ☐ *Sell through a trainer*

☐ ☐ *Sell at auction*

☐ ☐ *Sell at sale yards*

☐ ☐ *Lease it to someone*

☐ ☐ *Give to a friend or family*

☐ ☐ *Donate to a welfare society*

☐ ☐ *Free to a good home*

☐ ☐ *Euthanased by vet*

☐ ☐ *Knackery*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

Section F

F1. It is important to ensure that horse owners know how to look after a horse.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F2. It is important to have my horse check by a vet annually.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F3. Horses are expensive to keep.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F4. It is not important to provide horses with regular exercise.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F5. Horses are difficult to look after.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F6. Horses make great pets.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F7. It is important provide my horse with an appropriate and balanced diet

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F8. Horses are scary.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F9. Horses require regular supervision.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F10. It is not necessary to regularly attend to horses' teeth.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F11. Horses are affectionate animals.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F12. I am responsible for my horses' welfare.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F13. Horses are dangerous.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F14. It is my responsibility to provide a safe and comfortable environment for my horse.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F15. Horses are intelligent animals.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F16. It is not necessary to provide horses with a constant supply of water.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F17. My horse provides me with companionships.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F18. It is important to be aware of the possible risks to horses' welfare.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F19. Horses are powerful.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F20. Horses take up a lot of your time.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F21. There is always something new to learn about horses.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F22. It is important to treat horse's regularly for worms.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F23. Horses are not difficult to transport.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F24. Horses are pretty animals.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F25. Industry personnel can provide information and assistance that can improve the way we handle and care for horses.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F26. It is important to me that I see my horse regularly.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F27. Horses do not require a great deal of care.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F28. It is important to be alert and aware when handling horses.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F29. Horses are difficult to ride.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F30. It is important to have my horses' feet attended to regularly.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F31. Horses are stubborn animals.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F32. It is not necessary to provide horses with a form of shelter at all times.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F33. During times of difficulty my horse provides me with comfort.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F34. Horses are not hard to handle.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F35. It is important to regularly check a horses' condition.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F36. Horses are kind animals.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F37. It is annoying that I sometimes have to change my plans because of my horse.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F38. Losing my horse would be a traumatic experience.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F39. It is important that my horse responds appropriately to my riding aids.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

F40. It is not necessary to regularly provide horses with affection.

☐ agree strongly ☐ agree ☐ neither agree nor disagree ☐ disagree ☐ strongly disagree

Section G

NOTE: Non-horse owners please complete Section G up to Question G10.

G1. In which region do you live?

☐ *Melbourne & surrounding suburbs*
☐ *Daylesford & Macedon Ranges*
☐ *Gippsland*
☐ *Goldfields*
☐ *Grampians*
☐ *Bellarine Peninsula*
☐ *High Country*
☐ *Mornington Peninsula*
☐ *Murray*
☐ *Phillip Island*
☐ *Yarra Valley & Dandenong Ranges*

G2. What best describes your region?

☐ *City*
☐ *Urban*
☐ *Peri-urban*
☐ *Semi-Rural*
☐ *Rural*

G3. What is your postcode? _____

G4. What is your age (years)? _____

G5. Are you male or female?

☐ *Male*
☐ *Female*

G6. Do you have any children?

☐ *No*
☐ *Yes, please specify how many* _____

G7. What level of education have you reached?

☐ *Have not completed high school*
☐ *Secondary education*

☐ *Tertiary degree*
☐ *Post-tertiary degree*
☐ *TAFE course completion*
☐ *Other, please specify* _____

G8. What is your field of occupation?

☐ *Accounting*
☐ *Clerical*
☐ *Computing*
☐ *Domestic*
☐ *Education*
☐ *Hospitality*
☐ *Law*
☐ *Medical*
☐ *Nursing*
☐ *Public servant*
☐ *Police force*
☐ *Retail*
☐ *Science*
☐ *Student*
☐ *Tradesperson*
☐ *Unemployed*
☐ *Other, please specify* _____

G9. Which best describes your household's annual income (before tax)?

☐ *Below $20 000*
☐ *$21 000 – $35 000*
☐ *$36 000 – $50 000*
☐ *$51 000 – $70 000*
☐ *$71 000 – $100 000*
☐ *> $100 000*

G10. What description best describes your home?

☐ *Apartment*
☐ *Townhouse*
☐ *Small land block, please specify* _____
☐ *Large land block, please specify* _____

☐ *Acreage, please specify* _____

☐ *Other, please specify* _____

G11. Do you own any pets/animals? (please tick appropriate options)

☐ *No pets/animals.*

☐ *Dog(s)*

☐ *Cat(s)*

☐ *Birds*

☐ *Fish*

☐ *Rabbit(s)*

☐ *Chickens*

☐ *Sheep*

☐ *Cattle*

☐ *Reptiles*

☐ *Other, please specify* _____

G12. How many horses do you own? _____

G13. For how many years have you owned horses (not just the current one)? _____

G14. How did you come to be involved with horses?

☐ *Personal interest*

☐ *Through family*

☐ *Through friends*

☐ *Through work*

☐ *Other, please specify* _____

G15. What are your main reasons for owning your horse(s)? (please tick appropriate options)

Horse 1	**Horse 2**	
☐	☐	*Recreation riding*
☐	☐	*Breeding*
☐	☐	*Showing*
☐	☐	*Eventing*
☐	☐	*Dressage*
☐	☐	*Pet only*
☐	☐	*Retired*
☐	☐	*Companion to other horse*

☐ ☐ *To maintain the grass*

☐ ☐ *Knackery*

☐ *Other, please specify*: Horse 1_____

Horse 2_____

G16. Are you a member of a horse related club or society?

☐ *No*

☐ *Yes, please specify* _____

G17. Have you ever had riding lessons?

☐ *No*

☐ *Yes*

G18. Are you currently having riding lessons?

☐ *No*

☐ *Yes*

NOTE: If you answered YES to question G18 please answer question G19.

G19. How often do you have riding lessons?

☐ *Daily*

☐ *2-3 times / week*

☐ *Weekly*

☐ *Fortnightly*

☐ *Monthly*

☐ *Yearly*

☐ *Not anymore*

☐ *Other, please specify* _____

G20. What information/literature on horses do you read? (please tick appropriate options)

☐ *None*

☐ *Horse books*

☐ *Horse magazines*

☐ *Horse newsletters*

☐ *Daily newspapers*

☐ *Weekly newspapers*

☐ *Monthly newspapers*

☐ *Local newspapers*

☐ *Websites*

☐ *Instructional DVD's/video*

☐ *Other, please specify* _____

G21. How often are you reading this information/literature?

☐ *Daily*

☐ *2-3 times / week*

☐ *Weekly*

☐ *Fortnightly*

☐ *Monthly*

☐ *Occasionally*

☐ *Never*

☐ *Other, please specify* _____

G22. Do you actively try to improve you knowledge about horses?

☐ *No*

☐ *Yes, please specify how & why* _____

G23. Are you aware of the Codes of Practice, regarding the welfare of horses, developed under The Prevention of Cruelty to Animals Act 1986?

☐ *No*

☐ *Yes, please specify which codes*_____

G24. Under what conditions would you consider a horse's welfare to be at risk? (please tick appropriate options)

☐ *Overweight*

☐ *Underweight*

☐ *Irregular worming*

☐ *Irregular attention to hooves*

☐ *Irregular attention to teeth*

☐ *Irregular attention to coat*

☐ *Irregular checking of horses condition*

☐ *Irregular vet consultation*

☐ *Limited/irregular supervision*

☐ *Lack of shelter*

☐ *Insufficient water*

☐ *Lack of food*

☐ *Abundance of food*

☐ *Over rugging*
☐ *Windsucking/cribbing*
☐ *Weaving*
☐ *Lack of contact with people*
☐ *Lack of contact with other horses*
☐ *Lack of contact with other animals*
☐ *Bossy horse 'companion'*
☐ *Poor horse education (breaking in)*
☐ *Inadequate owner/carer knowledge of horses'*
☐ *Unconcerned owner/carer*
☐ *Inadequate fencing/housing*
☐ *Inadequate level of fitness for exercise asked of horse*
☐ *Inadequate education for level of exercise/competition asked of horse*
☐ *Unsafe environment*
☐ *Manure in paddocks*
☐ *Behaviour problems under saddle or in hand*
☐ *Poor rider education and skills*
☐ *Poor maintenance of gear*
☐ *Poor maintenance of transport vehicle*
☐ *Inadequate supervision/constraints on horses' when exercised/competing*
☐ *Lack of vet at competition/events*

G25. Please list what you consider to be the top 5 risks to a horses' welfare
1. _____

2. _____

3. _____

4. _____

5. _____

G26. Is the cost of keeping your horse(s) what you expected?
☐ *Yes*
☐ *No, please explain* _____
G27. Would you recommend owning a horse to others?
☐ *No, please explain why not* _____
☐ *Yes, please explain why* _____

APPENDIX TWO – THE ATTITUDE QUESTIONNAIRE

INSTRUCTIONS GIVEN BY RESEARCHER TO PARTICIPANT PRIOR TO QUESTIONNAIRE COMPLETION

As you know, the work I have been doing is examining the welfare of recreational horses in Victoria. To continue this work, I am conducting these on-site visits in order to look at human-horse interactions and the impact of horse owner attributes on recreational horses. One of these attributes is a horse owner's attitude towards recreational horses and horse husbandry and management. Because attitudes are unable to be directly observed, they must be inferred from measurable responses to attitude statements.

The questionnaire I will now have you complete consists of three types of attitude questions relating to recreational horses husbandry and management practices. Section A concerns your attitude towards recreational horses and performing horse husbandry and management practices. Section B involves your beliefs about other horse owner's attitudes towards performing particular management or husbandry techniques. And section C concerns your perception of your ability to perform horse husbandry and management behaviours. There are no right or wrong answers, so please provide the answer which describes how you feel about the attitude statement. All responses are confidential.

ATTITUDE QUESTIONNAIRE

SECTION A. Attitude towards a Behaviour: measuring a person's attitudes towards performing a particular management or husbandry technique.

A1. How important is it to base a horse's diet on its individual needs?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A2. Being overweight can be a serious problem for horses.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A3. How important is it to adjust a horse's diet according to its conditions?
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A4. How important is it that horses have a constant supply of water?
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A5. How important is the weather in determining a horse's water intake?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A6. How important is it to consider weather conditions when determining which rugs to use?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A7. How often should you check a horse's rugs?.
☐ morning and night ☐ daily ☐ weekly ☐ fortnightly ☐ no need to check

A8. When determining which rugs to use, is it better for a horse to be too hot or too cold?.
☐ too hot ☐ either too hot or too cold ☐ too cold

A9. It is my responsibility to provide a safe environment for my horse.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A10. How often should you check and maintain the paddocks horses are kept in?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

A11. How often should you check and maintain a horse's paddock fencing?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

A12. How often should you check and maintain the stables horses are housed in?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

A13. How important is it that stables do not restrict a horse's freedom to move?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A14. How important is it that stables do not restrict a horse's freedom to lie down?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A15. How important is it to provide horses with a form of shelter from the wind?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A16. How important is it to provide horses with a form of shelter from the sun?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A17. How important is it to provide horses with a form of shelter from the rain?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A18. How often should you check a horse's condition?.
☐ morning and night ☐ daily ☐ weekly ☐ fortnightly ☐ no need to check

A19. How important is it to provide horses with daily supervision?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A20. Horses are not difficult to load and transport.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A21. Horses are difficult to ride.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A22. How important is it to manage and care for a horse according to the work they are doing?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A23. How important is it that a horse responds appropriately to riding aids?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A24. How important is it for a rider to have good basic riding skills?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A25. How much physical effort is appropriate when asking a horse do what you want?.
☐ a lot ☐ reasonable ☐ neither a lot nor very little ☐ slight ☐ very little

A26. How important is it to provide horses with regular exercise or paddock turnout?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A27. How important is it to provide horses with social contact from other horses?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A28. How often should you treat horses for worms?.
☐ monthly ☐ 3 months ☐ 6 months ☐ yearly ☐ 2 years ☐ never

A29. How important is it to regularly attend to horses' teeth?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A30. How often should a horse's hooves be attended to?.
☐ 4-8 weeks ☐ 3 months ☐ 6 months ☐ yearly ☐ 2 years ☐ not necessary

A31. How important is it to have a veterinarians inspect a horse showing signs of ill-health?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A32. How important is it to have a horse annually checked by a veterinarian ?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A33. How important is it for the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A34. How important is it to recognize, assess and respond to lameness in horses?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A35. How important is it to recognize, assess and respond to injuries in horses?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A36. How important is it that horse owners know how to look after a horse?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A37. How important is it to be aware of the possible risks to horses' welfare?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A38. How important is it to be alert when handling horses?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

A39. What techniques should be used to change a horse's behaviour?.
☐ discipline ☐ continued work ☐ work over a number of days ☐ seek assistance ☐ withhold feed

A40. Horses are not hard to handle.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A41. I am responsible for my horse's welfare.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A42. Industry personnel can provide information and assistance that can improve the way we handle and care for horses.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A43. There is always something new to learn about horses.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A44. Horses are expensive to keep.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A45. Horses make great pets.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A46. Horses are difficult to look after.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A47. Horses are scary.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A48. Horses are affectionate animals.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A49. Horses are dangerous.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A50. Horses are intelligent animals.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A51. Horses provide companionship.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A52. Horses are powerful.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A53. Horses take up a lot of your time.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A54. Horses are beautiful animals.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A55. Horses do not require a great deal of care.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A56. Horses are stubborn animals.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A57. During times of difficulty horses can provide comfort.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A58. Horses are kind animals.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A59. It is annoying that a horse can make you change your plans.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

A60. Losing a horse would be a traumatic experience.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

SECTION B. Subjective Norms: measuring a person's beliefs about other horse owner's attitudes towards performing particular management or husbandry techniques.

B1. How important do other horse owners believe it is to base a horse's diet on its individual needs?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B2. Other horse owners believe that being overweight can be a serious problem for horses.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

B3. How important do other horse owners believe it is to adjust a horse's diet according to its conditions?
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B4. How important do other horse owners believe it is for horses to have a constant supply of water?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B5. How important do other horse owners suggest the weather is in determining a horse's water intake?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B6. How important do other horse owners believe it is to consider weather conditions when determining which rugs to use?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B7. How often do other horse owners suggest you should check your horse's rugs?.
☐ morning and night ☐ daily ☐ weekly ☐ fortnightly ☐ no need to check

B8. Do other horse owners believe it is better for a horse to bee too hot or too cold?.
☐ too hot ☐ either too hot or too cold ☐ too cold

B9. Other horse owners believe that it is my responsibility to provide a safe environment for my horse.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

B10. How often do other horse owners believe you should check and maintain the paddocks horses are kept in?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

B11. How often do other horse owners believe you should check a horse's paddock fencing?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

B12. How often do other horse owners believe you should check and maintain the stables horses are housed in?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

B13. How important do other horse owners suggest it is that stables do not restrict a horse's freedom to move?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B14. How important do other horse owners suggest it is that stables do not restrict a horse's freedom to lie down?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B15. How important do other horse owners believe it is to provide horses with a form of shelter from the wind?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B16. How important do other horse owners believe it is to provide horses with a form of shelter from the sun?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B17. How important do other horse owners believe it is to provide horses with a form of shelter from the rain?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B18. How often do other horse owners believe you should check a horse's condition?.
☐ morning and night ☐ daily ☐ weekly ☐ fortnightly ☐ no need to check

B19. How important do other horse owners believe it is to provide horses with daily supervision?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B20. Other horse owners suggest horses are not difficult to load and transport.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

B21. Other horse owners believe horses are difficult to ride.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

B22. How important do other horse owners believe it is to manage and care for a horse according to the work they are doing?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B23. How important do other horse owners believe it is that a horse to responds appropriately to riding aids?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B24. How important do other horse owners believe it is for a rider to have good basic riding skills?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B25. How much physical effort do other horse owners believe is appropriate when asking a horse to do what you want (when handling or riding)?.
☐ a lot ☐ reasonable ☐ neither a lot nor very little ☐ slight ☐ very little

B26. How important do other horse owners think it is to provide horses with regular exercise or paddock turnout?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B27. How important do other horse owners believe it is to provide horses with social contact from other?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B28. How often do other horse owners suggest that horses should be treated for worms?.
☐ monthly ☐ 3 months ☐ 6 months ☐ yearly ☐ 2 years ☐ never

B29. How important do other horse owners believe it is to regularly attend to horses' teeth?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B30. How often do other horse owners believe a horse's hooves should be attended to?.
☐ 4-8 weeks ☐ 3 months ☐ 6 months ☐ yearly ☐ 2 years ☐ not necessary

B31. How important do other horse owners believe it is to have a veterinarian inspect a horse showing sighs of ill-health?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B32. How important do other horse owners believe it is to have a horse annually checked by a veterinarian?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B33. How important do other horse owners believe it is that the person responsible for a horse to be able to recognize the signs of ill-health and contact a veterinarian for diagnosis and treatment?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B34. How important do other horse owners believe it is to recognize, assess and respond to lameness in horses?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B35. How important do other horse owners believe it is to recognize, assess and respond to injuries in horses?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B36. How important do other horse owners believe it is that horse owners know how to look after a horse?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B37. How important do other horse owners believe it is to be aware of the possible risks to horses' welfare?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B38. How important do other horse owners believe it is to be alert when handling horses?.
☐ very important ☐ important ☐ neither important nor unimportant ☐ slightly unimportant ☐ not important

B39. What techniques do other horse owners believe should be used to change a horse's behaviour?.
☐ discipline ☐ continued work ☐ work over a number of days ☐ seek assistance ☐ withhold feed

B40. Other horse owners believe horses are not hard to handle.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

B41. Other horse owners believe that I am responsible for my horse's welfare.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

B42. Other horse owners believe that industry personnel can provide information and assistance that can improve the way we handle and care for horses.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

B43. Other horse owners suggest that there is always something new to learn about horses.
☐ strongly agree ☐ agree ☐ neither agree no disagree ☐ disagree ☐ strongly disagree

SECTION C. Perceived Behavioural Control: measuring how much control (how able a person believes they are) a person believes they have over carrying out certain management or husbandry techniques.

C1. To what extent are you able to base your horse's diet on its individual needs?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C2. How difficult is it for you to ensure your horse does not become too fat?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C3. How difficult is it for you to adjust your horse's diet according to its conditions?
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C4. How difficult is it for you to provide your horse with a constant supply of water?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C5. To what extend do you consider the weather when determining your horse's water supply?.
☐ completely ☐ reasonably well ☐ neither well nor not well ☐ slightly ☐ not at all

C6. To what extent can you choose rugs to use according to the weather?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C7. How often are you actually able to check your horse's rugs?.
☐ morning and night ☐ daily ☐ weekly ☐ fortnightly ☐ never

C8. How difficult is it for you to determine the correct temperature for your horse when using rugs?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C9. To what extent are you able to provide your horse with a safe environment?.
☐ completely ☐ reasonably well ☐ neither well nor not well ☐ slightly ☐ not at all

C10. How often can you check and maintain the paddocks your horse is kept in?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

C11. How often are you able to check and maintain your horse's paddocks fencing?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

C12. How often can you check and maintain the stables your horse is kept in?.
☐ daily ☐ weekly ☐ fortnightly ☐ monthly ☐ yearly ☐ never

C13. How difficult is it for you to ensure that stables do not restrict your horse's freedom to move?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C14. How difficult is it for you to ensure that stables do not restrict your horse's freedom to lie down?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C15. How difficult is it for you to provide your horse with shelter from the wind?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C16. How difficult is it for you to provide your horse with shelter from the sun?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C17. How difficult is it for you to provide your horse with shelter from the rain?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult
C18. How often are you able to check your horse's condition?.
☐ morning and night ☐ daily ☐ weekly ☐ fortnightly ☐ never

C19. How difficult is it for you to provide your horse with daily supervision?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C20. How difficult is it for you to load and transport your horse?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C21. How difficult is it for you to ride your horse?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C22. To what extent are you able to manage and care for your horse in a manner suitable for the work they are performing?.
☐ completely ☐ reasonably well ☐ neither well nor not well ☐ slightly ☐ not at all

C23. How difficult is it to get your horse to respond appropriately to your riding aids?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C24. To what extent are you able to ensure you have good basic riding skills?.
☐ very well ☐ well ☐ neither well nor not well ☐ not well ☐ not at all

C25. How much physical effort do you need to use to make your horse respond in the manner you want it to?.
☐ a lot ☐ reasonable ☐ neither a lot nor very little ☐ slight ☐ very little

C26. How difficult is it for you to provide your horses with regular exercise or paddock turnout?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C27. How difficult is it for you to provide your horse with social contact from other horses?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C28. How often are you able to treat your horses for worms?.
☐ monthly ☐ 3 months ☐ 6 months ☐ yearly ☐ 2 years ☐ never

C29. How difficult is it for you to have your horse's teeth regularly attended to?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C30. How often are you able to attend to your horse's hooves?.
☐ 4-8 weeks ☐ 3 months ☐ 6 months ☐ yearly ☐ 2 years ☐ not necessary

C31. How difficult is it for you to have a veterinarian inspect your unwell horse?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C32. How difficult is it for you to have a veterinarian annually check your horse?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C33. How difficult would it be for you to recognize the signs of ill-health in your horse and contact a veterinarian for diagnosis and treatment?.

☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C34. How difficult is it for you to recognize, access and respond to lameness in your horses?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C35. How difficult is it for you to recognize, access and respond to injuries in your horses?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C36. To what extent do you know how to look after a horse?.
☐ extensive knowledge ☐ good knowledge ☐ neither good nor bad ☐ little knowledge ☐ no knowledge

C37. To what extent are you aware of the possible risks to horses' welfare?.
☐ very aware ☐ reasonably aware ☐ neither aware nor unaware ☐ reasonably unaware ☐ very unaware

C38. To what extent are you alert when handling your horses?.
☐ very alert ☐ reasonably alert ☐ neither alert nor unalert ☐ reasonably unalert ☐ very unalert

C39. What techniques do you use to change your horse's behaviour?.
☐ discipline ☐ continued work ☐ work over a number of days ☐ seek assistance ☐ withhold feed

C40. How difficult do you find it to handle your horses?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C41. How difficult is it for you to be responsible for your horse's welfare?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C42. How difficult is it for you to access information and assistance from industry personnel to improve the way you handle and care for your horses?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

C43. How difficult is it for you to learn new things about horses?.
☐ very easy ☐ easy ☐ neither easy nor difficult ☐ difficult ☐ very difficult

APPENDIX THREE – HORSE & HORSE HUSBANDRY AND MANAGEMENT INSPECTION

PARTICIPANT		
LOCATION		
HORSE 1 NAME		
HORSE 1	**AGE**	**BREED**
HORSE 2 NAME		
HORSE 2	**AGE**	**BREED**
DATE & TIME		
WEATHER		
OWNER OR PC		
NUMBER OF HORSES		

CURRENT VETERINARY TREATMENT	**HORSE 1**	**HORSE 2**
Is the horse currently receiving any veterinary treatment?		
Is the horse currently receiving any veterinary treatment?		
Veterinarian's details		

1. FEEDING.

BODY CONDITION SCORE				
STUDENT RESEARCHER SCORING				
	NECK	**BACK & RIBS**	**PELVIS**	**OVERALL BCS**
HORSE 1				
HORSE 2				
HORSE OWNER/PRIMARY CARER SCORING				
	NECK	**BACK & RIBS**	**PELVIS**	**OVERALL BCS**
HORSE 1				
HORSE 2				

HORSE 1	**FEEDING ROUTINE**					
FEED TYPE	**1 X DAY**	**2 X DAY**	**OTHER**	**AM**	**PM**	**OTHER**
None						
Pasture						
Grass Hay						
Lucerne Hay						
Hay (Other)						
Oaten Chaff						
Lucerne Chaff						
Grain						
Processed Feed						
Suppliments						
Other						

HORSE 2	FEEDING ROUTINE					
FEED TYPE	**1 X DAY**	**2 X DAY**	**OTHER**	**AM**	**PM**	**OTHER**
None						
Pasture						
Grass Hay						
Lucerne Hay						
Hay (Other)						
Oaten Chaff						
Lucerne Chaff						
Grain						
Processed Feed						
Suppliments						
Other						

PASTURE QUANTITY				
	BARE	**SCARCE**	**GOOD**	**ABUNDANT**
HORSE 1				
HORSE 2				

Table. Pasture Quantity Scale.

SCALE	DESCRIPTION
Bare	no pasture
Scarce	under 50% pasture
Good	over 50% pasture
Abundant	90-100% pasture

PASTURE QUALITY					
	100% green	¾ green ¼ dead	½ green ½ dead	¼ green ¾ dead	100% dead
HORSE 1					
HORSE 2					

	HORSE 1	HORSE 2
Number of horses in paddock		

HORSE 1	WATERING METHOD & INSPECTION						
WATER SOURCE	**QUANTITY (L)**	**1X DAY**	**2 X DAY**	**WEEKLY**	**MONTH**	**OTHER**	**NEVER**
None							
Automatic Troughs							
Hand-filled troughs							
Dam							
Creek							
Bucket							
Other							

HORSE 2	WATERING METHOD & INSPECTION						
WATER SOURCE	**QUANTITY (L)**	**1X DAY**	**2 X DAY**	**WEEKLY**	**MONTH**	**OTHER**	**NEVER**
None							
Automatic Troughs							
Hand-filled troughs							
Dam							
Creek							
Bucket							
Other							

2. HOUSING.

HOUSING METHOD	HORSE 1		HORSE 2	
	DAY	NIGHT	DAY	NIGHT
Full Time Paddock				
Full Time Stable				
50% Stable / 50% Paddock				
25% Stable / 75 % Paddock				
75% Stable / 25% Paddock				
Other				

PADDOCK SIZE		
	HORSE 1	HORSE 2
Yard		
< ¼ hectare		
¼ - ½ hectare		
½ - 1 hectare		
1-4 hectares		
5 – 10 hectares		
11 – 20 hectares		
> 20 hectares		
OTHER		

FENCING TYPE		
Fencing Material	HORSE 1	HORSE 2
Barbed Wire		
Non-barbed/Plain Wire		
Wood/Plastic Post & Rail		
Electric		
Wooden Palings (residential)		
Other		

PADDOCK CONDITIONS			
HORSE 1	**CONDITIONS SCORE**		
AREAS OF INTEREST	**GOOD**	**REASONABLE**	**POOR**
Dry area availability			
Condition/maintenance of paddock fencing & fittings			
Level of safety in paddock			
HORSE 2	**CONDITIONS SCORE**		
AREAS OF INTEREST	**GOOD**	**REASONABLE**	**POOR**
Dry area availability			
Condition/maintenance of paddock fencing & fittings			
Level of safety in paddock			

STABLE SIZE (square meters)					
	< 3	**3 – 3.4**	**> 3.4**	**OTHER**	**NOT STABLED**
HORSE 1					
HORSE 2					

STABLE CONDITIONS & MAINTANENCE			
HORSE 1	**SCORE**		
AREAS OF INTEREST	**GOOD**	**REASONABLE**	**POOR**
Ventilation			
Lighting			
Condition/Maintenance of stable & fittings			
Level of safety in stable			
HORSE 2	**SCORE**		
AREAS OF INTEREST	**GOOD**	**REASONABLE**	**POOR**
Ventilation			
Lighting			
Condition/Maintenance of stable & fittings			
Level of safety in stable			

STABLE BEDDING		
BEDDING TYPE	**HORSE 1**	**HORSE 2**
Straw		
Shavings		
Synthetic		
Other		
Not Stabled		

SHELTER AVAILABILITY			
	CONDITION TYPE		
	WIND	**RAIN**	**SUN**
HORSE 1			
HORSE 2			

3. HEALTH.

HEALTH SCORES & MEASURES		
	HORSE 1	**HORSE 2**
LAMENESS SCORE (1-3)		
HOOF SCORE (1-4)		
SHOD		
BARE FOOT		
LAST FARRIER VISIT		
NEXT FARRIER VISIT		
LAST WORMING		
NEXT WORMING		
LAST DENTIST VISIT		
NEXT DENTIST VISIT		
VACCINATION		

Table. Lameness Scoring

SCORE	DESCRIPTION
1	normal
2	irregular
3	avoid weight baring

Table. Hoof Condition Scoring

SCORE	DESCRIPTION
1	short
2	normal
3	long
4	overgrown

EYE CONDITION				
	WEEPING	DULL	BRIGHT	OTHER
HORSE 1				
HORSE 2				

COAT CONDITION					
	SHORT	LONG	DULL	GLOSSY	OTHER
HORSE 1					

HORSE 2					

WOUND/INJURY SCORING				
HORSE 1	**WOUND/INJURY TYPE**			
BODY AREA	**SCRATCH/ABRASION**	**CUTS**	**SWELLINGS**	**WOUNDS**
Head				
Neck				
Shoulders/Chest				
Stomach/Back				
Rump				
Legs				
HORSE 2	**WOUND/INJURY TYPE**			
BODY AREA	**SCRATCH/ABRASION**	**CUTS**	**SWELLINGS**	**WOUNDS**
Head				
Neck				
Shoulders/Chest				
Stomach/Back				
Rump				
Legs				

HORSE 1	**TREATMENT METHOD**			
DISEASE/ILLNESS/INJURY	**VET**	**OWNER/CARER**	**OTHER**	**NONE**
HORSE 2	**TREATMENT METHOD**			
DISEASE/ILLNESS/INJURY	**VET**	**OWNER/CARER**	**OTHER**	**NONE**

4. BEHAVIOUR.

SOCIAL (HORSE) INTERACTION LEVEL IN PADDOCK					
	INTERACTION	**TOUCH**	**SIGHT**	**SOUND**	**NONE**
HORSE 1					
HORSE 2					

SOCIAL (HORSE) INTERACTION LEVEL IN STABLE					
	INTERACTION	**TOUCH**	**SIGHT**	**SOUND**	**NONE**
HORSE 1					
HORSE 2					

STEREOTYPIC BEHAVIOUR				
STEREOTYPY	**HORSE 1**	**OBS(O)/INFORM (I)**	**HORSE 2**	**OBS(O)/INFORM (I)**
Windsucking				
Crib Biting				
Weaving				
Head Bobbing				
Pawing				
Unsure/Unknown				
Other				
None				

FEAR TESTING				
HORSE 1	**HOUSING**	**HORSES RESPONSE**		
APPROACH TEST	**STABLE/PADDOCK**	**APPROACHS**	**REMAIN STATIONARY**	**AVOIDS**
Owner/Carer				
Researcher				
HORSE 2	**HOUSING**	**HORSES RESPONSE**		
APPROACH TEST	**STABLE/PADDOCK**	**APPROACHS**	**STATIONARY**	**AVOIDS**
Owner/Carer				
Researcher				

APPENDIX FOUR – QUALITATIVE INTERVIEW GUIDE

Recording Number:

Date:

Participant Number:

1. Participants' involvement with recreational horses in Victoria.

a. How did your interest in horses develop?

b. How did you then come to be involved with recreational horses?

c. How did you acquire your first horse? And subsequent horses?

d. Where does your interest in horses lie?

Probe:

- which discipline?

e. To what extent do you interact with other horse owners?

Probe:

- what types of horse owners?
- how did you come to interact with them?
- what does your interaction with them involve? How often?

f. Are you a member of any horse clubs or societies?

Probe:

- how did you come to be involved with these horse clubs or societies?
- what does your involvement entail?
- what has this involvement meant to you? How have you benefited or lost?

g. What plans do you have for future involvement with recreational horses in Victoria?

2. **Participants' views on recreational horse industry and ownership today.**
   a. **What do you think of recreational horse ownership in Victoria?**

   b. **What do you believe the important issues in the Victorian recreational horse industry are?**

   c. **What do you think of the accessibility and value of the information, resources and support available to recreational horse owners in Victoria?**
      Probe:
      - where or from whom do you seek information, advice or support from?

   d. **What problems do you encounter or see in owning recreational horses in Victoria?**
      Probe:
      - reasons why?

   e. **What benefits do you gain in owning recreational horses in Victoria?**

   f. **How do you think recreational horse ownership in Victoria could be improved?**
      Probe:
      - what may be required?

3. **Participants' views on welfare issues and concerns in recreational horses.**
   a. **What are your thoughts on the welfare concerns and problems facing recreational horses in Victoria?**
      Probe:
      - what do you believe the major concerns and problems are?

   b. **Why do you think these welfare concerns and problems may arise?**

   c. **What do you think could be done to manage and prevent these welfare concerns and problems from arising?**

   d. **How confident are you in your ability to determine your horses' welfare?**
      Probe:
      - ability to make decisions and their confidence in doing so?
      - do they have enough information and support?

   e. **What is the decision process involved in:**

a) determining when your horse is no longer of use to you (no longer suitable/too old)

b) the manner in which you deal with this situation?

4. Participants' views on registration and identification of recreational horses.

<u>Horse Identification</u>

a. What are your thoughts on horse identification?

b. Are your horses identifiable in any way?

Yes - Probe:

- how is your horse identifiable?
- how did participant come to identify horse?
- what does this identification entail?
- what benefits are their to ensuring your horse is identifiable?

No – Probe:

- have you thought about making your horse identifiable?
- what are your reasons behind not identifying your horse?
- would you make your horse identifiable in the future, if so how?
- do you see any benefits/ disadvantages associated with identifying and not identifying your horse?

<u>Horse Registration</u>

a. How important do you think it is to have a horse registration system?

- what are your thoughts on horse registration?

Probe:

- would you support horse registration?

b. What are your thoughts on a registration levy?

Probe:

- how important do you think it is to have a registration levy on the industry?

c. Are your horses registered in any way?

Yes - Probe:

- how is your horse registered?
- how did participant come to register horse?
- what does registering horse entail?
- what benefits are their to registering your horse?

No – Probe:

- have you thought about registering your horse?=
- what are your reasons behind not registering your horse?
- would you register your horse in the future, if so how?
- do you see any benefits/ disadvantages associated with registering and not registering your horse?

Emergency Response Levy

a. Have you heard of EADRA, and are you aware of its benefits? (expand if required)

EADRA – Emergency Disease Response Agreement.

- An emergency disease response agreement between the government and animal industries.
- EADRA provides a mechanism for an effected animal industry to call for assistance from the government during/after a disease outbreak.
- EADRA requires a levy to be paid by those involved in the effected industry to help repay costs associated with response.
- Horse industry does not have an EADRA agreement.
- Under normal circumstances (if human health is not at risk) the government has no obligation to mount an emergency response to an animal disease outbreak.

Yes - Probe:

- how did participant hear about EADRA?

- participants thoughts regarding EADRA?

No - Probe:

- participants thoughts regarding EADRA?

b. Are you aware of the horse industries attempts to form an EADRA agreement with the government and therefore introduce a compulsory levy to help repay some of the costs associated with an emergency animal disease response?

Yes - Probe:

- how did participant hear about proposal?
- participants thoughts regarding the proposal?
- would participant support the proposal?

No - Probe:

- participants thoughts regarding the proposal?
- would participant support the proposal?

c. Are you aware of the mechanisms proposed to allow horse owners to pay the levy?

Probe:

- participants thoughts regarding the mechanisms of levy collection?
- are they aware of the mechanisms proposed to allow horse owners to pay the levy?
- alternative levy collection mechanisms?

d. Are you aware of what the benefits of EADRA would mean to the horse industry? Thoughts?

e. Are you aware that without an EADRA agreement and levy there will be no government assistance for any future outbreak of an exotic disease? Thoughts?

Probe:

- what would you do if there were to be an exotic disease outbreak and there was no government assistance to the horse industry?

<u>AHIC Proposed Annual Levy</u>

While this proposal has yet to be taken to the public for consideration, the Australian Horse Industry Council has proposed uniform regulation of micro-chipping of horses to ensure it is all performed to the same standard and involving ISO-compliant technology. The AHIC has

just received agreement from the 14 largest horse industry organizations for a proposed annual levy to be paid at the time of recording/registering horses' details.

- The levy, to be paid once a year, would be used to fund ongoing activities in the horse industry, i.e. R & D, promotion, consultation, etc.
- Such a levy is already in place in all other livestock industries.
- This levy would be separate from any levy imposed to repay debt from a disease outbreak, which would only be imposed after an emergency disease outbreak had been declared over.

a. What are your thoughts regarding the proposal?

b. Would you support such a proposal?

c. What do you think would be an appropriate annual fee/horse?

<u>Systems of Horse Registration and Identification</u>

a. Do you have any ideas on systems of registration and identification of horses that could be implemented in Victoria?

b. What type of regulatory framework do you think may be appropriate for recreational horses in Victoria?

Probe:

- how does participant feel about systems such as micro-chipping, disease control and levy?

5. Any other matters horse owners want to discuss.

Anything further that participant may want to discuss regarding recreational horses in Victoria.

a. Is there anything else that you would like to discuss?

APPENDIX FIVE – INDIVIDUAL ATTITUDE VARIABLES THAT DID NOT FORM PART OF AN ATTITUDE SUBSCALE

Individual attitude variable
Random telephone questionnaire
F1. It is important to ensure that horse owners know how to look after a horse
F4. It is not important to provide horses with regular exercise
F5. Horses are difficult to look after*:* (-ve RC)
F10. It is not necessary to regularly attend to horses teeth*:* (-ve RC)
F13. Horses are dangerous
F16. It is not necessary to provide horses with a constant supply of water
F19. Horses are powerful
F23. Horses are not difficult to transport
F34. Horses are not hard to handle
F36. Horses are kind animals
F22. It is important to treat horses regularly for worms
F27. Horses do not require a great deal of care*:* (-ve RC)
F37. It is annoying that I sometimes have to change my plans because of my horse
F38. Losing my horse would be a traumatic experience
F39. It is important that my horse responds appropriately to my riding aids
Attitude Questionnaire
A2. Being overweight can be a serious problem for horses
A4. How important is it that horses have a constant supply of water? (-ve RC)
A8. When determining which rugs to use, is it better for a horse to be too hot or too cold? (-ve RC)
A9. It is my responsibility to provide a safe environment for my horse (-ve RC)
A12. How often should you check and maintain the stables horses are housed in?(-ve RC)
A20. Horses are not difficult to load and transport (-ve RC)
A21. Horses are difficult to ride
A23. How important is it that a horse responds appropriately to riding aids? (-ve RC)
A24. How important is it for a rider to have good basic riding skills? (-ve RC)
A25. How much physical effort is appropriate when asking a horse do what you want? (-ve RC)
A28. How often should you treat horses for worms? (-ve RC)
A38. How important is it to be alert when handling horses? (-ve RC)
A39. What techniques should be used to change a horse's behaviour?(-ve RC)
A40. Horses are not hard to handle (-ve RC)
A42. Industry personnel can provide information and assistance that can improve the way we handle and care for horses.
A46. Horses are difficult to look after
A52. Horses are powerful
A56. Horses are stubborn animals (-ve RC)
A59. It is annoying that a horse can make you change your plans (-ve RC)
B12. How often do other horse owners believe you should check and maintain the stables horses are housed in?.
B20. Other horse owners suggest horses are not difficult to load and transport(-ve RC)
B21. Other horse owners believe horses are difficult to ride(-ve RC)

B25. How much physical effort do other horse owners believe is appropriate when asking a horse to do what you want (when handling or riding)? (-ve RC)

B28. How often do other horse owners suggest that horses should be treated for worms? (-ve RC)

B39. What techniques do other horse owners believe should be used to change a horse's behaviour? (-ve RC)

B40. Other horse owners believe horses are not hard to handle(-ve RC)

C5. To what extend do you consider the weather when determining your horses' water supply? (-ve RC)

C20. How difficult is it for you to load and transport your horse?

C23. How difficult is it to get your horse to respond appropriately to your riding aids?

C25. How much physical effort do you need to use to make your horse respond in the manner you want it to? (-ve RC)

C38. To what extent are you alert when handling your horses?

C39. What techniques do you use to change your horses behaviour?

C40. How difficult do you find it to handle your horses?.

C43. How difficult is it for you to learn new things about horses?.

NOTE: (-ve RC) re-coded negative attitude item

APPENDIX SIX – HORSE OWNER ATTRIBUTE VARIABLES

Horse owner-based variables

Horse owner attribute variable	Variable description/measurement	Measurement tool	Variable coding
Background factor			
Region type	Determines the type of region (regional or urban) where the horse owner's primary residence is located	RTS	1 = urban 2 = regional/rural
Age	Determines the horse owner's age	RTS	Years
Age (bracket)	Determines the horse owner's age bracket	RTS	1 = <18 years 2 = 18-25 years 3 = 26-35 years 4 = 36-45 years 5 = 46-55 years 6 = 56-65 years 7 = 65+ years
Gender	Determines the horse owner's gender	RTS	1 = male 2 = female
Children	Determines whether the horse owner has children	RTS	1 = yes 2 = no
Education level	Determines the horse owner's level of education	RTS	1 = have not completed high school 2 = secondary education 3 = tertiary education 4 = post-tertiary education 5 = TAFE course completion
Occupation type	Determines the horse owner's occupation	RTS	1 = professional 2 = non-professional 3 = trades and services 4 = student 5 = unemployed 6 = domestic 7 = other
Annual household income	Determines the horse owner's annual household income	RTS	1 = < $20 000 2 = $21 000-$35 000

			3 = $36 000-$50 000 4 = $51 000-$70 000 5 = $71 000-$100 000 6 = > $100 000
Property type	Determines the horse owner's type of primary residence	RTS	1 = apartment/townhouse 2 = small land block 3 = large land block 4 = acreage
Property size	Determines the size of the horse owner's property (primary residence)	RTS	Hectares
Horse numbers	Determines the number of horses owned by the horse owner	RTS	
Animals	Determines the type of animals other than horses that the horse owner owns	RTS	1 = yes 2 = no
Horse club or society member	Determines whether the horse owner is a horse club or society member	RTS	1 = yes 2 = no
Registered horse owner	Determines whether the horse owner is a registered horse owner	RTS	1 = yes 2 = no
Horse ownership years	Determines the number of years the horse owner has owned horses	RTS	Years
Riding instruction	Determines whether the horse owner has at some point in time received horse riding instruction	RTS	1 = yes 2 = no
Riding instruction frequency	Determines the horse owner's frequency of riding instruction	RTS	1 = daily 2 = 2-3 times/week 3 = weekly 4 = fortnightly 5 = monthly 6 = yearly
Awareness of the Code of Practice pertaining to the welfare of recreational horses	Determines the horse owner's awareness of the Code of Practice pertaining to the welfare of recreational horses	RTS	1 = yes 2 = no
Actively improve knowledge	Determines whether the horse owner actively improves their knowledge of horse ownership	RTS	1 = yes 2 = no
Horse owner attitudes			
Positive statements about horses	Measures horse owner's positive attitudes towards horses	RTS	1 = agree strongly 2 = agree 3 = neither agree nor disagree

			4 = disagree 5 = strongly disagree
Negative statements about horses	Measures horse owner's negative attitudes towards horses	RTS	1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Horses require resource provision	Measures horse owner's attitudes about the substantial resources required by recreational horses	RTS	1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
General horse husbandry and management	Measures horse owner attitudes about the general horse husbandry and management	RTS	1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
The importance of the horse to the owner	Measures the importance of the horse to the horse owner	RTS	1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Horse welfare is not the horse owners responsibility	Measures horse owners attitude towards horse welfare not being the horse owners responsibility	RTS	1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
General attitude statements	Measures the horse owner's attitude towards general positive statements about horses and horse ownership	On-SI	1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Horse husbandry and management - Health and welfare (Bb)	Measures the horse owner's attitude towards the performance of horse husbandry and management practices concerning horse health and welfare	On-SI	1 = very important 2 = important 3 = neither important nor unimportant 4 = unimportant 5 = not important

			Or 1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Horse husbandry and management – Housing (Bb)	Measures the horse owner's attitudes towards the performance of horse husbandry and management practices concerning horse housing	On-SI	1 = very important 2 = important 3 = neither important nor unimportant 4 = unimportant 5 = not important Or 1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Human-horse interactions (Bb)	Measures the horse owner's beliefs about the human-horse relationship	On-SI	1 = very important 2 = important 3 = neither important nor unimportant 4 = unimportant 5 = not important Or 1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Horse husbandry and management - Diet (Nb)	Measures the horse owner's normative beliefs about other horse owners attitudes towards the performance of horse husbandry and management practices concerning horse diet	On-SI	1 = very important 2 = important 3 = neither important nor unimportant 4 = unimportant 5 = not important Or 1 = agree strongly 2 = agree 3 = neither agree nor disagree

			4 = disagree 5 = strongly disagree
Horse husbandry and management - Health and welfare (Nb)	Measures the horse owner's normative beliefs about other horse owners attitudes towards the performance of horse husbandry and management practices concerning horse health and welfare	On-SI	1 = very important 2 = important 3 = neither important nor unimportant 4 = unimportant 5 = not important Or 1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Horse husbandry and management – Housing (Nb)	Measures the horse owner's normative beliefs about other horse owners attitudes towards the performance of horse husbandry and management practices concerning horse housing	On-SI	1 = very important 2 = important 3 = neither important nor unimportant 4 = unimportant 5 = not important Or 1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Human-horse interactions (Nb)	Measures the horse owners normative beliefs about other horse owners attitudes towards the human-horse relationship	On-SI	1 = very important 2 = important 3 = neither important nor unimportant 4 = unimportant 5 = not important Or 1 = agree strongly 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
Horse husbandry and management - Diet (Cb)	Measures the horse owner's control beliefs about how able they are to perform horse husbandry and management	On-SI	1 = very easy 2 = easily

	practices concerning horse diet		3 = neither easy nor difficult 4 = difficult 5 = very difficult
Horse husbandry and management - Health and welfare (Cb)	Measures the horse owner's control beliefs about how able they are to perform horse husbandry and management practices concerning horse health and welfare	On-SI	1 = very easy 2 = easily 3 = neither easy nor difficult 4 = difficult 5 = very difficult
Horse husbandry and management – Housing (Cb)	Measures the horse owner's control beliefs about how able they are to perform horse husbandry and management practices concerning horse housing	On-SI	1 = very easy 2 = easily 3 = neither easy nor difficult 4 = difficult 5 = very difficult
Human-horse interactions (Cb)	Measures the horse owner's control beliefs about how able they are to perform behaviours regarding human-horse relationship	On-SI	1 = very easy 2 = easily 3 = neither easy nor difficult 4 = difficult 5 = very difficult
Horse owner behaviour			
Registered horse	Determines whether the horse owner registers their horse with a horse club, society or organisation	RTS	1 = yes 2 = no
Registration type	Determines the type of horse registration employed by the horse owner	RTS	1 = council 2 = breed organisation 3 = equestrian organisation 4 = other 5 = horse not registered
Resources	Measures the range of resources the horse owner provides to their horse (resources include water, pasture, hay, supplementary feeding, shelter, rugs, and social contact)	RTS & ON-SI	1 = none of seven options 2 = one of seven options 3 = two of seven options 4 = three of seven options 5 = four of seven options 6 = five of seven options 7 = six of seven options 8 = all options
Daily human-horse interaction	Determines whether the horse owner interacts with their horse on a daily basis	RTS	1 = yes 2 = no
Daily human-horse interaction time	Measures the average amount of time the horse owner	RTS	1 = do not interact with horse each day

	spends interacting with their horse each day		2 = < 30 minutes/day 3 = 30-60 minutes/day 4 = 60-120 minutes/day 5 = 120-180 minutes/day 6 = > 180 minutes/day
Ride	Determines whether the horse owner rides their horse	RTS	1 = yes 2 = no
Compete	Determines whether the horse owner competes in equine competitions	RTS	1 = yes 2 = no
Advice	Measures whether the horse owner seeks advice from industry personnel	RTS	1 = yes 2 = no
Horse owner approach	Measures the horse owners approach to their horse; calm and steady or quick and abrupt	On-SI	Researcher observes horse owners approach to horse 1 = calm and steady 2 = quick and abrupt
Parasite control behaviour	Measures the horse owner's parasite control behaviour by determining the time interval between the most recent and the next scheduled parasite control treatment	On-SI	– When did you last (date) worm/drench your horse? – When are you next scheduled (date) to worm/drench your horse?
Hoof care behaviour	Measures the horse owner's hoof care behaviour by determining the time interval between the most recent and the next scheduled hoof care (i.e. hoof trim or shoeing) treatment	On-SI	– When did you last (date) have your horse's hooves trimmed or shod? – When are you next scheduled (date) to have your horse's hooves trimmed or shod?
Dental care behaviour	Measures the horse owner's dental care behaviour by determining the time interval between the most recent and the next scheduled dental care treatment	On-Si	– When did you last (date) have your horse's teeth checked? – When are you next scheduled (date) to have your horse's teeth checked?
Veterinary inspection	Measures the number of times the horse owner has sought veterinary inspection of their horse in the preceding 12 months	On-Si	In the last 12 months how many times has the vet attended to your horse?

Shod	Measures whether the horse is shod	On-SI	1 = yes 2 = no
Barefoot	Measures whether the horse receives barefoot trimming	On-SI	1 = yes 2 = no
BC Inspection	Measures the frequency with which the horse owner inspects the horses body condition for injury, illness, disease or abnormalities	On-SI	1 = twice daily 2 = daily 3 = 2-3 times/week 4 = weekly 5 = fortnightly 6 = monthly
Supplementary feeding	Measures the horse owner's provision of feed other than pasture to their horse	On-SI	1 = no supplementary feeding 2 = roughage 3 = grain or processed feed 4 = roughage and grain/processed feed
Horse region type	Measures the region type where the horse owner houses their horse	On-SI	1 = urban 2 = regional/rural
Horse location	Measures the location where the horse owner houses the horse	On-SI	1 = primary residence 2 = own land away from primary residence 3 = leased land 4 = commercial agistment property 5 = private agistment 6 = family property 7 = friends property 8 = riding school 9 = other
Primary residence housed	Measures whether the horse is housed at the horse owner's primary residence	RTS	1 = yes 2 = no
Distance between horse and horse owner's primary residence	Measure the distance the horse owner houses the horse from their primary residence	RTS & On-SI	1 = primary residence 2 = 1-5 kms 3 = 6-10 kms 4 = 11-20 kms 5 = 21-40 kms 6 = 41-60 kms 7 = 61-100 kms 8 = > 100 kms
Degree of general supervision at	Measures the degree of general supervision under which	RTS	1 = at all times

horse's housing location	the horse owner houses the horse		2 = majority of the day 3 = a few hours/day 4 = night and early morning 5 = daylight hours 6 = once daily 7 = not every day
Summer diet	Measures the diet the horse owner provides to the horse in summer	RTS	1 = pasture 2 = hay/roughage 3 = grain/processed feed 4 = pasture and hay/roughage 5 = pasture and grain/processed feed 6 = hay/roughage and grain/processed feed 7 = pasture, hay/roughage and grain/processed feed
Winter diet	Measures the diet the horse owner provides to the horse in winter	RTS	1 = pasture 2 = hay/roughage 3 = grain/processed feed 4 = pasture and hay/roughage 5 = pasture and grain/processed feed 6 = hay/roughage and grain/processed feed 7 = pasture, hay/roughage and grain/processed feed
Pasture quality	Measures the quality of the pasture the horse owner provides to their horse	On-SI	1 = 0% green pasture 2 = 25% green pasture 3 = 50% green pasture 4 = 75% green pasture 5 = 100% green pasture
Pasture quantity	Measures the quantity of pasture the horse owner provides to their horse	On-SI	1 = bare 2 = scarce 3 = good 4 = abundant
Stocking density	Measures the number of horses the horse owner houses with their horse	On-SI	Horse numbers
Water source inspection	Measures the frequency with which the horse owner inspects the horses water source	On-SI	1 = twice/day 2 = daily

			3 = weekly 4 = monthly
Housing method	Measures the horse owner's method of housing their horse		1 = full time paddock 2 = full time stable 3 = predominantly paddock/some stable 4 = predominantly stable/some paddock 5 = paddock day/stable night 6 = paddock night/stable day 7 = yards
Housed in paddock	Measures whether the horse is housed predominantly in a paddock	RTS	1 = yes 2 = no
Paddock size	Measures the size of the paddock in which the horse owner houses their horse	On-SI	0 = horse not housed in paddock 1 = <1/2 hectare 2 = ½ - 1 hectare 3 = 1-4 hectares 4 = 5-10 hectares 5 = 11-20 hectares 6 = > 20 hectares
Shelter availability	Measures the type of shelter the horse owner makes available to their horse	On-SI	1 = wind, rain and sun shelter 2 = wind and rain shelter 3 = wind and sun shelter 4 = rain and sun shelter 5 = wind shelter 6 = rain shelter 7 = sun shelter

Horse-based variables

Horse-based variable	Variable description/measurement	Measurement tool	Variable coding
Age	Determines the horse's age	RTS	Years
Age (bracket)	Determines the horse's age bracket	RTS	1 = <1 year 2 = 1-4 years 3 = 5-10 years 4 = 11-15 years 5 = 16-20 years 6 = 21-25 years 7 = 26+ years
Gender	Determines the horse's gender	RTS	1 = mare/filly 2 = gelding 3 = stallion/colt
Breed	Determines the horse's breed	RTS	1 = Arabian 2 = Pony 3 = Appaloosa/paint/pinto 4 = Australian stock horse 5 = Quarter horse 6 = Standardbred 7 = Thoroughbred (unraced) 8 = Thoroughbred (raced) 9 = Warmblood 10 = Crossbred 11 = Other
Body condition score (BCS)	The researchers visual and touch assessment of the horse's body fat cover	On-SI	BCS was assessed using the Carol and Huntington (1988) scale of 0 to 5; 0 = very poor 1 = poor 2 = moderate 3 = good 4 = fat 5 = very fat
Horse owner body condition score	The horse owners assessment of the horse's body fat cover	On-SI	*BCS* was assessed using the Carol and Huntington (1988) scale of 0 to 5; 0 = very poor

			1 = poor 2 = moderate 3 = good 4 = fat 5 = very fat
Lameness score (LS)	The researchers rating of the soundness of the horses gait at a walk	On-SI	*LS* was determined by the researcher when the horse is led at a walk by the horse owner in a straight line on flat ground. The horses soundness of gate is ranked on a scale of 1-3; 1 = regular 2 = irregular 3 = avoids weight baring
Hoof score (HS)	The researchers assessment of the condition of the horse's hooves	On-SI	*HS* was determined by the researcher when examining the horse's hooves. The condition of the horse's hooves is given a rated on a scale of 1-4; 1 = short 2 = normal 3 = long 4 = overgrown
Injury score (IS)	Records the presence of any form of injury (scratches, abrasions, cuts, swellings and wounds) on the horse's body and legs	On-SI	*IS* was determined via inspection of the horse and discussion with the participant. The horse's body and legs were examined by the researcher for the presence of scratches, abrasions, cuts, swellings and

			wounds. Scored according to the presence of injury; 1 = yes 2 = no
Disease, illness and injury score (DIIS)	Records the horse's disease, illness and injury status	On-SI	DIIS was determined by the researcher via inspection of the horse and discussion with the participant. It was scored according to the presence of a disease, illness and/or injury; 1 = yes 2 = no
Recent health problems	Determines whether the horse has had recent health problems	RTS	1 = yes 2 = no
Type of health problem	Determines the type of recent health problems the horse has experienced (preceding 12 months)	RTS	0 = no recent health problems 1 = lameness 2 = laminitus/founder 3 = colic 4 = wound 5 = swelling/heat 6 = bone fractures/breaks 7 = other

APPENDIX SEVEN – HORSE BCS ASSESSMENT

During the on-site horse and horse husbandry inspection horses underwent a BCS by both the researcher and the horse owner, which provided an estimate of body fat cover, which is made independently of the horse's body weight, size or conformation. The most commonly used method of condition scoring in Australia, and the method which was used during the on-site inspections, was developed by Carol and Huntington (1988), and employs a scale of 0 to 5, where 0 is very poor and 5 is very fat.

Method of BCS Estimation (Carol and Huntington, 1988)

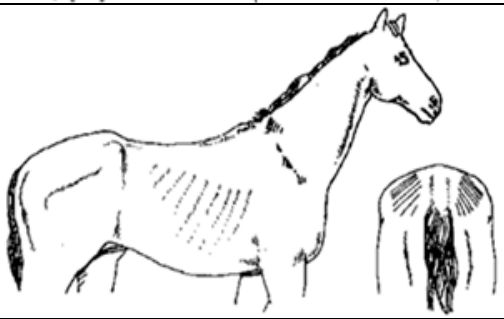
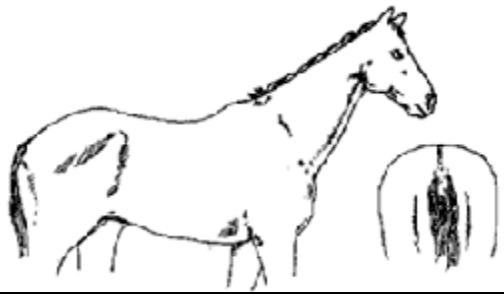
1. Assess visually the horses' pelvis and rump, back and ribs, and neck. A hand may be run over the animal to assist with assessment.
2. Give those areas individual scores using a scale of 0 (very poor) to 5 (very fat).
3. Intermediate assessments can be given half scores.
4. Using the pelvis and rump as a base, adjust the score by a half point if it differs from the score for the neck and ribs.

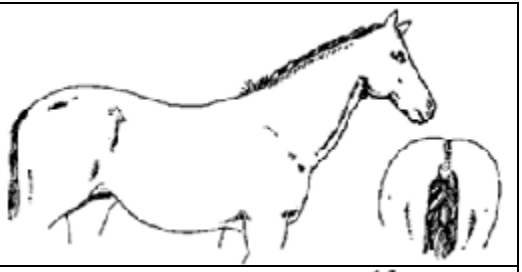
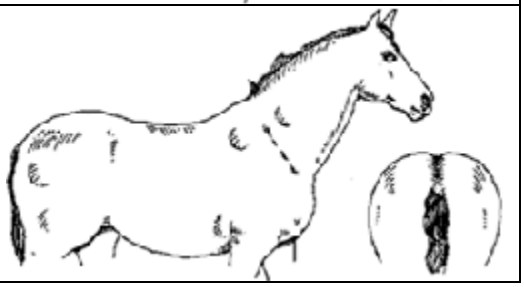
BCS Scoring system

Score	**Neck**	**Back & ribs**	**Pelvis**
0 – Very Poor	*Marked ewe neck.* *Narrow and slack at base.*	*Skin tight over ribs.* *Spinous processes sharp and easily seen.*	*Angular pelvis - skin tight.* *Deep cavity under tail and either side of croup.*
1 – Poor	*Ewe neck.* *Narrow and slack at base.*	*Ribs easily visible.* *Skin sunken either side of* *Backbone. Spinous processes well defined*	*Rump sunken, but skin supple.* *Pelvis and croup well defined* *Deep depression under tail.*
2 – Moderate	*Narrow but firm*	*Ribs just visible* *Backbone well covered* *Spinous processes felt*	*Rump flat either side of backbone.* *Croup well defined, some fat.* *Slight cavity undertail*
3 – Good	*No crest (except stallions)* *Firm neck*	*Ribs just covered* *No gutter along the back.* *Spinous processes covered but can be felt*	*Covered by fat and rounded.* *No gutter.* *Pelvis easily felt*

4 – Fat	*Slight crest*	*Ribs well covered – need firm pressure to feel* *Gutter along backbone.*	*Gutter to root of tail.* *Pelvis covered by soft fat – felt only with firm pressure*
5 – Very fat	*Marked crest* *Very wide and firm.* *Folds of fat.*	*Ribs buried - cannot feel.* *Deep gutter* *Back broad and flat.*	*Deep gutter to root of tail.* *Skin distended.* *Pelvis buried – cannot feel*

BCS guide

Score	Description	Diagram
0 – Very poor	- very sunken rump - deep cavity under tail - skin tight over bones - very prominent backbone and pelvis - marked ewe neck	
1 – Poor	- sunken rump - cavity under tail - ribs easily visible - prominent backbone and croup - ewe neck - narrow and slack	
2 – Moderate	- flat rump either side of backbone - ribs just visible - narrow but firm neck - backbone well covered	
3 – Good	- rounded rump - ribs just covered but easily felt - no crest, firm neck	

4 – Fat	- rump well rounded - gutter along back - ribs and pelvis hard to feel - slight crest	
5 – Very fat	- very bulging rump - deep gutter along back - ribs buried - marked crest - fold and lumps of fat	

APPENDIX EIGHT – DEMOGRAPHIC STATISTICS OF THE SAMPLE FOR CHAPTER 4

Demographic statistics of horse owners, n = 205

Demographic Variable	Horse owner %
Participant location	
City/Urban	14
Regional	86
Region of primary residence	
City	4
Urban	7
Peri-urban	3
Semi-rural	34
Rural	52
Gender	
Female	85
Male	15
Age (years)	
< 18	6
18-25	8
26-35	16
36-45	27
46-55	27
56-65	11
65 +	5
Level of education	
Did not complete high school	26
Secondary education	30
Tertiary education	29
Post-tertiary education	8
TAFE course	5
Other (undefined)	2
Field of occupation	
Professional	24
Non-professional	11
Trades and services	7
Student	10
Retired	1
Unemployed	8
Domestic	4
Other (undefined)	35
Household annual income (before tax)	
< $20 000	8
$20 000 – 35 000	14
$36 000 – 50 000	15
$51 000 – 70 000	26
$71 000 – 1000 000	18
> $100 000	19
Residence type	
Apartment/townhouse	5
Small land block	15
Large land block	20
Acreage	60

Demographic statistics of horses, n = 338 (H1 n = 195, H2 n = 143)

Demographic variable	Sample %	H1 %	H2 %
Horse gender			
Mare/filly	40	37	47
Gelding	54	59	50
Stallion/colt	6	4	3
Horse age (years)			
< 1	4	2	7
1-4	10	9	11
5-10	27	31	23
11-15	26	27	27
16-20	15	17	13
21-25	7	7	7
26 +	9	7	11
Horse breed			
Arabian	6	6	6
Australian stock horse	4	4	4
Crossbred	7	9	4
Pony	5	4	3
Quarterhorse	7	6	5
Standard bred	9	8	12
Thoroughbred	22	24	19
Thoroughbred (ex-racehorse)	14	15	14
Thoroughbred (un-raced)	7	9	6
Warmblood	5	9	4
Other	17	17	18
Region where horse is kept			
Peri-Urban	12	14	11
Regional/Rural	88	86	89

Descriptive data regarding the horse management and husbandry practices implemented by horse owners, n = 338 (H1 n = 195, H2 n = 143)

Demographic variable	Sample %	H1 %	H2 %
Horses location			
Home/Primary residence	68	70	71
Owners land, away from primary residence	8	7	10
Leased land	1	1	1
Agistment property	10	8	7
Family/friends property	10	9	10
Distance (km) from primary residence to horses location			
Primary residence	74	73	80
1-5	7	7	8
6-10	4	6	1
11-20	6	6	7
21-40	4	5	3
41-60	1	1	0
61-100	1	2	1
100 +	1	1	1
Horse Housing			
Full time paddock	75	73	82
Full time stable	1	1	1
Mainly paddock/some stable	13	16	9

Paddock day/stable night	7	8	5
Yards	1	0	1
Yard day/ stable night	2	1	2
Other	1	1	1
Pasture condition			
Horse not kept on pasture	2	2	2
Bare	17	18	17
Scarce	26	27	27
Good	36	39	37
Abundant	14	13	18
Don't know	1	1	0
Supervision level			
At all times	41	43	41
Majority of the day	35	36	36
A few hours a day	7	10	10
Only at night and early morning	7	7	7
Only during daylight hours	1	1	0
Once daily	3	3	4
Not every day	1	1	2
Does the farrier attend to horses hooves			
Yes	80	85	76
No	15	13	17
No, owner attends to horses hooves	5	2	7
How often are horses hooves attended to			
Never	2	1	4
Monthly	9	11	7
Every 6-8 weeks	55	59	54
Every 3 months	14	12	17
Every 6 months	4	5	3
Yearly	3	3	3
Other	11	11	12
How often is horse treated for worms			
Never	2	2	1
Monthly	4	5	4
Every 6-8 weeks	28	28	28
Every 3 months	34	36	34
Every 6 months	17	17	17
Yearly	7	7	7
Other	7	6	8
Determining horses diet			
Weight feed, estimate horses weight	15	16	14
Change in BC	47	47	49
Amount of feed that looks right	17	18	16
Advised by nutritionist/vet	4	4	3
Other	16	15	18
Owners rating of horses BCS			
Very thin	1	1	0
Thin	4	3	6
Correct weight	61	68	57
Overweight	28	26	33
Very overweight	4	3	4
Reasoning for horses BCS			
Correct care and feeding	57	62	54
Old	5	4	7
Good doer	10	11	9
Little available feed	1	1	1

Too much available feed	8	8	8
Insufficient exercise	7	6	8
Over-exercised	1	1	1
Uncertain	1	1	2
Other	8	6	11

Descriptive statistics concerning the recreational horse owner-horse interactions

Demographic variable	Sample %	H1 %	H2 %
Length of time (years) participant has owned horse			
< 1	20	20	23
1-3	19	21	19
4-7	27	28	26
8-15	22	24	22
15 +	7	7	9
How horse was acquired			
Bred myself	12	11	13
Breeder	14	18	9
Advertisement	13	14	12
Dealer	4	4	5
Yearling sale	2	1	3
Instructor	3	4	3
Saleyards	2	1	4
Friends/acquaintances	29	28	31
Family	2	2	3
Shelter/rescue/found	2	2	1
Came with property	1	1	0
Word of mouth	2	3	1
Gift	2	2	3
Off the track	2	2	1
Other	7	6	9
Don’t know	1	1	1
Disposal of horse when no longer required			
Sell through advertisement	29	30	29
Sell through trainer	3	4	1
Sell through auction/sale yard	3	3	3
Lease to someone	2	2	2
Give to friend	19	20	18
Donate to welfare society	1	1	1
Free to good home	8	7	10
Euthanize by vet	10	9	11
Knackery	2	2	3
Other	14	13	15
Don’t know	9	10	8
Horse registered			
Yes	44	49	40
No	66	51	60
Average daily interaction with horse (minutes)			
Interaction not daily	19	15	26
< 30	33	31	38
30-60	19	24	14
60-120	14	15	14
120-180	9	11	6
180 +	3	3	2

APPENDIX NINE – DESCRIPTIVE STATISTICS FOR ALL VARIABLES USED IN CHAPTER 4

Participant demographics (Horse owners and non-horse owners)

	Mean	Median	Std. Deviation	Inter-quartile range	Minimum	Maximum	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Region type	1.4	1.0	0.50	1.0-2.0	1	2	0.40	0.08
Age (bracket years)	46.2	45.0	16.5	35.0-57.0	12	92	0.30	0.08
Age (years)	4.5	4.0	1.6	3.0-6.0	1	7	-0.20	0.08
Gender	1.7	2.0	0.50	1.0-2.0	1	2	-0.80	0.08
Children	1.3	1.0	0.50	1.0-2.0	1	2	0.90	0.08
Education level	2.4	2.0	1.2	2.0-3.0	1	6	0.60	0.08
Occupation	3.5	3.0	2.2	1.0-5.0	1	7	0.30	0.08
Annual household income	3.5	4.0	1.7	2.0-5.0	1	6	-0.02	0.09
Property type	3.3	3.0	1.2	3.0-4.0	1	5	-.052	0.08

Horse owner background factors

	Mean	Median	Std. Deviation	Inter-quartile range	Minimum	Maximum	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Region type	4.3	5.0	1.0	4.0-5.0	1	5	-1.6	0.18
Age (bracket years)	42.1	42.0	14.0	31.0-52.0	14	76	0.03	0.18
Age (years)	4.1	4.0	1.5	3.0-5.0	1	7	-0.2	0.2
Gender	1.9	2.0	0.35	2.0	1	2	-2.04	0.18
Children	1.3	1.0	0.50	1.0-2.0	1	2	0.89	0.18
Education level	2.5	2.0	1.2	2.0-3.0	1	6	0.8	0.18
Occupation	4.2	4.0	2.3	1.0-7.0	1	7	-0.1	0.18
Annual household income	3.9	4.0	1.5	3.0-5.0	1	6	-0.3	0.18
Property type	4.4	5.0	0.96	4.0-5.0	1	5	-1.7	0.18
Animals	4.1	5.0	2.2	2.0-6.0	1	8	0.2	0.18
Horse numbers	2.1	2.0	0.88	2.0-3.0	1	5	0.83	0.18

Horse numbers (bracket)	4.0	2.0	4.9	2.0-5.0	1	36	3.8	0.18
Horse ownership years (non-bracket)	23.6	21.0	14.7	11.3-30.8	1	70	0.634	0.18
Horse ownership years (bracket)	5.3	6.0	1.5	5.0-6.8	1	7	-0.89	0.18
Horse club and society membership	1.4	1.0	0.50	1.0-2.0	1	2	0.33	0.18
Registered horse owner	1.6	2.0	0.50	1.0-2.0	1	2	-0.42	0.18
Compete	1.6	2.0	0.50	1.0-2.0	1	2	-0.25	0.18
Riding instruction	1.3	1.0	0.45	1.0-2.0	1	2	0.96	0.18
Riding instruction frequency	6.7	9.0	2.8	3.5-9.0	2	9	-0.46	0.25
Literature	4.0	3.0	2.7	1.5-7.0	1	9	0.42	0.18
Literature frequency	4.2	4.0	2.4	2.0-5.0	1	9	0.58	0.20
Actively improve knowledge	1.2	1.0	0.41	1.0	1	2	1.4	0.18
Awareness of the Code of Practice pertaining to the welfare of recreational horses	1.5	2.0	0.50	1.0-2.0	1	2	-0.03	0.18
Expected cost	1.2	1.0	0.39	1.0	1	2	1.6	0.18
Recommend horse ownership	1.2	1.0	0.38	1.0	1	2	1.753	0.18

Horse owner attitudes

	Mean	Median	Std. Deviation	Inter-quartile range	Minimum	Maximum	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Positive statements about horses	1.6	1.5	0.60	1.0-2.0	1.0	3.5	0.82	0.18
Negative statements about horses	3.6	3.7	0.80	3.0-4.0	1.7	5.0	-.032	0.18
Horses require resource provision	1.8	1.7	0.74	1.3-2.3	1.0	4.3	1.1	0.18
General horse husbandry and management	1.6	1.5	0.40	1.3-1.9	1.0	2.8	0.70	0.18
The importance of the horse to the owner	1.6	1.7	0.60	1.0-2.0	1.0	3.7	0.90	0.18

Horse welfare is NOT the horse owners responsibility	4.8	5.0	0.40	5.0	3.0	5.0	-2.8	0.18
F1	1.1	1.0	0.39	1.0	1	4	4.7	0.18
F2	2.6	3.0	1.2	1.8-3.0	1	5	0.06	0.18
F3	1.8	2.0	1.0	1.0-2.0	1	5	1.2	0.18
F4	3.8	4.0	1.3	3.0-5.0	1	5	-0.8	0.18
*F5**	2.7	3.0	1.1	2.0-4.0	1	5	0.11	0.18
F6	1.8	1.0	1.1	1.0-2.0	1	5	1.3	0.18
F7	1.3	1.0	0.67	1.0	1	5	3.3	0.18
F8	4.2	5.0	1.1	4.0-5.0	1	5	-1.2	0.18
F9	1.6	1.0	0.78	1.0-2.0	1	4	1.4	0.18
*F10**	1.9	2.0	1.1	2.0-3.0	1	5	0.98	0.18
F11	1.8	1.5	0.82	1.0-2.0	1	4	1.03	0.18
*F12**	4.9	5.0	0.44	5.0	1	5	-4.6	0.18
F13	3.1	3.0	1.2	2.0-4.0	1	5	0.15	0.18
*F14**	4.8	5.0	0.59	5.0	1	5	-4.7	0.18
F15	1.4	1.0	0.64	1.0-2.0	1	4	1.7	0.18
F16	4.8	5.0	0.83	5.0	1	5	-4.0	0.18
F17	1.6	1.0	0.67	1.0-2.0	1	4	0.90	0.18
F18	1.3	1.0	0.58	1.0	1	5	3.0	0.18
F19	1.3	1.0	0.57	1.0	1	5	2.7	0.18
F20	1.9	2.0	0.99	1.0-3.0	1	5	0.89	0.18
F21	1.4	1.0	0.54	1.0-2.0	1	3	1.0	0.18
F22	1.4	1.0	0.69	1.0-2.0	1	5	2.8	0.18
F23	2.9	3.0	0.97	2.0-3.5	1	5	-0.11	0.18
F24	1.6	1.0	0.78	1.0-2.0	1	5	1.2	0.18
F25	1.7	2.0	0.73	1.0-2.0	1	5	1.0	0.18
F26	1.3	1.0	0.49	1.0-2.0	1	3	1.5	0.18
*F27**	1.7	1.0	0.92	1.0-2.0	1	5	1.4	0.18
F28	1.2	1.0	0.41	1.0	1	2	1.4	0.18
F29	3.4	3.0	0.96	3.0-4.0	1	5	0.08	0.18
F30	1.3	1.0	0.57	1.0-2.0	1	4	1.6	0.18
F31	3.2	3.0	0.99	3.0-4.0	1	5	-0.09	0.18
*F32**	1.8	2.0	1.03	1.0-2.0	1	5	1.3	0.18
F33	1.9	2.0	0.91	1.0-2.0	1	5	1.1	0.18
F34	2.7	3.0	0.95	2.0-3.0	1	5	0.00	0.18
F35	1.3	1.0	0.56	1.0-2.0	1	5	2.2	0.18
F36	1.8	2.0	0.79	1.0-2.0	1	5	0.63	0.18
F37	3.6	4.0	1.2	3.0-4.3	1	5	-0.43	0.18

F38	1.5	1.0	0.83	2.0-1.0	1	5	2.4	0.18
F39	1.8	2.0	0.84	1.0-2.0	1	5	1.1	0.18
*F40**	1.9	2.0	0.96	1.0-3.0	1	5	0.87	0.18

Horse owner behaviours

	H1 (n=191)								H2 (n=142)							
	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error
Identifiable	1.3	1.0	0.50	1.0-2.0	1	2	0.70	0.18	1.44	1.0	0.50	1.0-2.0	1	2	0.25	0.21
Registered	1.5	2.0	0.50	1.0-2.0	1	2	-0.03	0.18	1.60	2.0	0.50	1.0-2.0	1	2	-0.42	0.21
Housing region type	1.9	2.0	0.34	2.0	1	2	-2.1	0.18	1.88	2.0	0.32	2.0	1	2	-2.4	0.21
Housing location	1.3	1.0	0.46	1.0-2.0	1	2	0.90	0.18	1.29	1.0	0.50	1.0-2.0	1	2	0.95	0.21
Distance between horse and horse owner's primary residence	1.7	1.0	1.4	1.0-2.0	1	8	2.1	0.18	1.51	1.0	1.2	1.0	1	8	2.8	0.21
Property size	4.6	3.0	3.1	2.0-7.0	1	13	0.80	0.18	4.83	4.0	3.2	2.0-7.0	1	12	0.62	0.21
Horse housing	1.3	1.0	0.45	1.0-2.0	1	2	1.0	0.18	1.18	1.0	0.40	1.0	1	2	1.7	0.21
Housing reasons	6.6	8.0	3.2	3.0-9.0	1	10	-0.60	0.18	6.71	8.0	3.1	3.0-9.0	1	10	-0.70	0.21
Paddock size	2.1	2.0	1.7	1.0-2.0	0	12	2.4	0.18	2.25	2.0	1.9	1.0-2.3	0	12	2.2	0.21
Pasture quantity	2.4	3.0	1.0	2.0-3.0	0	5	-0.20	0.18	2.50	3.0	1.0	2.0-3.0	0	4	-0.30	0.21
Water source	1.8	2.0	0.81	1.0-2.0	1	4	0.40	0.18	1.78	2.0	0.80	1.0-2.0	1	3	0.40	0.21
Resources	5.9	6.0	1.2	5.0-7.0	0	7	-1.2	0.18	5.85	6.0	1.2	5.0-7.0	1	7	-1.1	0.21
General supervision	2.0	2.0	1.2	1.0-2.0	1	7	1.8	0.18	2.08	2.	1.4	1.0-2.0	1	7	1.8	0.21
Daily human-horse interaction	1.2	1.0	0.40	1.0	1	2	1.6	0.18	1.27	1.0	0.44	1.0-2.0	1	2	1.1	0.21
Daily human-horse interaction time	1.8	2.0	1.3	1.0-3.0	0	5	0.50	0.18	1.43	1.0	1.3	0-2.0	0	5	0.90	0.21
Other people interact with horse	1.2	1.0	0.40	1.0	1	2	1.7	0.18	1.21	1.0	0.41	1.0	1	2	1.4	0.21
Other people interact with horse time	2.0	1.0	2.3	1.0-2.0	0	8	1.3	0.18	2.17	1.0	2.4	1.0-2.3	0	8	1.3	0.21
Behavioural problems	1.8	2.0	0.40	2.0	1	2	-1.6	0.18	1.75	2.0	0.44	1.3-2.0	1	2	-1.2	0.21

Ride	1.4	1.0	0.50	1.0-2.0	1	2	0.50	0.20	1.7	2.0	0.50	1.0-2.0	1	2	-0.72	0.20
Riding frequency	3.6	4.0	2.2	1.0-5.0	1	9	0.31	0.18	2.98	1.0	2.8	1.0-5.0	1	9	1.1	0.21
Farrier	1.2	1.0	0.36	1.0	1	2	2.0	0.18	1.24	1.0	0.45	1.0	1	2	1.2	0.21
Hoof care frequency	2.6	2.0	1.4	2.0-3.0	0	6	1.4	0.18	2.53	2.0	1.5	2.0-3.0	0	6	1.1	0.21
Parasite control frequency	2.7	3.0	1.3	2.0-3.0	0	5	-0.34	0.18	2.67	3.0	1.3	2.0-3.0	0	5	-0.40	0.21
Dental care frequency	2.6	3.0	1.5	2.0-3.0	0	5	-0.44	0.18	2.53	3.0	1.6	2.0-3.0	0	5	-0.43	0.21
Veterinary inspection	1.5	1.0	0.50	1.0-2.0	1	2	0.20	0.18	1.63	2.0	0.50	1.0-2.0	1	2	-0.53	0.21
Frequency of veterinary inspection	0.71	0	1.5	1.0	0	10	3.4	0.18	.56	0	1.6	0-1.0	0	15	6.2	0.21
Summer diet	5.0	5.0	2.1	4.0-7.0	1	8	-.062	0.18	4.57	5.0	2.3	2.0-7.0	1	8	-0.30	0.21
Winter diet	5.1	6.0	2.1	4.0-7.0	1	8	-0.75	0.18	4.71	5.0	2.3	3.0-7.0	1	8	-0.40	0.21
Diet determination	2.5	2.0	1.2	2.0-3.0	1	5	0.90	0.18	2.62	2.0	1.3	2.0-3.0	1	5	0.90	0.21
Horse owner BCS	3.3	3.0	0.60	3.0-4.0	1	5	0.60	0.18	3.36	3.0	0.70	3.0-4.0	2	5	0.40	0.21
BCS reasoning	2.9	1.0	2.8	1.0-4.0	1	10	1.3	0.18	3.54	1.0	3.2	1.0-8.0	1	10	0.91	0.21
BCS inspection	2.2	2.0	1.2	2.0	1	7	2.3	0.18	2.20	2.0	1.2	2.0	1	7	2.1	0.21

Horse-based variables

	H1 (n=191)								H2 (n=142)							
	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error
Horse age	4.0	4.0	1.4	3.0-5.0	1	7	0.50	0.18	3.94	4.0	1.7	3.0-5.0	1	7	0.25	0.21
Years owned	2.8	3.0	1.3	2.0-4.0	1	6	0.20	0.18	2.75	3.0	1.3	2.0-4.0	0	6	0.16	0.21
Horse gender	1.7	2.0	0.60	1.0-2.0	1	3	0.04	0.18	1.57	2.0	0.60	1.0-2.0	1	3	0.34	0.21

Horse breed	12.8	14.0	5.4	10.0-17.0	1	19	-0.08	0.18	12.88	13.0	5.0	10.0-17.0	2	19	-0.68	0.21
Recent health problems	1.7	2.0	0.45	1.0-2.0	1	2	-1.0	0.18	1.8	2.0	0.40	2.0	1	2	-1.8	0.20
Type of recent health problems	1.4	0	2.6	0-1.0	0	7	1.6	0.18	0.95	0	2.3	0	0	7	2.2	0.20

APPENDIX TEN – DEMOGRAPHIC STATISTICS OF THE SAMPLE FOR CHAPTER 5

Demographic statistics of horse owners, n = 57

Demographic Variable	Horse owner %
Participant location	
City/Urban	16
Regional	74
Region of primary residence	
City	2
Urban	10
Peri-urban	4
Semi-rural	33
Rural	51
Gender	
Female	86
Male	14
Age (years)	
< 18	9
18-25	4
26-35	21
36-45	28
46-55	19
56-65	12
65 +	7
Children	
Yes	77
No	23
Level of education	
Did not complete high school	25
Secondary education	33
Tertiary education	33
Post-tertiary education	5
TAFE course	4
Other (undefined)	0
Field of occupation	
Professional	30
Non-professional	12
Trades and services	4
Student	11
Retired	9
Unemployed	0
Domestic	9
Other (undefined)	26
Household annual income (before tax)	
< $20 000	6
$20 000 – 35 000	17
$36 000 – 50 000	6
$51 000 – 70 000	29
$71 000 – 1000 000	21
> $100 000	21
Residence type	
Apartment/townhouse	0
Small land block	17
Large land block	23
Acreage	60

Horse club or society member	
Yes	74
No	16
Registered horse owner	
Yes	41
No	59
Actively improve knowledge	
Yes	83
No	17
Awareness of the Codes of Practice pertaining to horse welfare in Victoria	
Yes	47
No	53
Riding instruction	
Yes	72
No	28
Participation in horse competitions	
Yes	54
No	46

Demographic statistics of horses, n = 98 (H1 n = 57, H2 n = 41)

Demographic variable	Sample %	H1 %	H2 %
Horse gender			
Mare/filly	47	40	50
Gelding	48	53	45
Stallion/colt	5	7	5
Horse age (years)			
< 1	6	7	5
1-4	9	4	17
5-10	30	32	27
11-15	27	30	22
16-20	12	11	16
21-25	9	11	5
26 +	6	5	8
Horse breed			
Arabian	6	4	10
Australian stock horse	3	2	5
Crossbred	4	5	2
Pony	8	9	7
Quarterhorse	2	4	0
Standard bred	10	12	7
Thoroughbred	18	16	22
Thoroughbred (ex-racehorse)	12	12	12
Thoroughbred (un-raced)	6	4	10
Warmblood	11	11	12
Other	20	23	17
Region where horse is kept			
Peri-Urban	15	16	14
Regional/Rural	75	84	86

Descriptive data regarding the horse management and husbandry practices implemented by horse owners, n = 98 (H1 n = 57, H2 n = 41)

Demographic variable	Sample %	H1 %	H2 %
Horses location			
Home/Primary residence	70	67	71
Owners land, away from primary residence	10	9	12
Agistment property	13	16	10
Family/friends property	8	7	7
Full-time paddock housing	80	75	83
Daily interaction between owner and horse			
Yes	79	79	79
No	21	21	21
Does the farrier attend to horses hooves			
Yes	84	84	83
No	1	2	0
No, owner attends to horses hooves	15	14	17
How often are horses hooves attended to			
Never	1	2	0
Monthly	11	11	12
Every 6-8 weeks	62	67	57
Every 3 months	16	12	21
Every 6 months	4	5	2
Yearly	5	4	7
How often is horse treated for worms			
Never	4	4	5
Monthly	6	5	7
Every 6-8 weeks	27	28	26
Every 3 months	40	40	38
Every 6 months	20	18	21
Yearly	4	5	4
Dental technician attends to horses teeth			
Yes	85	84	86
No	15	16	14
Owners rating of horses BCS			
Very thin	0	0	0
Thin	1	2	0
Correct weight	59	61	57
Overweight	35	33	38
Very overweight	4	4	5
Supplementary feeding			
No supplementary feeding	14	9	21
Roughage	33	32	36
Grain/processed feed	2	2	2
Roughage and Grain/processed feed	50	58	41
Presence of an injury or illness			
Yes	29	35	21
No	71	65	79
Health concerns in last 12 months			
Yes	26	35	15
No	74	65	85
Veterinary attention			
Yes	54	58	48
No	46	42	52
Horse registered			
Yes	47	47	46
No	53	53	53
Horse ridden	58	67	42

APPENDIX ELEVEN – DESCRIPTIVE STATISTICS FOR ALL VARIABLES USED IN CHAPTER 5

Horse owner background factors

	Mean	Median	Std. Deviation	Inter-quartile range	Minimum	Maximum	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Region type	4.2	5.0	1.05	4.0-5.0	1	5	-1.41	0.32
Age (bracket years)	4.1	4.0	1.6	3.0-5.0	1	7	-0.15	0.32
Age (years)	41.5	42.0	14.7	30.0-52.5	15	74	0.10	0.32
Gender	1.9	2.0	0.35	2.0-2.0	1	2	-2.13	0.32
Children	1.2	1.0	0.42	1.0-1.0	1	2	1.33	0.32
Education level	2.3	2.0	1.02	1.5-3.0	1	5	0.52	0.32
Annual household income	4.0	4.0	1.54	3.0-5.0	1	6	-0.43	0.34
Property type	3.4	4.0	0.78	3.0-4.0	2	4	-0.91	0.32
Property size (H1)	4.1	4.0	2.73	2.0-5.5	1	10	0.85	0.32
Property size (H2)	4.2	4.0	2.75	2.0-6.3	1	10	0.78	0.37
Horse numbers (bracket)	2.1	2.0	0.93	1.5-3.0	1	4	.066	0.32
Horse numbers	4.7	2.0	5.77	1.5-5.5	1	30	2.60	0.32
Animals	4.6	5.0	2.34	2.0-6.0	2	8	0.09	0.32
Horse club or society member	1.3	1.0	0.45	1.0-2.0	1	2	1.0	0.32
Registered horse owner	1.6	2.0	0.50	1.0-2.0	1	2	-0.37	0.32
Horse ownership years	5.4	6.0	1.47	4.5-7.0	1	7	-0.95	0.32
Riding instruction	1.3	1.0	0.44	1.0-2.0	1	2	1.11	0.32
Riding instruction frequency	6.3	7.0	2.90	3.0-9.0	2	9	-0.21	0.41
Awareness of the Code of Practice pertaining to the welfare of recreational horses	1.5	2.0	0.50	1.0-2.0	1	2	-0.11	0.32
Actively improve knowledge	1.3	1.0	0.44	1.0-1.8	1	2	1.19	0.32
Literature	4.37	3.0	2.70	2.0-8.0	1	9	0.30	0.32
Advice	1.79	2.0	0.41	2.0	1	2	-1.50	0.32
Compete	1.46	1.0	0.50	1.0-2.0	1	2	0.18	0.32

Horse owner attitudes

	Mean	Median	Std. Deviation	Inter-quartile range	Minimum	Maximum	Skewness	
	Statistic	Statistic	.Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Positive statements about horses	1.63	1.50	0.59	1.0-2.0	1.00	3.00	0.80	0.32
Negative statements about horses	3.52	3.67	0.83	3.0-4.3	1.67	5.00	-0.32	0.32
Horses require resource provision	1.64	1.67	0.65	1.0-2.0	1.00	4.33	1.82	0.32
General horse husbandry and management	1.60	1.50	0.40	1.3-1.7	1.00	2.70	1.0	0.32
The importance of the horse to the owner	1.50	1.33	0.51	1.0-1.9	1.00	3.00	0.92	0.32
Horse welfare is NOT the horse owners responsibility	4.91	5.00	0.24	5.0	4.00	5.00	-2.73	0.32
General attitude statements	2.16	2.22	0.50	1.8-2.6	1.22	3.33	0.10	0.32
Horse husbandry and management - Health and welfare (Bb)	.00	-0.12	0.60	-0.43-0.28	-.73	1.69	1.09	0.32
Horse husbandry and management – Housing (Bb)	.00	-0.16	0.60	-0.42-0.50	-.82	1.29	0.45	0.32
Human-horse interactions (Bb)	1.60	1.50	0.40	1.3-1.9	1.00	2.50	0.29	0.32
Horse husbandry and management - Diet (Nb)	1.64	1.60	0.60	1.1-2.0	1.00	3.00	0.50	0.32
Horse husbandry and management - Health and welfare (Nb)	.00	-0.11	0.70	-0.50-0.43	-1.00	2.52	1.14	0.32
Horse husbandry and management – Housing (Nb)	.00	-0.09	0.70	-0.36-0.46	-1.02	2.05	0.62	0.32
Human-horse interactions (Nb)	1.54	1.50	0.50	1.2-1.8	1.00	3.00	0.97	0.32
Horse husbandry and management - Diet (Cb)	1.90	2.0	0.61	1.5-2.30	1.00	4.00	0.67	0.32
Horse husbandry and management - Health and welfare (Cb)	.00	0.02	0.55	-0.50-0.42	-0.99	1.17	0.16	0.32

Horse husbandry and management – Housing (Cb)	0	-0.03	0.53	-0.45-0.28	-0.81	1.41	0.61	0.32
Human-horse interactions (Cb)	1.72	1.60	0.50	1.4-2.0	1.00	3.00	0.74	0.32
A1	1.26	1.00	0.44	1.0-2.0	1	2	1.1	0.32
A2	1.33	1.00	0.70	1.0-2.0	1	5	3.3	0.32
A3	1.21	1.00	0.41	1.0	1	2	1.5	0.32
A9	4.89	5.00	0.36	5.0	3	5	-3.7	0.32
A18	2.05	2.00	0.80	1.5-3.0	1	4	0.36	0.32
A19	1.74	2.00	0.70	1.0-2.0	1	4	0.74	0.32
A22	1.21	1.00	0.41	1.0	1	2	1.5	0.32
A28	4.84	5.00	0.60	5.0	3	6	-0.49	0.32
A29	1.75	2.00	0.80	1.0-2.0	1	5	1.6	0.32
A30	1.33	1.00	0.60	1.0-2.0	1	4	2.1	0.32
A31	1.51	1.00	0.71	1.0-2.0	1	4	1.4	0.32
A33	1.19	1.00	0.44	1.00	1	3	2.2	0.32
A34	1.25	1.00	0.43	1.0-1.5	1	2	1.2	0.32
A35	1.16	1.00	0.40	1.0	1	2	1.9	0.32
A36	1.12	1.00	0.33	1.0	1	2	2.4	0.32
A37	1.23	1.00	0.42	1.0	1	2	1.3	0.32
A41	1.07	1.00	0.258	1.0	1	2	3.5	0.32
A42	1.67	2.00	0.60	1.0-2.0	1	3	0.17	0.32
A43	1.37	1.00	0.50	1.0-2.0	1	2	0.56	0.32
A46	3.18	3.00	0.93	2.0-4.0	2	5	0.05	0.32
B1	1.58	1.00	0.71	1.0-2.0	1	4	1.5	0.32
B2	1.98	2.00	0.90	1.0-2.0	1	4	0.69	0.32
B3	1.82	2.00	0.97	1.0-2.0	1	5	1.1	0.32
B9	1.44	1.00	0.60	1.0-2.0	1	3	1.0	0.32
B18	2.16	2.00	0.82	2.0-3.0	1	5	0.50	0.32
B19	2.00	2.00	0.89	1.0-2.5	1	4	0.64	0.32
B22	1.74	2.00	0.79	1.0-2.0	1	4	0.96	0.32
B28	2.18	2.00	0.57	2.0	1	4	1.2	0.32
B29	1.89	2.00	0.75	1.0-2.0	1	5	1.2	0.32
B30	1.47	1.00	0.73	1.0-2.0	1	5	2.3	0.32
B31	1.66	1.50	0.80	1.0-2.0	1	4	1.2	0.32
B33	1.54	1.00	0.63	1.0-2.0	1	3	0.72	.0.32
B34	1.53	1.00	0.63	1.0-2.0	1	3	0.80	0.32
B35	1.46	1.00	0.60	1.0-2.0	1	3	0.78	0.32
B36	1.46	1.00	0.54	1.0-2.0	1	3	0.54	0.32
B37	1.58	2.00	0.63	1.0-2.0	1	3	0.60	0.32

B41	1.42	1.00	0.53	1.0-2.0	1	3	0.70	0.32
B42	1.93	2.00	0.70	1.0-2.0	1	4	0.42	0.32
B43	1.54	2.00	0.57	1.0-2.0	1	3	0.43	0.32
C2	2.47	2.00	1.07	2.0-3.0	1	5	0.60	0.32
C3	1.84	2.00	0.80	1.0-2.0	1	5	1.4	0.32
C9	1.60	2.00	0.53	1.0-2.0	1	3	-0.03	0.32
C18	1.58	1.00	0.73	1.0-2.0	1	4	1.4	0.32
C19	1.53	1.00	0.66	1.0-2.0	1	4	1.3	0.32
C22	1.63	2.00	0.77	1.0-2.0	1	5	2.0	0.32
C28	2.12	2.00	0.60	2.0	1	4	1.5	0.32
C29	2.07	2.00	0.86	1.0-3.0	1	4	0.60	0.32
C30	1.35	1.00	0.62	1.0-2.0	1	4	2.1	0.32
C31	1.67	1.00	0.85	1.0-2.0	1	5	1.6	0.32
C33	1.44	1.00	.054	1.0-2.0	1	3	0.62	0.32
C34	1.56	1.00	0.63	1.0-2.0	1	3	0.70	0.32
C35	1.44	1.00	0.50	1.0-2.0	1	2	0.25	0.32
C36	1.74	2.00	0.58	1.0-2.0	1	3	0.10	0.32
C37	1.42	1.00	0.53	1.0-2.0	1	3	0.70	0.32
C41	1.35	1.00	0.52	1.0-2.0	1	3	1.0	0.32
C42	1.74	2.00	.745	1.0-2.0	1	4	0.74	.316
C43	1.58	1.00	.680	1.0-2.0	1	4	1.1	.316

Horse owner behaviour

	H1 (n=57)								H2 (n=42)							
	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error
Registered horse	1.53	2.0	0.50	1.0-2.0	1	2	-0.11	0.32	1.54	2.00	0.51	1.0-2.0	1	2	-0.15	0.37
Resources	6.79	7.0	1.01	6.0-8.8	4	8	-0.41	0.32	6.86	7.00	1.03	6.0-8.0	4	8	-0.70	0.37
Daily human-horse interaction	1.21	1.0	0.41	1.0	1	2	1.50	0.32	1.21	1.00	0.42	1.0	1	2	1.45	0.37
Daily human-horse interaction time	2.95	3.0	1.30	2.0-4.0	1	5	0.10	0.32	2.55	2.00	1.30	2.0-3.3	1	5	0.55	0.37
Ride	1.31	1.0	0.47	1.0-2.0	1	2	0.85	0.32	1.50	1.50	0.51	1.0-2.0	1	2	0.00	0.37
Horse owner approach	1.28	1.0	0.44	1.0-2.0	1	2	1.0	0.32	1.25	1.00	0.43	1.0-1.63	1	2	1.20	0.37
Parasite control behaviour	3.23	3.0	1.30	2.0-4.0	2	7	1.50	0.32	3.10	3.00	0.99	2.5-3.0	2	7	1.72	0.37
Hoof care behaviour	2.58	2.0	1.15	2.0-3.0	1	7	1.78	0.32	2.74	2.00	1.43	2.0-3.0	1	7	1.53	0.37
Dental care behaviour	3.51	3.0	0.81	3.0-4.0	2	5	0.30	0.32	3.55	3.00	1.04	3.0-5.0	2	5	0.34	0.37
Veterinary inspection	1.42	1.0	0.50	1.0-2.0	1	2	0.33	0.32	1.52	2.00	0.51	1.0-2.0	1	2	-0.10	0.37
Shod	1.70	2.0	0.50	1.0-2.0	1	3	-0.45	0.32	1.93	2.00	0.34	2.0	1	3	-1.26	0.37
Barefoot	1.32	1.0	0.47	1.0-2.0	1	2	0.81	0.32	1.10	1.00	0.30	1.0	1	2	2.90	0.37
BC Inspection	2.02	2.0	0.80	2.0	1	4	0.95	0.32	2.02	2.00	0.75	2.0	1	4	0.70	0.37
Supplementary feeding	3.09	4.0	1.12	2.0-4.0	1	4	-0.60	0.32	2.62	2.00	1.23	2.0-4.0	1	4	0.04	0.37
Horse region type	2.84	3.0	0.37	3.0	2	3	-1.93	0.32	2.86	3.00	0.35	3.0	2	3	-2.12	0.37
Horse location	2.19	1.0	1.98	1.0-3.0	1	7	1.35	0.32	1.86	1.00	1.70	1.0-2.0	1	6	1.78	0.37

Distance between horse and horse owner's primary residence	1.65	1.0	1.20	1.0-2.0	1	5	1.74	0.32	1.38	1.00	0.85	1.0	1	4	2.36	0.37
Degree of general supervision at horse's housing location	4.98	5.0	1.10	5.0-6.0	2	6	-1.15	0.32	4.90	5.00	1.19	4.0-6.0	2	6	-1.01	0.37
Summer diet	4.86	5.0	2.30	3.0-7.0	1	7	-0.60	0.32	4.26	4.50	2.43	1.8-7.0	1	7	-0.20	0.37
Winter diet	5.07	6.0	2.20	3.5-7.0	1	7	-0.72	0.32	4.56	5.00	2.32	2.0-7.0	1	7	-0.39	0.37
Pasture quantity	1.95	2.0	0.80	1.0-3.0	1	3	0.10	0.32	2.02	2.00	0.90	1.0-3.0	1	4	0.38	0.37
Pasture quality	3.56	4.0	1.12	3.0-4.0	1	5	-0.64	0.32	3.79	4.00	1.05	3.0-5.0	1	5	-0.48	0.37
Stocking density	2.04	2.0	1.30	1.0-2.50	1	6	1.52	0.32	2.26	2.00	1.56	1.0-3.0	1	10	3.20	0.37
Water source inspection	1.49	1.0	0.85	1.0-2.0	1	3	1.21	0.32	1.69	1.00	0.97	1.0-3.0	1	4	0.84	0.37
Housing type	4.88	5.0	0.47	5.0	3	5	-3.74	0.32	4.95	5.00	0.31	5.0	3	5	-6.50	0.37
Paddock size	3.21	3.0	1.41	2.0-4.0	1	7	0.80	0.32	3.38	3.00	1.74	2.0-4.3	1	8	1.07	0.37
Shelter availability	1.46	1.0	0.50	1.0-2.0	1	2	0.18	0.32	1.14	1.00	0.68	1.0	1	5	5.11	0.37

Horse welfare outcomes

	H1 (n=57)								H2 (n=42)							
	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error	Mean	Median	Std. Deviation	Inter-quartile range	Min	Max	Skewness	Std. error
BCS	3.40	3.3	0.480	3.0-3.7	2.50	4.50	0.50	0.32	3.40	3.42	0.66	3.0-4.0	1.67	4.50	-0.78	0.37
LS	1.11	1.0	0.31	1.0	1	2	2.64	0.32	1.10	1.00	0.30	1.0	1	2	2.90	0.37
HS	2.21	2.0	0.45	2.0	2	4	2.04	0.32	2.40	2.00	0.53	2.0-3.0	2	4	1.12	0.37
IS	1.79	2.0	0.41	2.0	1	2	-1.50	0.32	1.85	2.00	0.36	2.0	1	2	-2.08	0.37
DIIS	1.72	2.0	0.75	1.0-2.0	1	6	3.15	0.32	1.80	2.00	0.42	2.0	1	2	-1.45	0.37