What is the size and scope of the Australian horse industry and what does this mean for infectious disease management?

A report for the Australian Horse Industry Council

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The University gratefully acknowledges the co-operation given to the student authors since activities such as this permit students to be exposed to real world problems thus enhancing the relevance of their learning.
Abstract
This study looked into the size and scope of the horse industry in terms of the number of horses, people and events in Australia as a whole, and within each state. The information collected has been used to discuss the issues of infectious disease control in horses. The focus was on the introduction of exotic diseases into the country and how disease control is currently managed in the horse industry. The information was collected through an email survey to equine organisations which are part of the Australian Horse Industry Council’s Industry Advisory Committee. The three main types of organisations which the information was collected from were racing organisations, recreation/sporting organisations and breed based organisations.

The literature available on the horse industry as a whole and disease control in the horse industry is discussed in detail. The literature provided a background on the current state of the industry in terms of the information available on size and scope, and information available on the disease prevention and control. The literature available is limited in that it does not provide a complete picture of the current situation in the Australian horse industry. The review also looks at literature available on other livestock industries in the area of disease control, as similar principles to the horse industry are present. The lack of information about the industry is the main reason behind this study being conducted.

The key findings suggest that there is a high percentage of horses, people and events run in the eastern states of Australia. The highest percentage was seen in New South Wales, followed by Victoria and then Queensland, with the other three states also being represented all cases. The two territories were present in only some sections, mainly the results for breed based organisations. These findings show the high concentration of horses present and events run on the eastern coast of Australia in all three types of organisations surveyed.

The report discusses the management implications presented due to the high numbers of horses on the eastern coast for disease control, including the possibility of exotic disease being introduced through horses imported and quarantined in the two quarantine centres in Sydney and Melbourne. The issues with large numbers of volunteers and spectators attending events, increasing the chance of disease spread from an event into the population are also discussed.
The conclusion taken from this study is that more detailed information on the horse industry size and scope is needed for disease control across the horse industry to improve. It is recommended that a more extensive survey of the industry including organisations of all sizes, businesses and individual people needs to be conducted for more detailed information to be collected. A survey more detailed in the location of horses within each state is also recommended, as spread of disease is not only between states but smaller regions.
Acknowledgments

The data collected in this study was sourced from several equine organisations which are part of the Australian Horse Industry Councils (AHIC) Industry Advisory Committee, thank you for providing information on your organisation. Thank you also to the AHIC for assisting with the contacts and survey development. The author is appreciative of this assistance.
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1. Introduction

1.1. Background

The Australian livestock industry is currently free from most known serious infectious livestock diseases (AHA 2009). This freedom from disease is due to the combination of Australia’s isolated location as an island and strict quarantine measures designed to prevent the introduction of infectious disease (AHA, 2009). This is true for the Australian horse industry, which is free of many major infectious diseases experienced within other countries such as Equine Influenza (*Orthomyxovirus*) (Callinan 2008), African Horse Sickness (*Orbivirus*), and Vesicular Stomatitis (*Vesiculovirus*). There are also several other diseases including Rabies (*Lyssavirus*) and Japanese Encephalitis (*Flavivirus*) which are zoonotic¹. Zoonotic diseases are a serious threat to the horse industry and to the health of the general public (Quinn et al. 2002).

Although Australia is free of many exotic infectious diseases, there is still a potential threat to the different livestock industries if they were introduced. As eradication is not always possible or feasible, other methods including vaccination programs are also planned in the case of an outbreak (AHA 2008). An outbreak in Australia would impact several of the livestock industries including exportation, sales, animal movements within Australia, and general running of animal based businesses. This impact is based on previous outbreaks in Australia and other countries (AHA, 2009 (1)). This was shown through the impacts of Equine Influenza on the horse industry during the 2007 outbreak (refer to 2.2.3.2.).

Disease threats are currently managed through a number of management plans developed by Animal Health Australia in conjunction with industry professionals and the government. These plans attempt to prevent the introduction and the spread if a disease was introduced (Turner Et al. 1996). These plans were developed through a co-ordinated effort between the Australian government and industry (including Animal Health Australia and livestock industry representatives). The key plan in disease prevention is the Australian Emergency Veterinary Plan (*AUSVETPLAN*). Serious exotic diseases such as Rabies are addressed in this plan, which guides the control and management of an emergency disease outbreak (AHA, 2008).

¹ A disease which can be transferred from animals to humans (Boden 2007)
The AUSVETPLAN covers 35 diseases which are considered a serious threat to Australia and provides full disease management strategies for each, and 29 other diseases covered by smaller policy briefs (AHA 2008). The AUSVETPLAN is aimed at controlling and eradicating any outbreaks of emergency animal disease\(^2\) through national coordination. These plans include measures such as movement restrictions, decontamination of premises, vaccination, and treatment of infected animals. These plans are implemented nationally in conjunction with the Quarantine Act (1908), and at state and local level through state legislation (refer to 2.1.4.) (AHA 2008).

Currently, there is very little reliable and up to date data on the size and scope of the horse industry in Australia, making it difficult for the AHIC to measure the impacts on the industry if a disease outbreak were to occur. For instance it is not known how many horses, people and businesses would be affected. This information is difficult to collate due to the diversity of activities involving horses within the industry, as the management of the horses and what they are used for varies greatly (Gordon, 2001). In an attempt to collate this report data has been collected on behalf of the Australian Horse Industry Council from the Industry Advisory Committee to give an outline of the size and scope of the horse industry. This committee represents a significant proportion of the leading organisations in the horse industry.

1.2. **Purpose of the study**

The purpose of this study is to collect a sample of data on the size and scope of the Australian horse industry. This sample of the industry is represented by the members of the Australian Horse Industry Council’s Industry Advisory Committee (Refer to section 2.1.3.).

The data which was collected includes:

- Horses registered (new and ongoing) within each organisation,
- Individuals registered within each organisation,
- Events coordinated by each organisation,
- Average minimum and maximum of competing individuals, spectators and volunteers represented at these events.

\(^2\) A disease which is exotic, a variation of an endemic disease, unknown serious infectious disease or a severe outbreak of endemic disease (AHA 2009, 3)
1.3. Research aims

There are 3 aims to this study, namely:

1. To gather data on the size and scope of the horse industry in Australia, as represented by the members of the Australian Horse Industry Council’s Industry Advisory Committee;

2. To identify the potential impacts of an exotic infectious disease outbreak on the horse industry in Australia based on the literature and data collected; and

3. To determine the implications of horse distribution for future management of outbreaks of infectious diseases in the Australian horse industry.

1.4. Research question

The research question arising from the previously stated aims is:

*What is the size and scope of the Australian horse industry and what does this mean for infectious disease management?*

1.5. Report Outline

This section has introduced the background, context, aims and purpose of the study.

The literature review follows and is divided into two sections; the horse industry and infectious disease. It outlines the data that can be accessed at present, discuss the gaps in the literature and highlights the ways which this study aims to fill the knowledge gaps. The literature for the horse industry is based around reports published by industry bodies and the Australian government. These reports have been accessed to identify the data that is available and where the collection of data is needed. The second section of the literature review covers infectious diseases within the livestock industry, focusing on zoonotic and equine diseases. This section outlines the current situation in the livestock industry, past situations such as outbreaks of diseases, past and future threats, and how the control of a possible outbreak is planned.

Section 3 covers the methods used and the data collection technique used and the methods used for data analysis. The methods which have been applied in this study are based on previous AHIC surveys. The data analysis is based around the types of organisations
surveyed and what their differences and similarities are, and the analysis was divided by state to show the distribution. The survey used is based around previous AHIC survey methods, and looks at the advantages and disadvantages of email based surveys relating to this study.

The results are presented in four section: All organisation, racing organisations, recreation/sporting based organisations, and breed based organisations. Within each section is are the number of horses registered (total and new), members, events, horses at events, participants in events, spectators at events, volunteers involved in the running of events and other people involved in the running of events. Each section is either show in results per state or nationally.

The discussion focuses on the results collected by the survey and discusses the implication this has for disease management based on the literature available. This includes the impact on future outbreak control, endemic disease control, emerging disease control, and quarantine measures. Control measures discussed include vaccination programs, quarantine changes, and the current management measures in place.

Conclusions have been drawn from the data collected, and from the discussion, and the recommendations have been based on these conclusions.
2. Literature review

2.1. Information in the horse industry

There is a limited amount of information on the Australia horse industries size, contribution to the economy and number of people involved (Gordon, 2001). People who are involved in the industry range from the everyday interaction with horses (e.g. riding, owning, and working in the industry) to occasional contact (e.g. volunteering at events) (AHIC 2007). The only reliable current information presently available on the industry is from the statistics provided on the racing industry (AR 2009) and some information from organisation annual reports. These provide limited information about competition and other horse event results above a certain level (e.g. prenovice in eventing) (EA 2009).

In addition to this limited amount of information there is the issue of differing sources of information (e.g. Literature, research, and industry figures). The impacts of the economy and Equine Influenza (EI) on the industry means that the limited information is not relevant in most cases (Callinan 2008). Much of the industry data was made available through the Rural Industries Research and Development Corporation (RIRDC). This data includes reports on the whole industry and its needs (e.g. research into diseases and their control). Other sources include other government and industry agencies (O’Brien and Vincent 2006). The client (AHIC) has also provided some data from recent years on several of the organisations being surveyed which is included in appendix 2. Each of these sources of data provides it in a different manner (e.g. RIRDC produces research articles).

Another issue with the data available is that are based around estimations of the size of the industry and its contribution to the economy (Gordon 2001). The estimated number of horses in the industry varies from 900,000 to 1.8 million (Gordon 2001). This data is based on a variety of methods of calculations, with the best guess made by Gordon (2001) being 1.2 million. These estimates also include the estimated 300,000 feral horses present in various parts of Australia, which are not part of the focus of this current study, but will be important in future studies.

The estimate of horse numbers is based around previous data, and allows for changes in numbers of horses due to the variety of reasons (e.g. impacts of the EI 2007 outbreak). This inevitably means that the data is not appropriate for this study as no current research into the trends of horse ownership and the affects of the 2007 outbreak of EI has had on the industry.
size. Prior to EI certain sectors were seen to be increasing, though these figures only cover a small section of the industry (O’Brien and Vincent 2006).

Gordon (2001) showed the difficulties identified in previous studies of the industry, with most cases only estimating the number of registered horses, events and members. Another issue is the presence of deceased horses or horses which have been sold to another owner since being registered, which also increases the likelihood of over estimation in the numbers (Gordon, 2001).

Estimates of other sections in the horse industry included the number of personnel in the horse industry, about 400,000 people own horses in Australia, with 1 million horses in the industry. This translates into about 2% of the population in Australia own horses (AHIC Survey 2009). This demonstrates that the majority of horses are registered or associated with breed societies, with over 50% of horses being registered based on their breed, though this may overlap with racing and recreation registrations. Currently there is not enough detail about events and the number of horses and people involved, and this is the gap which this study aims to fill.

2.1.1. Industry components

For the purpose of this study organisations involved in the survey were divided up into breed based, sport/recreation based, and racing based. The variety in the industry is what makes collecting detailed and comparable data difficult, which is why only a section of the industry is being surveyed which tries to represent the whole industry (Pilkington 1993). This portion of the industry included several of the larger organisations, a variety of disciplines and all at a national level. Current information from these organisations is limited with event information only covering the higher levels of competition are recorded. This leaves out several lower level competitions which in many cases are where the majority of the horses and riders compete (EA 2009). Other issues include the cases where the numbers recorded for public viewing are either outdated or only estimations of the actual numbers (AR 2009).

The main issue with having various styles of organisations is that members and horses are not exclusive to one organisation and it is common for a horse or person to be registered or a member of multiple organisations. This leads to a large amount of overlapping in the information on membership and registered horse numbers. Overlaps mainly occur when
horse is registered with a breed society, such as the Arabian Horse Society for its breed and then with Equestrian Australia to compete in events. This issue has been highlighted by previous horse industry surveys in Australia on the industry e.g. Gordon 2001 and Dalgey 2008. One of the reasons why the data being collected from the Industry Advisory Committee is useful, as it consists of several of the larger organisation which are less likely to overlap in registrations. These organisations are also a good representation of the industry due to their large size, presence in most states and variation between the purposes of the registries with a range from Olympic discipline to Pony Clubs. An example of this is that a horse registered with Equestrian Australia is not likely to be registered with the Polocrosse Association as they are aimed at two different parts of the industry.

2.1.2. Stakeholders

One of the ways that the horse industry is unique is the variety of stakeholders which are part of the industry from recreational riders to business owners. In many cases the AHIC helps these stakeholders in communicating with each other as well as outside sectors such as the government (AHIC 2009). The stakeholders in the horse industry can be divided up into several areas, mainly breeding, racing, and non-racing competition or sport, all of which have different aims in what they want to achieve through the use of horses (Gordon 2001).

These three areas are not completely separate from each other, and in many cases overlap in their aim and purpose. An example of this is that many breeders are breeding horses for sale or for competition, and this applies to both racing and non-racing areas (Gordon 2001). Another division between stakeholders is the purpose of their involvement with horse, whether it is for business or profit purposes, as part of their work (e.g. stock horses), for competition, or for recreation (Dalgey 2008).

The organisations included in this survey represent several of the larger groups of stakeholders present in the horse industry. An example of the larger stakeholders included in the study is the large racing organisations, which consist of exclusively one breed (e.g. thoroughbred). The organisations which are part of the study and other industry bodies are discussed in section 2.1.3. in more detail.
2.1.3. Key industry bodies

The key industry bodies consist of the common racing, sport and breed organisations, these organisations are well known to the general public through events such as the Sydney Royal Easter Show, Melbourne Cup and Olympics. These organisations were included due to their large size in terms of numbers of member and horses. The Horse Industry Council (AHIC) and the Rural Industries Research and Development Corporation (RIRDC) work to coordinate these key industry bodies (e.g. Equestrian Australia) to achieve future goals relating to research, industry development and working closely with stakeholders to identify issues (O’Brien and Vincent 2006). This coordination helps to further the growth of the horse industry and the relationships between different organisations, sports, and non-horse organisation, as well as with the local, state and federal Australian governments (AHIC 2009).

Other interaction can include with group such as agriculture show societies (e.g. Royal Agricultural Society). These societies organise shows and competition at local, state and national level for horses and other agricultural areas (e.g. horticulture). On another level, interactions between sports during competitions such as eventing and showjumping occur often outside the AHIC. This is done through the larger parent organisations which consist of several smaller groups, such as Equestrian Australia, a registration organisation for a variety of sports ranging from local to international competitions. These parent organisations typically consist of state bodies and in some cases state and national level bodies for each sport/area of the organisation (EA 2009).

Other interactions can occur outside the AHIC and RIRDC between organisations for various reasons, such as collaboration for events such as Equitana and when working with the government on policy. One of the main collaborations of the industry was the Equine Influenza Inquiry, where several sectors of the industry collaborated, along with the AHIC to provide information, ask questions, and propose changes relating to the 2007 Equine Influenza outbreak (Callinan 2008). The EI inquiry included not only organisations but stakeholders which are part of the industry
2.1.4. Legislation

Australian commonwealth and state regarding horses mainly relates to welfare and cruelty issues, such as hurdles racing, rodeos, hunting and the use of certain equipment and is regulated by state and territory Governments. These legislations can vary between the states on minor points, including the allowance of hurdles racing within that state e.g. the Prevention of Cruelty to Animals Act 1979 (NSW). The use of certain equipment such as sharpened rowelled spurs, working or competing on an unsound or injured horse, and cause any unnecessary harm to an animal is included in most state legislation e.g. Prevention of Cruelty to Animals Act 1986 (Vic).

Other legislation relating to the horse industry includes the Quarantine Act 1908, Stock Disease Act 1923 (NSW), and the Animal Disease (Emergency Outbreaks) 1991 (NSW). Federal legislations and those applying to each state are listed in Table 1. These acts mostly relate to the control, prevention and notification of diseases in Australia and NSW. All states in Australia have similar legislation, and vary little in how the legislation relates to horses, with the main exception being the requirement for properties containing horses to register a Property Identification Code (PIC). PICs are not currently required in all state for properties with horses present. This is gradually changing so that it is required for properties with horses to have one including Victoria which recently changed legislation to include horses in PIC requirements (Harkin 2010). The legislations relating to disease control are in conjunction with the AUSTVETPLAN, which is discussed in part 2.2.2.3 of this report, and applies to other livestock and domestic animals as well as horses.

The Stock diseases Act 1923 (NSW) and similar legislation in other states also have several clauses relating to the voluntary permanent identification of horses, which relates to the use of microchips. Though microchipping of horses is not compulsory, voluntary microchipping still has to be conducted by trained personnel using the guidelines within the legislation. Permanent identification is done to ensure that a horse can be identified easily when sold, bought or shown, and is required by several organisations when horses are registered (e.g. EA).
<table>
<thead>
<tr>
<th>State or Federal</th>
<th>Legislation Name</th>
<th>Year</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Capital Territory</td>
<td>Animal Diseases Act</td>
<td>2005</td>
<td>To protect animal health and welfare, as well as the industry through preventing, detecting and controlling disease outbreaks.</td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>Animal Welfare Act</td>
<td>1992</td>
<td>The welfare of animals, including the prevention of cruelty and mistreatment in all animals including research, pet and working animals.</td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>Stock Act</td>
<td>2005</td>
<td>Control of levies, movement, registration of marks, and the identification of livestock.</td>
</tr>
<tr>
<td>Federal</td>
<td>Quarantine Act</td>
<td>1908</td>
<td>To minimise the risk of exotic pests and diseases being introduced into Australia.</td>
</tr>
<tr>
<td>New South Wales</td>
<td>Animal Disease (Emergency Outbreaks) Act</td>
<td>1991</td>
<td>Relates to the prevention, control and eradication of an outbreak of exotic or endemic disease in animals.</td>
</tr>
<tr>
<td>New South Wales</td>
<td>Animals Act</td>
<td>1977</td>
<td>Obligations of owners in their animals cause any damage to property etc.</td>
</tr>
<tr>
<td>New South Wales</td>
<td>Prevention of Cruelty to Animals Act</td>
<td>1979</td>
<td>To prevent cruelty and promote welfare in animals.</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>Animal Welfare Act</td>
<td>2000</td>
<td>Prevent cruelty and promote humane welfare for animals, increase public awareness on welfare issues.</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>Livestock Act</td>
<td>2008</td>
<td>Regulate identification, movement, health and welfare in livestock.</td>
</tr>
<tr>
<td>Queensland</td>
<td>Animal Care and Protection Act</td>
<td>2001</td>
<td>Provide standards for the welfare, care, use and research in animals, and protect animals from mistreatment.</td>
</tr>
<tr>
<td>Queensland</td>
<td>Stock Act</td>
<td>1915</td>
<td>Relates to stock disease control, identification and movement of stock, artificial breeding and the confinement of stock.</td>
</tr>
<tr>
<td>South Australia</td>
<td>Animal Welfare Act</td>
<td>1985</td>
<td>The promotion of animal welfare in teaching, research and all other areas. Control of animal ethics and permits or license for animal use.</td>
</tr>
<tr>
<td>State</td>
<td>Act</td>
<td>Year</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>South Australia</td>
<td>Livestock Act</td>
<td>1997</td>
<td>Relating to livestock in terms of disease, identification, and control of livestock movement.</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Animal (Brand and Movement) Act</td>
<td>1984</td>
<td>To regulate the identification of animals and the movement of animals within the state.</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Animal Farming (Registration) Act</td>
<td>1994</td>
<td>Controls what animals can be kept for farming purposes and the registration of farmers.</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Animal Health Act</td>
<td>1995</td>
<td>Relates to the Quarantine requirements, importation of animals, disease notification and control, artificial breeding, and the responsibilities and powers of inspectors.</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Animal Welfare Act</td>
<td>1993</td>
<td>The welfare of animals including animals used in research, pets or any other live vertebrate.</td>
</tr>
<tr>
<td>Victoria</td>
<td>Impounding of Livestock Act</td>
<td>1994</td>
<td>Control of impounding of stock, and matters relating to the agistment of horses.</td>
</tr>
<tr>
<td>Victoria</td>
<td>Livestock Management Act</td>
<td>2010</td>
<td>Prevent, control and eradicate disease in stock.</td>
</tr>
<tr>
<td>Western Australia</td>
<td>Animal Welfare Act</td>
<td>2002</td>
<td>Provide standards for the welfare, health and safety of animals, and to regulate the use of research and teaching.</td>
</tr>
<tr>
<td>Western Australia</td>
<td>Exotic Diseases of Animals Act</td>
<td>1993</td>
<td>To prevent, control and eradicate exotic disease of animals.</td>
</tr>
<tr>
<td>Western Australia</td>
<td>Stock (Identification and Movement) Act</td>
<td>1970</td>
<td>The registration and use of brands, ear tags and other identification in stock, and the movement of stock within the state.</td>
</tr>
<tr>
<td>Western Australia</td>
<td>Stock Disease Act</td>
<td>1968</td>
<td>Prevention, control and eradication of disease in livestock.</td>
</tr>
</tbody>
</table>
2.2. Infectious disease

An infectious disease is a disease which follows the infection of the body by a pathogen, such as a virus, bacteria or fungi (Boden 2007). This section looks at a variety of disease causing pathogens for example viruses, bacteria and prions. In the case of livestock most infectious disease are contagious viruses, and transmitted through direct contact or aerial spread, or vector borne viruses, being transmitted through disease causing organisms such as midges or mosquitoes (Allaby 2009).

2.2.1. Australian livestock industry

The Australian livestock industry is well known for its lack of serious infectious disease, which is maintained by Australia isolation and strict quarantine measures (AHA 2009). This lack of disease means that Australia is able to export live animals and animal products without many of the restrictions which apply to countries where serious infectious diseases are endemic (Geering 1995). The impacts which such a disease would have on the industry would be immense, as the population is naive and unprotected from exotic or emerging diseases. It would also have an impact on the production of animal products for local markets and exportation to international markets.

Many of the diseases of particular concern are so largely due to their ability to pose a great impact on production. Several of these diseases are also zoonotic and a public health concern if they were to occur in Australia (Geering 1995). These diseases include rabies and Vesicular Stomatitis which can affect many other species including domestic animals or wildlife (Quinn et.al. 2002). Some of these diseases are not necessarily exotic, but emerging diseases, including Hendra (Henipavirus) which has not occurred outside of Queensland and northern NSW (Sellon and Long 2007) and Lyssavirus (Australian Bat Lyssavirus). Emerging diseases can pose a serious threat as their transmission, symptoms and severity are not entirely known (Mackenzie 1999).

2.2.1.1. Infectious disease threats to the livestock industry

The threats from infectious disease come from diseases which impact the productivity of the industry either through death of animals, lowered production rates, lowered fertility and conception rates and or impacts on exportation, importation and trade (Geering 1995). One example is Rabies (Lyssairus) which has a high mortality rate though the disease is not
contagious between livestock and other animals. Livestock are typically infected with rabies through infected dogs or bats (Morrison et.al. 1996). Foot and Mouth Disease (FMD) (*Aphthovirus*) is another example exotic disease which has the potential to cause loss of production in livestock and is a serious threat (AHA 2010). FMD is a highly contagious infectious viral disease in cattle, sheep and other cloven hoof animals; it is spread through the saliva, lesions, urine, faeces and milk of animals. The disease does not cause high mortality rate in adult animals but is serious in young animals where up to half of the infected animals may die (Boden 2007).

Exotic disease threats to the livestock industry originate from multiple countries where the production of livestock is a well established industry, including the United Kingdom and America (Garner and Lack 1995). Importation of live animals, animal product and reproductive material is restricted to countries approved by the Australian Quarantine and Inspection Service (ICON 2010). This restriction prevents the importation of animals from countries where serious infectious diseases are endemic, and limits the risk of disease spread. The restrictions also control how soon an animal can leave quarantine and how long it needs to be in isolation prior to importation, and this also depends on the country of origin, species of animal, and the use of that animal once in Australia.

Threats can come through live animals, animal products and contaminated persons or equipment depending on the disease and mode of transmission (Thrusfield 2005). Quarantine against livestock diseases not only applies to animals and animal products but also any person or an object which has been in contact with livestock (Quarantine Act 1908). Not all threats are contagious diseases, with some infectious diseases transmitted through the consumption of animal products. Bovine Spongiform Encephalopathy (BSE or mad cow disease) is an example of this as it is only transmitted through the consumption of contaminated animal products and possibly vertically from dam to calf (AHA 2005). The variation between disease transmissions for the various threats is the reason for strict quarantine measures over not only live animals but animal products and possibly contaminated objects.

### 2.2.1.2. Past outbreaks of infectious disease in the livestock industry

Australia has been lucky to not suffer serious outbreaks of exotic infectious disease within the livestock industry. Previous outbreaks in the last 15 years have been limited in most cases to a small area, normally a property or region. An example of this is Avian Influenza
Orthomyxovirus) in birds, which occurred several times in the 1990’s but only limited outbreaks on the properties in Australia where the original infection occurred (Alexander 2000 and AHA 2010). The most recent exception to this is the outbreak of Equine Influenza in 2007, which spread to parts of NSW and a small area of Queensland (Callinan 2008). This outbreak is thought to be due to the importation of horses with the disease, and spread of the disease from these horses through unknown means to over 200 horses attending an event in NSW, and spreading from these initial infections and properties.

Other outbreaks which have occurred have done so without spreading from the original infected animal (AHA 2000). Several outbreaks of the emerging infectious disease Hendra have occurred within Australia, though the disease is not highly contagious and rarely spreads beyond the original infected property (Sellong and Long 2007). Bovine Ephemeral fever (Rhabdovirus), Pestivirus and Strangles (Streptococcus equi equi) are endemic to Australia, but can occur in outbreaks due to a variety of factors including environmental conditions and weather (AHA 2010). Rabies (Lyssavirus) has occurred in humans infected prior to coming to Australia but it has not spread beyond the original infected person showing the need for strict quarantine in all areas and not only with live animals (Morrison et al 1996).

### 2.2.1.3. Current infectious disease management

Disease management in Australia is controlled by the federal and state government through legislation at both levels. The federal government prevents the introduction of disease through the Quarantine Act (1908) by controlling what is imported into the country which could potentially pose a risk of disease. There are various state legislations designed to prevent, control, and eradicate animal disease in that state (see Table 1). State legislation relate to disease control through the regulation of stock identification and registration, monitoring of stock movement, and health management e.g. vaccination programs. An example of a vaccination plan used to control the spread of infectious disease is vaccination against pestivirus in cattle (Robson 2007).

These legislations are backed up by the AUSVETPLAN (refer to 1.1.) which contains strategies to control 35 diseases which are considered serious by Animal Health Australia and 29 less serious diseases (AHA 2008). All 35 serious diseases have full disease strategies included in the plan e.g. Foot and Mouth Disease, and the 29 remaining diseases have what is called a ‘disease brief’. Disease strategies outline what is to happen if a disease were to be
introduced or an outbreak occurs in the case of endemic diseases in detail, with many including the restrictions on movement which would be put in place and vaccinating of animals in certain areas (AHA 2007). The disease briefs for less serious threats to Australia contain information about the disease including the control and eradication methods (AHA 2009(3)).

Many disease threats come from exotic or emerging infectious diseases being introduced and becoming endemic within the domestic, feral or wildlife populations (Geering 1995). The AUSVETPLAN outlines the strategy for control and in most cases eradication of emergency animal diseases which are viewed as a threat to the Australia livestock industry (AHA 2008). These plans outline the quarantine, de-contamination, surveillance and restrictions needed for suspected and infected animals and properties (AHA 2008).

2.2.1.4. Future infectious disease threats to the livestock industry

The main diseases which threaten the livestock industry are those which are exotic to Australia and have proven in other countries how much of an impact they can have on the industry. These factors are the basis for the AUSVETPLAN strategies for 35 diseases which are viewed as a serious threat to the industry eg. Vesicular Stomatitis (AHA 2008). There is also 27 other emergence animal diseases which are also listed, but do not have a full disease strategy due to them not being likely to be introduced, or are less likely to have a serious impact (AHA 2008). These diseases range in their pathogenicity, virulence, mode of transmission, the rate of mortality and other epidemiological factors (Thrusfield 2005).

2.2.2. Horse Industry

2.2.2.1. Infectious disease threats to the horse industry

The threats to the horse industry consist of exotic diseases, emerging diseases, and zoonotic diseases which are not currently endemic to Australia (Geering 1995). These threats vary from serious impacts on the productivity of the industry due to disease to high mortality among the population; these diseases threaten Australia with the loss of its disease free status and the benefits that come from this state (Wilson 1995).

The serious threats to industry include the diseases African Horse Sickness, Equine Influenza and Vesicular Stomatitis which are included in the AUSVETPLAN disease strategies (Wilson 1995, AHA 2008). African horse sickness, a non-contagious infectious disease, and a
serious threat in terms of mortality, it normally results in death of animals not vaccinated against the disease (Sellon and Long 2007, OIE 2009 (1)). African horse sickness is a vector borne disease transferred by species of *Culicoides* (Midges) which species of are present in Australia. Vector borne diseases create difficulty when attempting to control and eradicate the disease if it were to spread into the insect population (Turner et al. 1996).

Equine Influenza (EI) has been a threat to the industry for many years, and the impact it would have on the industry was shown during the 2007 outbreak in NSW and QLD (Callinan 2008). Though it does not pose a threat in terms of loss of life, it has and could again have a serious impact on the industry in terms of loss of production (Wilson 1995). Another factor is the mode of transmission, which is through direct contact, contaminated animals, contaminated objects, and aerial spread (Sellon and Long 2007). It will also impact Australia’s export trade, as it would result in loss of the disease free status allowing it to trade feely with other countries e.g. New Zealand(Wilson 1995).

Vesicular Stomatitis does not have a high mortality rate and has a major impact on the production side of the horse industry (Wilson 1995). This disease is zoonotic, and not only poses a threat to the horse industry but the livestock industry as a whole, the general public and possibly native Australian wildlife (Sellon and Long 2007). Transmission occurs in multiple ways, primarily through a vector such as sandflies (*Phlebotomus, Lutzomyia*) and possibly through direct contact in some species, and is seasonal due to being vector borne (Sellon and Long 2007). This disease could be introduced through either infected animals or infectious animal material, mainly from the vesicles or saliva being brought into Australia (OIE 2009 (2)).

2.2.2.2. Past outbreaks in the horse industry

The most recent significant disease outbreak in the horse industry is the 2007 outbreak of Equine Influenza in parts of NSW and Queensland (Callinan 2008). This outbreak had a large impact on the industry, restricting the movement of horses within all of Australia for 72 hours, and restrictions applied to NSW and Queensland for several months until Australia was declared officially free of the disease on 30 June 2008 (Callinan 2008). It is estimated that the outbreak cost 3.35 million per day in income for equine businesses, and $560 000 per day in disease control (Callinan 2008). It also impacted greatly on the importation and
exportation of horses, preventing trade with several regular trade partners including New Zealand, Malaysia and France from September 2007 until March 2008 (Callinan 2008).

Other outbreaks have occurred, but not on the same scale, not spreading beyond the originally infected animal or the property where the infected animals were housed (AHA 2000). Included in this is the emerging Hendra virus, which has only occurred in Queensland and one case in NSW, and is not highly contagious but still has a high mortality rate (Wild 2009). Hendra is thought to occur due to an overspill from their reservoir host of fruit bats (Pyeropus) into horses. This disease is not highly contagious and occurs rarely in horses and humans, and only in humans after contact with an infected horse (Deubel and Wild 2009).

2.2.2.3. Future threats to the horse industry

Since a recent outbreak of Equine Influenza, a serious infectious disease has recently occurred in the horse industry, the quarantine and biosecurity measures in place are aimed at preventing any future outbreaks (Callinan 2008). Future threats to the industry are in terms of when they will occur, rather than if they will occur, especially after outbreaks of Hendra in Queensland which are occurring regularly (Deubel and Wild 2009). This idea of threats being a case of when they will occur is the reasoning behind programs such as AUSVETPLAN to help prevent the spread of disease once it is introduced, and minimising the impact that it will have on the industry (AHA 2008).
3. Methods

3.1. Methods background

As this study is being conducted on the behalf of the Australian Horse Industry Council, using similar techniques to those they have used previously to conduct survey of the industry would be desirable as it would mean that data collected from previous studies would be compared to the new and future data. The main method of surveying of the organisations involved is email based to ensure that the targeted organisations are reached due to their locations all over Australia (AHIC 2007). Previous research into the industry has mainly been conducted through online surveys of individuals which are part of the industry (Dagley 2008). The technique of email based surveying is used due to the nature of the industry, with a variety of organisations which are located in various states, at multiple levels of management. Other techniques used in the horse industry include surveying at major horse related events, which has a higher response rate, but only targets a certain section of the industry from where the event is located, and what parts of the industry are participating at the event.

The use of online surveys over paper based surveys has several advantages and disadvantages. The main disadvantage of online survey are that the people you wish to survey may not have access to the survey, or may not be able to understand the format, which is not applicable in this case due to the nature of the organisations which have regular access to the internet (Andrews 2003). These disadvantages are greatly outweighed by the advantages of confidentiality, easy to manage responses and instantaneous responses in most cases (Andrews 2003). The return rate on email based surveys versus mail or strictly web based has been shown to be higher in groups where internet usage is more common place (Sheehan 2001). This as well as the use of follow up methods such as phone calls to the organisations and prior agreement to complete the survey helps to ensure higher rates of response to the survey (Yun and Trumbo 2000).

3.2. Survey design

The survey used in this study was developed in conjunction with an AHIC representative and is based on previous research into industry and aimed at the industry representative being surveyed. The survey is focused on quantitative data, with closed questions about the estimation of numbers within the organisation. The quantitative section breaks up into
sections information about the organisation sizes in terms of membership and horse numbers, the number of events conducted, and the number of people and horses involved in events.

The first section of the survey aims to outline the size of the organisation, and this data has previously been collected from several organisations, and also confirms the organisation contact details in case of future research. It includes the number of people registered or affiliated with the organisation, the total number of horses registered with the organisation, the number of new horse registrations, and the amount of revenue produced by the organisation in the last year. This section is important as the organisations will vary in numbers of horses and people greatly, as will the ratio between the two as some may register breeding animals as well as competitive animals.

The second section focuses on the number of events and what type they are conducted in each state, to help define where each style of competition is focused. The descriptions used are very general, and future work would need to be done into whether the events were open to all riders or just members, and at what level they started and stopped, as this varies depending on the event and who is running it. For example, showjumping events can be run through the State branch of Equestrian Australia, or can be run by other organisations such as breed based organisations, and this study should help define how many organisations are running each type of event and where.

The third and final section of the survey looks at the involvement of people and horses in events for each state, including participants and volunteers separately. This information is the basis of an average for the numbers involved in each event, for the people involved, such as riders, horses involved and the volunteers needed on average to run the event. The number of volunteers is important as the majority of equestrian events would not occur without their assistance. All three parts have been divided into states, and not just the total numbers for Australia, as the concentration of horses and members in each state is important if the data is to be used in developing policies and to be used as supporting evidence for future research.

3.3. Participants

The organisations that participated in the survey are part of the Australian Horse Industry Council’s Industry Advisory committee (IAC). These organisations were chosen due to their position on the IAC, their large size and position as national organisations. They were also in
contact with the AHIC by email regularly and closely involved in the development of policy, making them easier to contact. This also avoids the issue of anonymity which would be present in other email surveys, as the organisations are already known and committed to the study.

3.4. Methods for data collection

Organisations were contacted by email and provided with a letter of introduction and survey. This letter contained information on the nature of the project, who was conducting the research, why the data was being collected, contact details of the main people involved in the project and what data was needed. The survey (Table 10; Appendix 8.1) was created in an Excel spreadsheet which enabled the organisation and the data they are providing and returned to the researcher via email or postal means if necessary. A second email was sent a month after the first, requesting the return of any outstanding surveys. This second email was followed by a phone call either thanking for their participation in the survey or inquiring to whether or not they were still interested in completing the survey.

3.5. Methods of Data Analysis

As the main aim of this study is to identify how many horses registered, members, events run and horses and people involved at events which are run, analysis of the data will focus on these areas, and the concentrations in different states and territories. For each of the sections, various graphs and charts will be used to demonstrate the spread of numbers over each state, competition type and organisation type. As the confidentiality of the organisations is important, the organisations will be divided by their ‘type’, firstly into breed based and competition based organisations, then within the competition type, styles of competition which depends on the number of organisations being surveyed.

In the results membership of an organisation is defined as people who are part of the organisation, which consists of the member paying a membership fee once or annually. Many of the organisations require some form of membership if a person is to compete at one of their events. Horse registration is similar to this, and involves a financial contribution to the organisation so that a horse is able to compete in events run by that organisation or their
affiliates. In the case of breed based organisation and racing organisation, horse registration is used when breeding to prove that a foal is from a certain breed, and can be competed in events run by that organisation even if the dam or sire has not competed previously.

As there are no geographically based organisations in this survey, so division of the actual surveys by state/territory is not needed but may become an organisation type in future studies and would need to be included.
4. Results

The results collected have been divided up into three main sections based on the organizations purpose:

1. Racing
2. Recreation/sporting
3. Breed based

In the results racing organisation are defined as those which organise and run horse racing events in both thoroughbred and harness racing. Recreation and sporting is defined as organisations which organise and run events of a non-racing nature which are still considered sport, including Olympic disciplines and team sports. Breed based organisations are focused on the breed of a horse and organise events for purebred or part bred horses, as well as ensuring true breeding of the horses.

All states and territories were surveyed, with the majority of the data being on New South Wales, Victoria and Queensland. Data was obtained for all states and territories in some cases, but many did not have information relating to the Australia Capital Territory and Northern Territory. Several organisations were unable to provide state specific data in some areas, including number of horses registered.

4.1. All organisations

These results are those collected from all three types of organisations and divided into the sections of membership, horse registration, events run, horse participating in events, people participating in events, spectators at events and volunteers at events.

4.1.1. Membership

The membership of the combined organisations is the highest in the states of New South Wales (38.41%), Victoria (23.79%), and Queensland (16.77%). The states of Western Australia (9.44%), South Australia (7.07%), Tasmania (3.89%), Australian Capital Territory (0.62%), and the Northern Territory (0.02%) are also represented.
Figure 1. Current membership of all organisations by state.

4.1.2. **Number of horses registered**

The number of live horses registered with all organisations is also highest in New South Wales (38.51%), followed by Victoria (24.79%) and Queensland (20.29%). All other states and Territories are represented with percentages of 6.75% in Western Australia, 6.02% in South Australia, 3.07% in Tasmania, 0.37% in Australian Capital Territory, and 0.21% in Northern Territory.

Figure 2. Horses currently registered with all organisations by state.

The percentage of new horses registered with all organisations was highest in Victoria (46.31%), followed by New South Wales (22.94%), Western Australia (13.82%) and Queensland (9.10%). The states of Tasmania and South Australia were also represented with smaller percentages of 4.02% and 3.82%.
4.1.3. Events run

The numbers of events run by the combined organisations was highest in New South Wales (32.47%), followed by Victoria (24.20%), Queensland (16.95%) and Western Australia (13.20%). The states and territories of South Australia (8.75%), Tasmania (4.14%) and Australian Capital Territory (0.09%) were also represented.

4.1.3.1. Horses participating in events

The number of horses in an event varies depending on the organisation, state, event type and location within the state. The lowest number estimated is 25 horses in Organisation 1 in Tasmania, the highest estimated number is 43,360 horses. These values show for three different organisations for comparison.
4.1.3.2. People participating in an event

The number of people participating in events also varies similar to the number of horses. The lowest value was 18 people participating in Tasmania, the highest being 10,840 in New South Wales. The minimum value does not include one of the organisations as this information was not provided.

Table 4. Minimum number of people participating at an event for three organisations.

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<td>24,010</td>
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Table 5. Maximum number of people participating in an event for three organisations.

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<td>250</td>
<td>100</td>
<td>600</td>
<td>600</td>
<td>5,980</td>
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<tr>
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<td>1,000</td>
<td>6,160</td>
<td>3,460</td>
<td>1,820</td>
<td>10,260</td>
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<tr>
<td>10,840</td>
<td>600</td>
<td>80</td>
<td>80</td>
<td>38</td>
<td>160</td>
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4.1.4. People involved in events

The number of people involved in an event varies from volunteers to spectators, participants are also present at events but they are included in the previous section about events run. These tables only include three different organisations to give an example of the variation within the industry for the number of people needed to volunteer for an event to run and the number which attend as spectators.
4.1.4.1. Spectators at events

The number of spectators varies greatly, with the minimum number varying from 20 to 135,500 people, with the maximum also varying from 30 to 542,000 people. The difference within each state is also significant.

Table 6. Minimum number of spectators at an event for three organisations.

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<td>22,750</td>
<td>128,250</td>
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Table 7. Maximum number of spectators at an event for three organisations.

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<tr>
<td>542,000</td>
<td>308,000</td>
<td>173,000</td>
<td>91,000</td>
<td>513,000</td>
<td>299,000</td>
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4.1.4.2. Volunteers at events

The number of volunteers needed does not vary as much as other numbers of peoples involved in events. The lowest minimum number needed is 4, with the highest maximum being 8,130, with the states vary greatly when compared to each other.

Table 8. Minimum number of volunteers needed to run an event for three organisations.

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<td>2,710</td>
<td>1,540</td>
<td>865</td>
<td>455</td>
<td>2,565</td>
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<td>1,495</td>
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Table 9. Maximum number of volunteers needed to run an event for three organisations.

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<td>100</td>
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</tr>
<tr>
<td>8,130</td>
<td>4,620</td>
<td>2,595</td>
<td>1,365</td>
<td>7,695</td>
<td>4,485</td>
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</tbody>
</table>
4.2. Racing organisations

Racing organisations consisted of both flat racing and harness racing. Data was collected on all states in Australia, but no information on the Australian Capital Territory or the Northern Territory was available. Data was collected on the number of members within the organisation; horses registered, both currently and new registrations per year; number of events run, what type of event, and how many horses were involved; and the people involved in running events, participating and other people involved.

4.2.1. Members within organisation

Nearly 60% of membership to the racing organisations surveyed consisted of New South Wales and Victoria, with the states of Western Australia (16%), Tasmania (10%), South Australia (8%) and Queensland (8%) all being represented.

![Figure 5. Current members and affiliates of racing organisations by state](image)

4.2.2. Horses registered

Over 45% of new registrations to racing organisations are located in Victoria, with over 35% being located in the states of New South Wales and Western Australia. The three other states also had data provided, with Queensland having 9% and both South Australia and Tasmania making up 4% of new horses registered.
Figure 6. New Horses registered with racing organisations by state

4.2.3. Events run

The majority of events run by racing organisations are in the eastern states of Australia, namely New South Wales (28%), Victoria (27%), Queensland (16%) and on the western side of Australia Western Australia (15%). The remaining events are run in South Australia and Tasmania with 9% and 5% respectively.

Figure 7. Events run by racing organisations by state
The number of horses involved in events run by racing organisations differs over all six states from a minimum of 20,564 to a maximum of 22,033 horses on average. No information was available for the Australian Capital Territory and Northern Territory.

Figure 8. Minimum and maximum number of horses participating in events run by racing organisations.

4.2.4. People involved in events

The people involved in the running of racing events are mainly made up of volunteers, trainers, and other participants including drivers or riders. The number varies depending on the event type, the location and the number of horses competing.
Figure 9. People involved in the running of racing events.

4.3. Recreation/sporting organisations

The recreation/sporting organisations consist of a variety of sports including showjumping, dressage, vaulting, and eventing. Data was provided for all states of Australia, but no data was provided for the two territories of Australian Capital Territory and Northern Territory. Data collected was the number of members currently, new members, horses registered, new registrations, event numbers information, and people involved with the organisation and running of events.

4.3.1. Members

Almost 40% of membership in the recreation/sporting organisations is in the state of New South Wales, with Victoria representing 25% and Queensland 16%. The remaining data was consisted of membership in the states of Western Australia (10%), South Australia (7%) and Tasmania (3%).
4.3.2. Horses registered

Similar to the membership in recreation/sporting organisations, the majority of new horses registered with recreation and sporting organisations are located in the states of New South Wales (30%), Victoria (29%), and Queensland (20%). The states of Western Australia and South Australia both represent 9% of the horses registered, with Tasmania accounting for the final 3% of new registrations.
4.4. Breed organisations

Breed organisation are made up of variety of breeds e.g. Welsh Ponies and compete in a variety of sports, including horse shows, jumping and campdrafting. The focus for most organisations is on breed agricultural show classes. Data was provided for all states and territories in Australia, with the majority being from the eastern states of New South Wales, Victoria and Queensland.

4.4.1. Members

All states and territories in Australia are represented in the data for current membership of breed based organisations. The majority of data was collected from the eastern states of New South Wales (37.65%), Victoria (20.15%), and Queensland (19.33%). The other three states make up less than 8% in the case of Western and Southern Australia, and less than 5% in Tasmania’s case. Australian Capital Territory makes up less than 3% with Northern territory being represented by 0.10% of the current members.

![Figure 12. Percentages of current members registered with breed based organisations by state](image)

4.4.2. Horses registered

All the states and territories of Australia are represented in the data on the number of ‘live’ horses which are registered with breed based organisations. New South Wales (38.51%), Victoria (24.79%) and Queensland (20.29%) made up the majority of the data in this section. The states of Western Australia (6.75%), South Australia (6.02%) and Tasmania (3.07%)
making up the majority of the remaining data. The territories of Australian Capital Territory and Northern Territory were represented with less than 0.5% in each case.

Figure 13. Percentage of 'live' horses registered with breed organisations by state

4.4.3. Events Run

All States and the Australian Capital Territory are included in the data on events run by breed based organisations. The majority of events run were in New South Wales (53.69%), with the states of Queensland representing 21.63% and Victoria 13.49%. The remaining 10% consists of South Australia (7.63%), Western Australia (1.78%), Tasmania (1.27%), and Australian Capital Territory (0.51%). No data was available on the Northern Territory.

Figure 14. Total of events run in breed based organisations by state.
4.4.4. Horses participating in events

The estimated minimum and maximum numbers of horses and participants/competitors in breed based events varied depending on the organisation. The lowest minimum was 34 horses, and the highest maximum was 1367 horses (averaged from state values). The minimum number of people participating or competing went from 25 as lowest average minimum and a maximum average over the states of 442 people participating or competing.

Figure 15. Minimum and maximum numbers of horses and participants in breed based events from two organisations.

4.4.5. Spectators and volunteers at events

A number of other people are involved in breed based events, mainly spectators and volunteers who help organise and run events. The number of spectators varies greatly on the type and size of event, with the lowest average minimum being approximately 25 and the
highest maximum 408. The number of volunteers needed also varies depending on the event and organisation, the lowest minimum being 7, and the highest maximum being 149.

Figure 16. Minimum and maximum numbers of volunteers and spectators at breed based events from two organisations.
5. Discussion

The number of horses and people involved in the Australian horse industry is hard to quantify due to the nature of the industry, with no real national or encompassing body for the registration of horses. This study looked at the information available which was collected via a survey of a select group of equine organisations. The number of horses registered, membership numbers, the increase in both horses and members yearly, number of events run each year and the number of people involved in events as spectators and volunteers were recorded. The aim of the study was to develop a knowledge base for the size and scope of the horse industry in Australia to assist with development of plan for disease control. The affect that an outbreak of infectious disease have had and could have on the industry were also looked at in relation to how disease control has worked previously, hasn’t worked in the past and how it has improved due to previous outbreaks in Australia and overseas.

The various organisations within the horse industry are divided into three sections for this study: racing, recreation/sporting and breed based organisations. These organisations varied greatly in aims and size, and the information taken from the surveys varied in detail depending on the organisation type and management. The results were not as detailed or as conclusive as needed to make solid estimates of the size and scope of the horse industry. These organisations varied in their interest in horses, though are generally agreed on the need for better disease control, and prevention of exotic diseases in Australia.

The results of the survey show that the majority of horses, members and events are located in the states of New South Wales, Victoria and Queensland. This trend is similar to that of the human population in Australia, with higher concentrations in the eastern states and smaller but still significant amounts in Western and South Australia. Smaller populations in the remaining state of Tasmania and the two territories of Australian Capital Territory and Northern Territory also represented by smaller horse concentrations. The number of spectators, horses participating, people participating, and volunteers at events also followed this trend of higher numbers present or needed in the eastern states of mainland Australia.

This number of horses in the eastern states of Australia affects the chances of disease outbreaks due to the high concentration as well as location of the only two quarantine centres for imported horses being located in Sydney and Melbourne (Callinan 2008). This means that any horses entering Australia do so via these cities, and are located there for a period of time,
which increases the risk of an infectious disease outbreak in the states of New South Wales and Victoria. These horses may also travel to the quarantine centre from another area, meaning there is a chance of disease during these transfers from the arrival point.

The number of people involved in events which they are not participants in is higher than anticipated. They people were likely to come into contact with horses though they might not have regular contact with horses outside volunteering or as spectators at an event. These people may not be as aware as participants or people regularly in contact with horses about diseases in horses and may unintentionally spread a disease from one area to another due to lack of hygiene processes normally implemented after contact with horses. In the case of an outbreak of infectious disease the people who attend events as volunteers or spectators may not be as easily contacted by relevant organisations as people who were participants and who have to register prior to competition. Volunteers and spectators could possibly spread a disease from one region to another without realising it, resulting in a larger outbreak than if only people participating in an event were present.

The current disease control in Australia for the horse industry focuses on the consequences of an exotic disease being introduced. As it has already been shown through the Equine Influenza outbreak in 2007 such introductions could result in detrimental impacts on the industry. The focus in exotic disease is on those which would either have a large impact on the industry in terms of loss of production or loss of life, with some diseases having the potential for both impacts on the industry. Exotic diseases in the horse industry are notifiable and many have control plans outlined in the literature section of this report.

Many of the diseases of concern to the horse industry are viruses spread through direct contact between horses or are spread as an aerosol, sometimes over large distances. This also increases the chance of a disease which is introduced spreading quickly and easily through the eastern states where the concentrations of horses are high. More detailed information on the distribution of horses, especially in the eastern states is needed for disease control methods to be reviewed and strategic plans for disease investigation to be developed.

Diseases which are endemic or emerging should also be included in disease management planning. An example of a recently described emerging disease is Hendra and although it is not currently of national significance the increasing occurrence of this disease in Queensland is of concern (Wild 2009). Disease control of endemic diseases is mainly through
vaccination, good hygiene practices and education of people involved in the husbandry and management of horses. Education of members of organisations such as those surveyed in this study on aspects of the range of diseases, their spread, control and occurrence should also be attempted. The results from this study show that an outbreak of disease in the horse industry could easily occur in the eastern states due to the higher concentrations of horses, people involved with horses and larger and more events taking place.

Management of endemic diseases is often focused on the control of the disease in regional areas, and reduction in the number of cases (e.g. Equine herpesvirus-1, Allen 2002). A further issue is that a number of important endemic diseases are not notifiable in all states of Australia and the number of cases is not currently monitored for these diseases, so their occurrence is not known. An improved recording system for the diseases of horses would facilitate greater opportunities for disease control strategies, and this is the primary recommendation to the industry through this study.

Between the organisations surveyed it was shown that various record were kept, that meant some were not able to provide as detailed information on aspects of their membership, registration and events. The major example of this was the racing section was unable to provide details on the number of horses in each state which were registered. They were however able to provide details on the distribution of which were registered with the organisation by state (refer to figure 6.). This could pose a major issue in future studies, and should be considered when creating surveys.

6. Conclusions and recommendations

The main conclusion from this study is that more detailed information is needed for disease control to improve within the horse industry. The information collected shows the general distribution of horses, people and events over the states of Australia, but not the distribution within each state. These results show an overview of where a disease outbreak is likely to occur due to the concentration of horses and where it would have the most impact on the industry.

The conclusions drawn in the literature review are that there is lack of information about the industry in terms of distribution of horses, people and events. This lack of information results in disease control not based totally on real data about the industry, and show where
improvements could be made. Improvements include stricter vaccination requirements for endemic diseases, increased biosecurity within the Australian horse industry, and a standard recording system for horse registration and membership to organisations. Other areas which are shown to need improvements is the need for more detailed management of organisations, especially records at events of who attended, where they came from and are going to and the details of their horse or horses.

The literature review also showed what diseases are threats to the industry, and how they could be introduced, prevented, controlled and eradicated. The past outbreaks of disease (e.g. Equine influenza, 2007) support the results obtained in relation to where a likely outbreak would occur and the impact it would have on the industry (Wilson 1995).

It is recommended that a more extensive survey of the industry including organisations of all sizes, businesses and individual stakeholders needs to be conducted for the whole of Australia. A survey more detailed in the location of horses within each state is also needed, as spread of disease is not only between states but smaller regions.
References


Australian Horse Industry Council (AHIC) (2007). Equine Influenza Impact Study,


Australian Horse Industry Council (AHIC) (2009). Constitution,


Harkin, J. (2010). Horse owners need PICs. Horse Notes. Victoria, Department Of Primary Industries


World Organisations for Animal Health (OIE) 2009, African Horse Sickness Technical Disease Card.

8. Appendices

8.1. Example of survey

Table 10. Example of survey

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<th>Organisation</th>
<th>Name</th>
<th>Phone</th>
<th>Email</th>
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<td>Australian Horse Industry Council - horse industry data</td>
<td>AHIC contacts</td>
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<td>Organisation contacts</td>
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<td>Phone</td>
<td>Email</td>
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<tr>
<td></td>
<td>Heather O'Sullivan</td>
<td>0416 050 285</td>
<td><a href="mailto:16521315@student.uws.edu.au">16521315@student.uws.edu.au</a></td>
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<tr>
<td></td>
<td>Roger Lavelle</td>
<td>03 5429 1682</td>
<td><a href="mailto:rogerblavelle@bigpond.com">rogerblavelle@bigpond.com</a></td>
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<tr>
<td></td>
<td>Chris Murphy</td>
<td>02 4842 7114</td>
<td><a href="mailto:keyi.welshponies@bigpond.com">keyi.welshponies@bigpond.com</a></td>
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<th>ACT</th>
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<th>NT</th>
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<td>Total number of &quot;live&quot; horses registered with the society</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
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</table>
Average Number of new horses registered each year

| Average Number & type of events held by the Society and Affiliates (list major events) |
|----------------------------------|---|
| e.g. Horse shows                 | 1 |
| Dressage Days                    | - |
| Polo crosse events               | - |
| Camp drafting events             | - |
| Harness                          | - |
| Show jumping events              | - |
| Eventing                         | - |
| Education days                   | - |
| Field Days                       | - |
| (Add your own list)              | - |
| Miscellaneous events             | - |
| **Total**                        | **1** |

Average Minimum Number of horses at events (your best estimate)
<table>
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<tr>
<th><strong>Average Maximum</strong></th>
<th><strong>Number of horses at events (your best estimate)</strong></th>
<th><strong>Average Minimum Number of people participating events</strong></th>
<th><strong>Average Maximum Number of people participating events</strong></th>
<th><strong>Average Minimum Number of spectators at an event</strong></th>
<th><strong>Average Maximum Number of spectators events</strong></th>
<th><strong>Average Minimum Number of volunteers running events</strong></th>
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### 8.2. Organisation statistics 2009

#### Organisation Member Numbers

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<th>WA</th>
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<td>732</td>
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#### Organisation Horse Numbers

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