RACING VICTORIA ON BEHALF OF AUSTRALIAN RACING BOARD

Australian Thoroughbred Racing Industry Comment on 2009 Draft Import Risk Analysis for Horses

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This submission has been prepared by Racing Victoria Limited on behalf of the Australian Racing Board.

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Executive Summary

The thoroughbred industry is economically and culturally important. Critical to the functioning of the industry is the safe international movement of horses into and out of the country.

As a large stakeholder the racing industry has always been aware of and taken active steps to mitigate quarantine risk. This approach has been demonstrated in the operation of the quarantine facilities by the racing industry.

The draft IRA is a detailed and commendable review of diseases relevant to importing horses to Australia. It provides information that should support the development of import conditions that reduce the risk of exotic disease to an appropriate level. While the draft IRA achieves this outcome, the racing industry is concerned that the information presented does not support the introduction of policies that both prevent disease introduction and maximise the economic opportunities associated with international horse movement.

The racing industry response to the draft IRA has a heavy emphasis on equine influenza (EI). This is due to the potential impact of this disease on the Australian horse industry and the fact that quarantine periods are largely determined in relation to this EI. Time and available expertise have also limited the opportunity to provide extensive comment on many other diseases of relevance.

Since the 2007 outbreak of EI in Australia, quarantine conditions have been amended. The racing industry supports changes that improve quarantine effectiveness, however there is concern that some changes are overly restrictive and do not contribute to reducing risk. In particular, the increase in PAQ periods from 14 to 21 days for mixed PEQ shipments is not supported. Other changes, such as restricting local horses from entering PAQ as a companion, are also not supported.

General racing industry concerns with the draft IRA relate to the process and method and the manner in which technical information is presented. In particular it is believed that the consultation process is not a true consultation. The method is flawed and technical information is presented in a manner that does not support complete analysis.

As a part of this submission, alternative methods for analysing quarantine risk in relation to EI are presented. It is believed these methods should be explored by relevant stakeholders so that the significant opportunities associated with the movement of horses into Australia can be achieved. Representatives of the racing industry would like to meet with authors of the draft IRA to discuss this matter before the IRA is presented to the Minister.

Introduction

The thoroughbred industry is the largest sector of the Australian horse industry. It is important culturally and economically. Australian racing is internationally renowned and Australia is the world's second biggest producer of thoroughbred foals. Critical to the functioning of both the racing and breeding sectors of the thoroughbred industry, is the movement of horses into and out of Australia.

Over the last 15 years international movement of horses for racing competition has substantially increased. This has produced significant economic benefits for the entire thoroughbred industry and the broader community. While international movement of horses can never be risk free, if quarantine operations are well managed, the substantial benefits that flow from these movements far outweigh the risk.

As one of the largest stakeholders in the Australian horse industry, and one that was severely affected by the 2007 equine influenza outbreak, the Australian racing industry comments on the draft Import Risk Analysis (IRA) are made with a view to ensuring that quarantine failures do not occur in the future, but also ensuring that the economic opportunities associated with international horse movement are maximised.

Background

Benefits of International Racing

The Irish gelding "Vintage Crop" first ran in the Melbourne Cup in 1993. Since, there has continued an influx of overseas horses trying to win Australia's most famous race and other landmark events such as the Caulfield Cup and Cox Plate. During this time, interest in the Melbourne Cup and associated Spring Racing Carnival has increased to record levels. This has brought substantial benefits to the Victorian economy. The economic benefit of the 2008 Spring Racing Carnival was estimated to be $550 million.

As well as international competition within Australia, Australian horses have been very successful on the world stage. This has included success in Japan, Hong Kong, Dubai and more recently a series of stunning wins in sprint races in the United Kingdom. Benefits of this success flow to both the racing and the breeding industry through increased sales of Australian horses. The success of Australian horses also encourages increased international investment in Australian racing and breeding operations, such as the 2008 purchase of the Ingham racing and breeding operation by Sheik Mohammed of Dubai for approximately $500 million.

Future Benefits of International Racing

Competition in Australian wagering markets is intensifying both from a local and international perspective. For many participants in the racing industry, particularly employees and smaller operators who are typically rurally based, making a reasonable living from working in racing is becoming increasingly difficult. To assist the racing industry compete, new operating models for racing and wagering are being pursued by the Australian racing industry. Included in these is the establishment of international wagering pools, particularly with Asian countries. Freer movement of horses for competition will help establish these pools. To develop freer movement the racing industry believes that a more flexible approach to the importation of horses for competition, especially those involving small numbers of horses from low risk countries such as Hong Kong and Singapore, should be examined.

The Racing Industry and Exotic Disease

Historically the racing industry has viewed exotic disease very seriously. Various letters from the Australian Racing Board to the Ministry of Forestry Fisheries and Agriculture, written prior to the 2007 EI outbreak, drew attention to quarantine risk. Unfortunately these letters did not generate a response that was not sufficient to improve standards at government quarantine stations. This was very unfortunate, as even modest improvements to government quarantine operations would probably have prevented the 2007 EI outbreak. Today the racing industry continues to view exotic disease risk very seriously.

Current Import Conditions

The 2007 EI outbreak led to a significant tightening of import conditions. The racing industry supports many of these changes. Indeed, the introduction of antigen detection tests as a routine risk reduction measure for EI was suggested by the racing industry nearly ten years ago. However, not all changes are supported. In particular, the increase in PAQ for mixed PEQ consignments is not supported. The effect of this change is that visiting horses racing in Australia must spend a minimum of 35 days in quarantine plus travel time. When the complications of airline schedules and race dates are added the time between races for international competitors is typically upwards of 40 days. This reduces international participation in Australian racing and increases operating costs for the racing industry.

In addition to specific concerns with current import conditions, the racing industry is concerned that the the application of existing import conditions by AQIS has become excessively rigid. Recent examples of this are the importation of an American horse to Australia, via Hong Kong. Despite the horse posing zero risk to Australian horses from Japanese encephalitis (JE), it was obliged to undergo vaccination for JE at a time that was potentially deleterious to its welfare and racing performance. In this regard it is noted that quarantine typically fails at an operational level, and not at a policy level.

Racing Industry Quarantine Operations

The Victorian racing industry has been operating private quarantine stations since 1993. Since 2000, two permanent facilities have been in use at Sandown Racecourse and temporary facilities have been operated at Sandown and Werribee racecourses. In 2009 Victorian racing industry quarantine operations will permanently move to Werribee Racecourse. All facilities are run under the supervision of the Australian Quarantine and Inspection Service (AQIS).

Operating standards at Sandown have always been above minimum requirements and have been subject to regular review and improvement. In 2000 a HACCP (Hazard Analysis Critical Control Point) program was introduced at Sandown. Salient features of Sandown operating conditions at Sandown include:

- 24 hour security guard presence.
- Electronic access controls and CCTV surveillance.
- Purpose designed shower huts for entry and exit.
- Daily visits and review of operations and horse health by veterinarians experienced in quarantine management.
- Induction process for all visitors.

The threat of EI has always been the major focus of risk control at Sandown. Risk reduction measures for EI introduced by Racing Victoria, long before the 2007 EI outbreak, included the introduction of compulsory showering for persons having contact with local horses and horses in quarantine. Showering was subsequently made compulsory at government quarantine stations. Effective showering was instrumental in avoiding escape of EI from Spotswood during the 2007 outbreak.

Another significant risk control that has long been a part of Standard Operating Procedures at Sandown is ensuring that Directigen EI virus detection kits are obtained and stored at the quarantine station, prior to commencement of all PAQ periods. This has enabled the rapid investigation of horses exhibiting clinical signs such as increased temperature, coughing and nasal discharge. If this risk control procedure had been applied during the PAQ intakes that led to the 2007 EI outbreak, quarantine failure would probably have been avoided.

The purpose of describing how quarantine has been operated by the racing industry is to highlight how seriously the industry has, and continues to, consider and address quarantine risk. It also aims to convey the fact that suggestions in this submission, that are directed at modifying quarantine conditions, are made by a large stakeholder with extensive experience in quarantine management and with due concern for the risks involved.

The IRA

Overview of Racing Industry Response

The draft IRA is a very detailed and commendable review of many diseases that can affect horses. From a racing industry perspective, it provides confidence that disease threats to Australian horses are being examined in a manner that should support development of procedures that prevent disease incursions.

Generally, the racing industry supports the recommendations contained in the draft IRA. Notwithstanding, the racing industry does have some concerns with specific recommendations in the draft IRA, parts of the IRA process and the manner in which information on EI outbreaks is presented.

The racing industry response to the IRA has a heavy emphasis on EI. Reasons for this are firstly, most disease outbreaks associated with international horse movements have been due to EI, and secondly, quarantine periods are largely determined in relation EI. In relation to many of the racing industry comments on EI, there has not been time to fully reference all comments made. This is a reflection of the time available to comment and the difficulties in accessing all relevant material.

Concerning the many other diseases referred to in the draft IRA, because of the time available for comment and the expertise of racing industry veterinarians, there is limited comment on these diseases. Notwithstanding this, the racing industry has consulted with other industry stakeholders and supports review of the comments raised by these groups.

As a comment on the tenor of the IRA, the racing industry is concerned that risk assessment and risk management in the IRA have too often been approached with an excessive focus on keeping exotic disease out of Australia, as opposed to focussing on how to import horses to Australia without importing exotic disease. Both approaches can achieve Australia's ALOP, however the latter approach achieves it and at the same time maximises the benefits that are associated with international horse movement. The experience of the racing industry in trying to facilitate the participation of Japanese horses in the 2008 and 2009 Melbourne Cup is consistent with the former approach.

In this regard the technical information on EI is presented as a series of referenced facts. However, interpretation of the facts, details of disease incidence in exporting countries, and analysis of quarantine failures associated with EI is limited. This does not lend itself to having a true understanding of the risk of introducing EI by importing horses. Effectively the analysis of import risk is incomplete.

Specific concerns relate to the conditions that are being applied in relation to the control of equine influenza. An issue of particular concern is the maintenance of 21 day PAQ periods for mixed PEQ consignments. This limits international participation in Australian racing and adds significant costs to importing horses for all end uses. The industry is also concerned that local training companions will no longer be allowed to enter PAQ. These concerns are discussed in later sections.

Concerns with the IRA process relate to the consultation process and the IRA method. These are discussed below.

Consultation Process

The IRA process only includes one consultation step. As such, interested parties are not given the opportunity to consider general comments from other parties or the opportunity to consider comments relating to scientific, technical, or other gaps in the data, misinterpretations and errors. If there are gaps misinterpretations or errors the general comments from interested parties will necessarily be based on incorrect or incomplete information. Despite this limited consultation process the IRA becomes non-appealable after submission to the Minister.

Once the IRA is finalised, experience suggests that it will be very difficult to change import conditions. The racing industry believes that there should be an ongoing review of quarantine procedures. This is especially relevant to the conditions imposed to control EI, as diagnostic capabilities for EI and available vaccines are constantly changing. Indeed as more results from PCR testing become available there will be a much better understanding of the incidence of disease in horses entering PEQ and PAQ.

The IRA Method,

The method used in the IRA to assess diseases risk is very thorough, albeit rather complex especially in relation to consequence analysis. Properly applied the method should enable the identification of critical disease risks, and introduction of appropriate controls to avoid disease incursions into Australia. A criticism of the application of the method is that it is formulaic and does not provide insight into the decision making process. The racing industry believes an approach using a combination of empirical analysis, risk matrices and quantitative analysis would have improved objectivity and transparency and thereby improved the analysis.

In relation to objectivity and transparency it is stated on page 28 of the draft IRA that the method used in the IRA conforms to that recommended by the OIE. The OIE Code states that "the principal aim of import risk analysis is to provide importing countries with an objective and defensible method of assessing the disease risks associated with the importation of animals", and further "provides recommendations and principles for conducting transparent, objective and defensible risk analyses for international trade". Whether the draft IRA conforms with OIE recommendations is open to question.

Concerning objectivity the use of purely qualitative methods to evaluate likelihood may not be viewed as objective. This is especially so when the descriptive definitions are not clearly defined. For example in the draft IRA there is limited explanation of what is meant by the terms used to describe likelihood. While the descriptive definition of a moderate likelihood is that the event would occur with an even likelihood in a period of one year and relative to the total number of horses imported to Australia, the other measures of likelihood are not described. So for example, it is unclear what is meant by low, very low or extremely low.

In many disease situations qualitative descriptions may be the only available. This is not always the case and in some situations quantitative descriptions are indicated. Instances where quantitative methods may be indicated include assessment of the effectiveness diagnostic tests and estimates of disease incidence in the populations from which horses are imported. For example, utilising information on the sensitivity of clitoral and cervical CEM swabs may be used to estimate the likelihood of detecting an infected animal. Likewise, such methods could be applied to diagnostic tests for equine influenza. Utilising quantitative measure of disease incidence in country of origin could also provide an objective method of estimating the likelihood of release assessment. While such methods may be utilised by the authors of the draft IRA, there is no reference to their use, which makes the IRA process non-transparent.

Technical Information and Risk Assessment Overview

The IRA includes extensive and well referenced epidemiological information on exotic diseases. This should support development of effective policies for preventing disease entry to Australia. While the information supplied is extensive, the analysis of this information and how risk assessment conclusions are reached is often not clear. As such it does not follow that effective risk analysis will be achieved.

Consequences of poor analysis can include development of overly restrictive importation conditions. Such conditions can limit opportunities associated with horse importation and impose significant costs on the horse industry. Also, once conditions are established they tend to become a paradigm and so become very difficult to amend, even if they are based on incomplete analysis.

Application of overly restrictive conditions by Australia can lead to application of overly restrictive import conditions by countries to which Australia exports horses. Incomplete analysis can also lead to unwarranted fear of disease outbreaks from importing horses in the community and so may influence decisions concerning preparation for diseases of quarantine concern. For example, whether or not to introduce vaccination programs for EI could be heavily influenced by the way information is presented in the IRA.

Technical Information and Risk Assessment for EI

The nature of EI is well established and the technical information in the draft IRA provides numerous references to scientific publications that consider EI. The information is detailed and indicates that extensive research has been done by the authors. However, the information is generally presented as a series of referenced statements with little insight into how the statements should be interpreted. Further, limited information is provided on the events that surround the statements.

Considering that the 2007 Australian EI outbreak was the trigger for the IRA, it is surprising that more consideration is not given to this disease in the draft IRA. It is also surprising that there is limited review of the history of EI quarantine failures over the last 40 years and of the Commission of Inquiry into the Australian 2007 EI outbreak. Learning's from these failures should be used in the development of quarantine protocols, both to ensure that failures do not occur in the future and that import conditions are not unnecessarily restrictive.

One key learning from the Australian EI Inquiry was that human behaviour was probably the cause of quarantine failure. While it may be that AQIS, and not Biosecurity Australia, are responsible for implementation of quarantine procedures, and therefore operational risks, it is difficult to understand why the IRA did not consider operational risks more extensively. Indeed a stepwise analysis that reviewed critical points in the import process, using principles similar to those of HACCP programs, would have provided very valuable information. Analysis of human behaviour and attitude to risk could have also provided additional useful insight into why quarantine fails.

An example of limited interpretation is the statement that EI is endemic in many countries. This is not accompanied by any attempt to estimate disease incidence in approved countries. While EI is not a notifiable disease in many approved countries, disease incidence information from countries where EI is endemic is available. This information suggests that EI is a regular but infrequent disease. This is especially so in a competition horses that are regularly vaccinated against EI. In recent personal communications with Dr Richard Newton from the Animal Health Trust in Newmarket, Dr Newton stated that most detected EI cases in the UK are in non-vaccinated horses and he is not aware of EI being present in racing horses in the UK in the last two years. Further, Dr Newton stated that in a longitudinal study of EI in racehorses in the UK, only one incursion of EI was seen in a three year period. Unless readers have the time and resources to investigate disease incidence themselves they will remain uninformed of matters such as this.

In the risk assessment of EI, how release likelihood is estimated is not clear. To estimate release likelihood the incidence in the country of export is important. However, as stated in the previous paragraph, little or no information is provided on the incidence of EI in any country. So it is not possible to understand how the release assessment for EI, which allocates a moderate likelihood for release, is estimated. If the moderate likelihood is correct, on average at anyone time in countries where EI is endemic, approximately one out of 500 horses would be sub-clinically infected with EI. Available information suggests that this is probably not so in countries where EI is known to circulate. It is certainly not realistic in countries such as Hong Kong, where EI has not been recorded since 1992, despite continued and extensive surveillance programs. The incidence of EI is explored in later sections of this submission.

A very concerning example of limited interpretation in the draft IRA is the reference to the 1992 outbreak of EI in Hong Kong. The draft IRA states that "sub-clinical horses were released from quarantine and spread disease to most of the local population". On reading the paper of Powell et al, it is clear that EI was present in local horses before release of any horses from quarantine. It is not clear whether horses were infected with EI when they were released. Additionally, even if infected horses were released from quarantine, as there were two staggered shipments that were not properly segregated from a biosecurity aspect, it is possible that horses were infected while serving quarantine.

Examination of the paper of Powell et al reveals:

- two shipments of horses were imported a week apart, the first included six horses and the second eight horses.
- four of the 14 imported horses had elevated temperatures soon after arrival (this may have been attributed to travel sickness).
- there was no PEQ .

- quarantine stables were only 20 metres from local stables.
- grooms working in quarantine stables also worked with local horses.
- air circulation was common to the quarantine stables and the local stables.
- retrospective analysis revealed that EI had spread to local horses before any imported horses were released from quarantine.
- retrospective analysis revealed local horses had clinical signs of EI long before 25 to 32 days after importation, however they were not reported.
- movement between the two quarantine areas was not restricted (K. Watkins personal communication).

The following sections in italics are copied directly from the paper of Powell et al.

Outbreak of equine influenza among horses in Hong Kong during 1992.

Origin of outbreak-

A retrospective investigation established that on October 15, 1992, six horses arrived by air from the UK and Ireland and were placed in quarantine block D. These horses were released on October 29 and dispersed to four trainers (7, 11, 13 and 18). On October 22, eight horses arrived by air from the UK and Ireland, were placed in quarantine block B, and dispersed to trainers 1, 11, 18, 20 and 23 on November 5. During the period that both groups were in quarantine at least four horses were reported to have high temperatures within 24 hours of arrival, a common finding among horses transported by air, including one horse diagnosed with pleuritis.

Spread of infection-

Although trainers initially reported cases on November 16, a retrospective examination of paired sera showed that at least four horses with trainers 8, 11 and 13 had become infected between October 28 and November 15. One horse in the care of trainer 11 was reported to have a temperature of 41.4C, and to be anorexic and depressed on October 28. This episode occurred one day before the release of the horses in quarantine block D. As illustrated in Fig 1, block D is in close proximity to the building housing trainer 11's horses.

Discussion-

It was evident during the outbreak that the quarantine facilities and arrangements were inadequate to prevent the release of virus from infected horses while they were in quarantine and after their release. Furthermore, the facilities permitted susceptible horses to become infected during their period of quarantine.

The racing industry's concerns with the statements re the Hong Kong outbreak were directly related to Biosecurity Australia in early January. The major concern with the statements is that they could be viewed by many interested parties as justification for extending PAQ periods.

A significant gap in the technical information is the absence of information on the sensitivity and specificity of the various tests diagnostic tests for EI and how these tests are used throughout the world. Information on these tests is very useful in helping estimate the incidence of EI in endemic countries and the likely incidence of EI in horses serving PEQ and PAQ. It is also critical to understanding what impact the introduction of diagnostic tests will have on quarantine effectiveness.

The Directigen test has been shown to be very useful in outbreaks of EI (Powell et al 1992). More recently the Japanese Espline test has been adopted for use in Hong Kong. This test was shown to be very useful in Japan in 2007 and is easier to use than Directigen.

The Directigen test, and more recently the Espline test, are routinely used on imported horses in countries including Hong Kong, Dubai and Singapore. Many thousands of EI tests have been performed in these countries and available information indicates there have been no positives. Many of the tests were performed on horses that had not served PEQ. Even if the sensitivity of Directigen is not high, this evidence suggests that the incidence of EI in horses being shipped internationally is very to extremely low.

Investigation of the use of Directigen testing in Australian quarantine operations was suggested by Racing Victoria in a 2000 submission to Biosecurity Australia and AQIS in regard to establishment of a second quarantine area at Sandown racecourse. An extract from this submission is copied in italics below.

> *In recent years the Directigen Flu-A test has been successfully used throughout the world. The test is a rapid test for detection of Influenza particles. It can do this in both clinically and sub-clinically affected horses. As with the current operation the Directigen will be used when infectious respiratory disease is suspected.*
>
> *The test is highly specific but has low sensitivity. (Although it is more sensitive than virus isolation.) As such the Directigen test has significant limitations as a test for individual animals. If EI is active in a group of horses the Directigen test will have a greater chance of detecting virus particles than if only a single animal is infected.*
>
> *Since the outbreak of EI in Hong Kong in 1992 the Directigen test has been routinely used as a part of the strategy to prevent re-introducing EI to Hong Kong. Thousands of tests have been performed and there has been neither a true or false positive. Potential exists to adopt the Directigen test on a routine basis in the Sandown quarantine operation.*
>
> *Numerous scientific papers quote specificity values for the Directigen test of less than 100%. These results have been generated in the face of an outbreak of EI where animals are deemed to be positive on the grounds of clinical signs and/or sero-conversion. Absence of clinical signs and/or sero-conversion does not preclude the presence of EI virus which is what the test detects. The specificity of the Directigen Test for detection of EI virus particles is probably close to 100%. If the specificity is less than 100% then problems with false positives will be occur and major dilemmas in quarantine operation will be encountered.*

> *The sensitivity of the Directigen test does limit its usefulness but it is nevertheless a useful adjunct to the quarantine operation. Further investigation of the potential for using the test during quarantine operations may be most beneficial.*

While antigen detection tests are very useful they cannot entirely replace quarantine. It should be noted that in Dubai in 1995 two horses who tested negative to EI with a directigen test, were released after serving a total of three days in PAQ and subsequently spread EI to local horses. This is not surprising as Directigen is not highly sensitive and single tests in two animals should not be relied on as a substitute for quarantine. Repeat testing during PEQ and/or PAQ will have a much greater chance of detecting infected animals.

ELISA tests and RT-PCR tests are more sensitive than Directigen and probably also more sensitive that the Espline test. During the Australian EI outbreak valuable information and expertise on the use if RT-PCR was generated. This experience is invaluable and is suggestive of RT-PCR having a sensitivity of greater than 90%. More recently in New Market trials in infected vaccinated horses have shown the test to be highly sensitive to the Australian virus in vaccinated horses (Dr James Watson CSRIO personal communication). The routine use of these tests in PEQ and PAQ improves the chance of detecting infected horses and is generating significant information on the incidence of EI in these populations. As more test results become available a better picture of EI incidence will be generated.

In the risk assessment limited reference is made to EI outbreaks from the international movement of horses. These are infrequent but regular events. In the last 39 years there have probably been in the region of 10 to 15 well documented outbreaks of EI in countries that were previously free of the disease. Considering many thousands of shipments have occurred in this time gives some indication of the rarity of EI transmission associated with international horse movement.

In 1994, George R. Wilson, Bureau of Resource Sciences, submitted a paper to AQIS entitled "A Review of Horse Import Policy with respect to Equine Influenza". In the paper characteristics of EI, outbreaks of EI in other countries, vaccination strategies, quarantine arrangements and other relevant aspects were examined. Various recommendations were made relating to these issues.

Wilson's examination of EI outbreaks showed that all were associated with sub-standard or absent quarantine operations. Extracts of the paper that relate to EI outbreaks are found in Appendix One. A summary of the outbreaks and their salient features follows.

In South Africa in 1986 PEQ failed and infected horses entered the same quarantine area as horses that were two days away from completing their PAQ. The infected horses, showing clinical signs of EI, were stabled in a separate stable block approximately four meters from the horses that were due to complete quarantine. The latter contracted EI and then moved into the local horse population while they were incubating the disease. PEQ requirements were of a lower standard than those required by Australia. There was also strong evidence that a veterinarian and/or trainer also transmitted disease from the quarantine stables to local racing stables.

In the EI outbreak in Hong Kong in 1992, horses had not undergone PEQ but were required to serve 14 days PAQ. This allowed horses from the European Union to travel directly to Hong Kong while either incubating or suffering from influenza. Of 14 horses imported to Hong Kong in two shipments a week apart, four had elevated temperatures soon after arrival. The PAQ area was approximately 20 meters from the stable complex of the local horses thus allowing aerosol transmission. Also, the same stablehands worked in both the local and quarantine stables and moved freely between the two stables without disinfection procedures. This would have allowed the transmission of infectious material from the imported horses to the local horses. In essence there were really no effective quarantine procedures in place. While clinical signs of disease were not reported until 25 to 32 days after importation, a retrospective review revealed that local horses had contracted EI before any horses had been released from PAQ and were displaying clinical signs of disease, including a temperature of 41.4 C.

In Jamaica, newly arrived infected mares and yearlings from Kentucky shared the same quarantine barn as two local racehorses that were returning from competing in Puerto Rico. The young horses apparently had a nasal discharge and signs of mild upper respiratory disease. The two local horses completed their quarantine and returned to their local training stables two days after the arrival of the infected horses. This enabled the two racehorses to contract influenza and spread it to the local population.

In Japan, the exact source of infection was not apparent but was associated with mixing of horses during quarantine.

Despite the well documented outbreaks of EI examined by Wilson and others, EI outbreaks from international movement of horses have continued to occur. In 2003 South Africa experienced a second outbreak and in 2007 Japan experienced an outbreak some 37 years after its first outbreak. In 2007 Australia experienced its first outbreak.

The 2003 South African EI outbreak has been reviewed by Professor Alan Guthrie and was the subject of a judicial inquiry. As with the 1986 outbreak vaccination regimens, temperature monitoring and movement controls in and out of quarantine were all deficient.

Circumstances leading to the EI outbreak in Japan in 2007 are not documented so comment on the cause of quarantine failure cannot be made.

The 2007 Australian EI outbreak was subject of a government inquiry. While the exact cause of outbreak was not determined severe deficiencies in quarantine operations were detected. Salient features of the outbreak were similar to other outbreaks over the previous 36 years. They included poor or absent biosecurity in PEQ and PAQ, poor immunity from vaccination, poor temperature monitoring during PAQ and no utilization of EI detection tests. As with other EI outbreaks, horses were showing clinical signs of EI well before the possibility of EI was investigated. These included Jungle Pocket who had a high temperature on arrival into quarantine, and Encosta de Lago who had an elevated temperature some 9 days after the arrival of Japanese horses at Eastern Creek. In the case of Jungle Pocket, EI was not investigated till approximately 10 days after arrival and with Encosta de Lago, EI was not investigate and confirmed for a number of days after the initial temperature rise. Use of RT-PCR or rapid antigen tests, when these horses first displayed clinical signs, could have easily prevented the entire outbreak. At the very least, use of these tests could have provided an earlier warning of the possibility of an outbreak that would have enhanced the control response.

One very informative feature of quarantine failures is the presence of horses showing clinical signs of disease during PAQ. In South Africa in 1986, Jamaica in 1989, Hong Kong in 1992 and Australia in 2007 imported horses were displaying clinical signs of EI on or soon after arrival. In South Africa in 2003 temperature monitoring was not undertaken until well into PAQ so horses with elevated temperatures were not detected until this time. So while it is known that EI often presents mildly or sub-clinically, evidence from the above well documented outbreaks reveals that when quarantine failure has occurred there have always been some horses in PAQ with clinical signs of EI.

In less well documented outbreaks the presence or absence of clinical signs is not generally known. In the Dubai 1995 outbreak , two horses that tested negative on Directigen were released after three days of quarantine and spread EI to local horses. On this occasion the horses may have been sub-clinically or mildly infected at the time of release.

Valuable lessons can be learnt from EI outbreaks. Where the outbreaks are well documented there are consistent findings. These are poor movement controls and poor disease monitoring. Improvements in either of these areas could have prevented the outbreaks from occurring. Another informative fact is that there does not appear to be an instance where horses have completed 14 days PEQ and 14 days PAQ and then been released and spread disease to local horses. This is despite the poor quarantine operations in many parts of the world.

In conclusion, there is little mystery about the behavior of the EI virus during quarantine failures. Disappointingly what is also obvious is that over the last 30 or more years, human behavior and poor quarantine management remain the cause of quarantine failure.

Risk Management and Draft Import Conditions

Concerns with the Risk Management section and draft import conditions are similar to concerns with earlier sections. That is, facts are presented in isolation without surrounding details or analysis. So, while the majority of the risk management measures suggested in the draft IRA are supported by the racing industry, there are significant concerns.

Risk Management Options Overview

Approved Country

The racing industry believes that there should be different levels of approval between approved countries. For example the equine population in Hong Kong is small and animal health is extremely well monitored. It would be reasonable to view Hong Kong and Singapore in a different light to regions such as the EU and USA where many significant equine diseases are endemic. This should be subject to review.

Country or area Freedom

The 60 days residency in an approved country requirement is potentially restrictive for horses competing in multiple countries. It is not restrictive if AQIS specifically approves that the 60 days residency may be achieved in multiple countries and this approval is generally forthcoming. However, the racing industry would like to know on what basis is this approval given and if there are times when it will not be given.

Diagnostic Testing

It is stated that the level of risk reduction provided by PEQ and PAQ testing would depend on the availability and sensitivity of tests, and on sampling and other operational procedures. However there is little reference to sensitivity and operational procedures in the IRA. In the technical assessment the sensitivity of CEM testing is stated. Similar statements are not made in relation to EI other than to say PCR testing is more sensitive than rapid antigen detection kits.

Risk Management Options for EI

Country or area Freedom and Premises

It is stated that it is difficult for a country to demonstrate disease freedom if there has been prior exposure to endemic disease and/or vaccination. This may be true, however in the case of Hong Kong a rigourous surveillance system makes it extremely unlikely that EI is circulating in the population. Although in the period immediately after the Hong Kong International races there may be an increased chance of EI being present. Other countries, such as Singapore probably have a similar EI status to Hong Kong.

In countries where EI is known to regularly circulate rigorous surveillance is not readily achieved. To better understand the true incidence of disease in these countries the racing industry would encourage sentinel population to be developed in approved countries. The sentinels could be horses that had only been vaccinated with canarypox recombinant vaccine. As such, exposure to disease could be detected in these horses. Information generated from this could enable different approaches to quarantine management. The racing industry encourages investigation of such a system that could be managed with some financial support from Australia, as a part of risk reduction for importing horses to Australia.

Diagnostic Testing

Diagnostic testing for EI has been a routine part of quarantine operations for many years. This has provided valuable information. In recent years RT-PCR has been introduced during PEQ and PAQ. This will further understanding of EI incidence in horses during PEQ and PAQ. Despite the value of the information provided by these tests, the IRA does not explore the potential impact of these tests for reducing quarantine risk to Australia. Further, no explanation of how the timing of the tests was determined is given. For instance why is the first PAQ test done at four to six days and not within 24 hours of arrival?

The earlier noted concern with the reference to the 1992 Hong Kong outbreak is repeated in the Diagnostic Testing section.

Specific racing industry concerns with the risk management options for EI are:

- The recommendation to subject horses with temperatures above 38.5C to RT-PCR should be strengthened by adding "or other signs of infectious respiratory disease" or similar.
- The maintenance of an increase in the PAQ period from 14 to 21 days for mixed PEQ consignments. There is not an historical precedent for this change and little theoretical justification is provided in the IRA. The authors suggest the increase is necessary because horses may be exposed to a different strain. What this means is not elaborated upon. This requirement significantly limits competition options for racehorses and imposes extra costs on the racing industry.
- Requirement: that only horses of the import consignment are to enter PEQ. Training companions are desirable and sometimes due to injury one horse out of a shipment cannot travel due to injury or other reasons. The fact that they do not travel should not affect the status of horses that do. AQIS should have the right to approve other horses entering PEQ.
- Removal of the condition that allows AQIS the right to approve horses, other than horses of the import consignment, to enter PAQ: This will prevent international race horses having a local companion horse or galloping partner in quarantine station. As the horse is a herd animal companion horses are very useful in reducing stress in horses that are stabled individually. Training companions provide better and safer conditions for training horses. From a quarantine perspective local horses can also act as a sentinel horse for EI. No explanation is provided as to why this has changed.
- Lack of analysis of the effect of reducing the distance of PEQ stables from other horses to less than 100m: On occasion, applications are made to reduce this distance and it may assist AQIS if some guidelines as to how this distance could be safely reduced were provided. In countries such as Dubai maintaining a separation of at least 100 meters is problematic.
- Little reference to use of serological testing for EI in horses in quarantine: Use of serology could be an adjunct to assessing the immune status of individual horses. Horses with low antibody titres are the horses that are likely to be amplifiers of virus and so may warrant extra scrutiny during PAQ (Richard Newton personal communication).
- Where RT-PCR is not practically available, use of alternative tests, such as Espline, should be investigated. The 2007 paper of Evaluation of Antigen Detection Kits for Diagnosis of Equine Influenza by Yamanaka et al provides useful information on the Espline test.

Alternative Views for Assessing and Managing EI Risk

As espoused in this response, the racing industry believes the approach to risk analysis and management in the draft IRA is not ideal. As such, it is believed that alternative approaches should be used. These are explored in the following sections.

Historical Analysis

The history of EI outbreaks is highly informative. The paper by George Wilson provides a good summary and references to his paper are contained in the comments on Technical Information for EI and Appendix One.

Salient points of the history of EI outbreaks and quarantine failure are:

- All well documented outbreaks are associated with poor quarantine management.
- EI is rarely diagnosed in horses serving PEQ or PAQ, which suggests that the incidence of EI is very low even in countries where it is endemic. Poor disease monitoring of horses in quarantine facilities is a potential explanations for this. However, while disease monitoring in quarantine has been poor in numerous locations, the results of EI antigen tests and clinical observations of horses imported to Hong Kong, Dubai, Singapore and Australia over many years, supports the premise that EI is infrequent in endemic countries and so is very rare in horses that are being transported internationally.
- Delays in diagnosing EI in horses in PAQ have been associated with poor temperature monitoring, an absence of antigen detection tests and a failure to recognize the symptoms of EI. E.g South Africa 1986 and 2003, Hong Kong 1992, Australia 2007.
- When horses with EI have been serving quarantine there appears to be a high chance that quarantine will fail. E.g. Australia, Hong Kong, South Africa.
- Horses that have completed PEQ and PAQ have not been released from quarantine and spread disease to local horses.
- In the Hong Kong 1992 outbreak disease had entered the local population before any horses were released from quarantine.
- Review of documented quarantine failures show that clinical signs of disease have been present in horses serving PAQ, though not always recognised. The one possible exception to this is Dubai, where horses did not serve PEQ and only served three days of PAQ.

In respect of historical analysis in Australia Figures 1 and 2 represent the difference between Australian quarantine operations prior to and after the 2007 EI outbreak. It is hard to envisage under what circumstances today's quarantine system would fail.

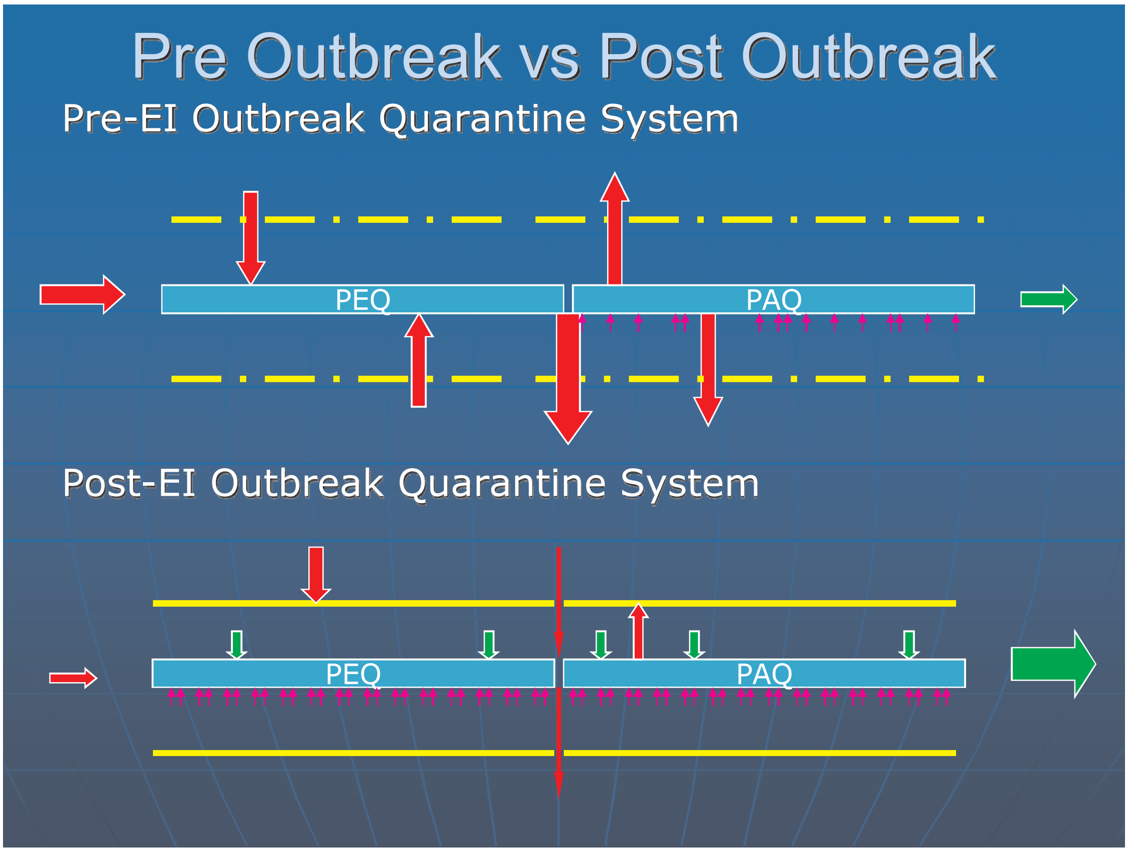


Figure 1 New versus old quarantine operations

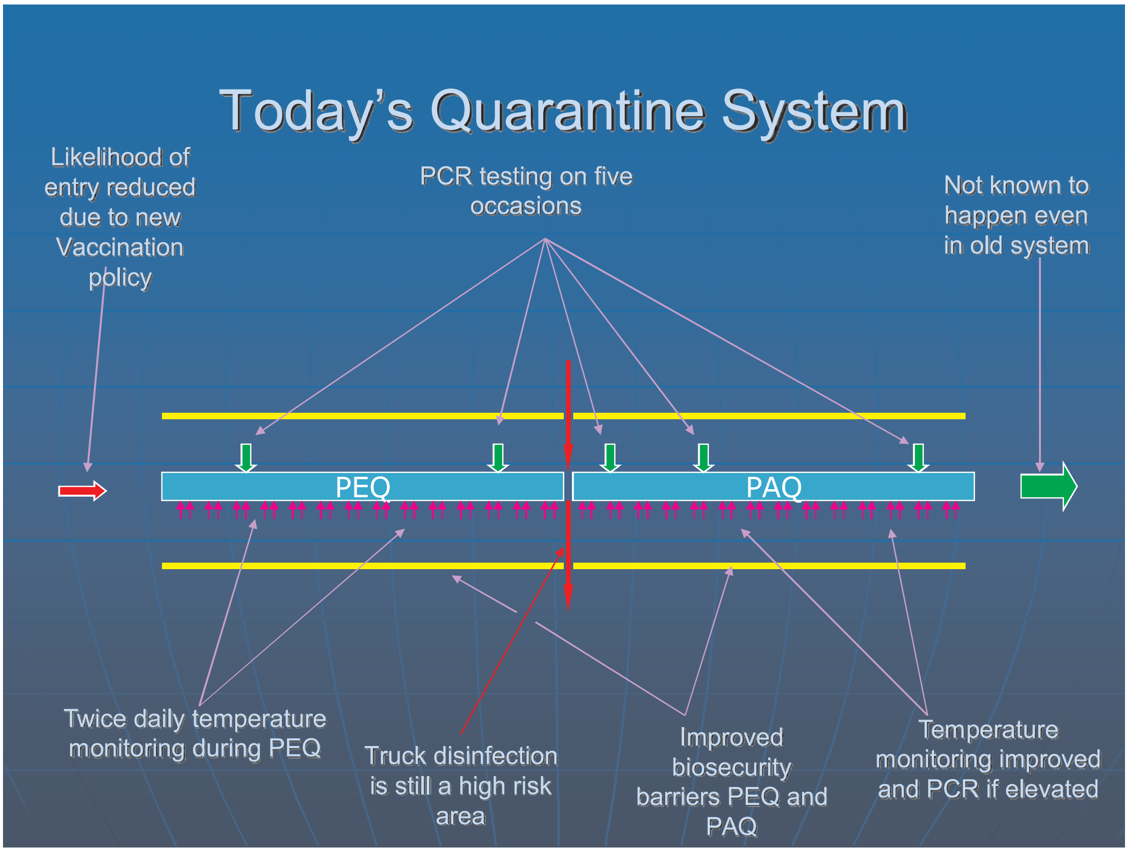


Figure 2 Schematic of current Australian quarantine system

As well as lessons from outbreaks information on how quarantine is successfully managed is relevant.

- In Hong Kong international races, between 40 and 50 horses are temporarily imported to Hong Kong every year. Horses are not subject to PEQ and the PAQ period can be as little as seven days. All horses are subject to a rapid antigen detection test prior to import and soon after arrival. Since 1992 no positive tests have been recorded.
- In Dubai several thousand horses are imported each year. Horses do not serve PEQ but until recently were subject to Directigen testing on arrival. There have not been any positive tests although there has been one false negative.

In summary EI outbreaks associated with international horse movements are rare but have significant consequences. They are readily avoided by properly managed quarantine, which is readily achieved. There is not an historical precedence for extending PAQ periods to 21 days.

Assessment from First Principles

The characteristics of EI are well known and can assist understand how EI will behave.

In a quarantine situation quarantine can fail in two ways. The first is for infected horse(s) to enter PEQ and infected horse(s) be released at the end of PAQ. For this to occur, a number of conditions must apply which include:

1. An infected horse must enter quarantine.
2. There must be enough horses in the shipment(s) to sustain EI for at least 28 days.
3. Disease must remain undetected during PEQ and PAQ.

The second way for this to occur is for there to be a quarantine border failure during PEQ, transport and/or PAQ. There are a number of scenarios that might be associated with border failure.

1. Failure during PEQ: An infected horse must enter quarantine or EI must enter on a fomite during PEQ or transportation.
2. There must be enough horses in the shipment to sustain EI during the entire PEQ or from the time of entry on a fomite till arrival in PAQ.
3. Disease must go undetected either till the end of PAQ or till border failure.
4. Biosecurity failure during PAQ.

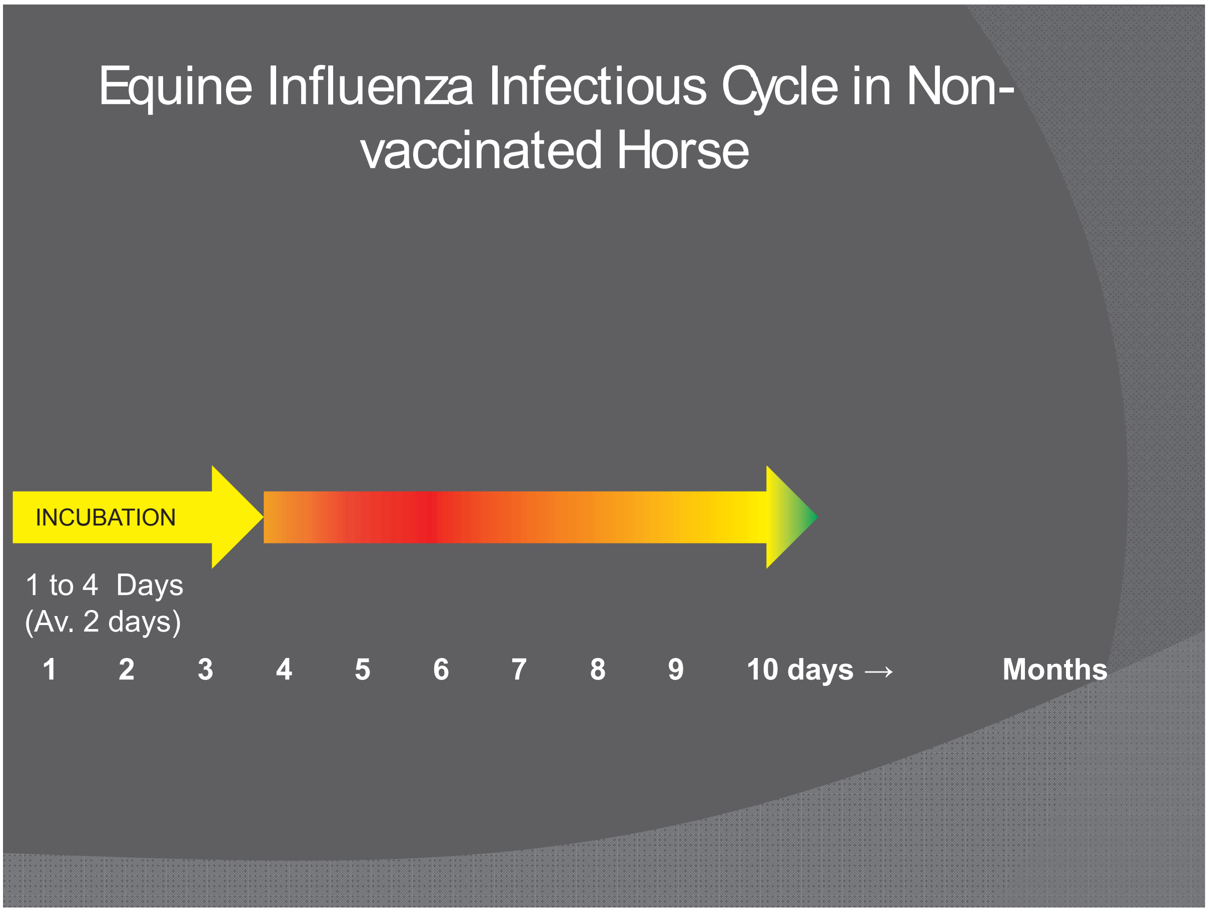
Infected Horse Released at the End of PAQ without Quarantine Border Failure

The probability of an infected horse entering PEQ is low. This has been noted in previous sections in reference to historical outbreaks of EI. It is also in agreement with the results of testing horses with Directigen, Espline and RT-PCR while in PEQ and PAQ. It is not in agreement with the draft IRA Risk Assessment in which the unrestricted release risk is assessed as moderate. If this assessment is based on approximately 500 horses imported per year, and a four day incubation period and four day infectious period applied, the annual incidence of disease in the imported population would have to be at least 10%. This percentage is likely to be increased if horses that are showing signs of clinical disease are excluded. If the horses come from a population that is regularly vaccinated, such as racehorses, the incidence of disease is highly likely to be much less than 10%.

If the incidence of EI is very much lower than 10% then according to the draft IRA method, Australia's ALOP has probably already been achieved. If the horse has been subject to PEQ then the Australia's ALOP will almost certainly have been achieved. It is not suggested that this should lead to an abandonment of PEQ and PAQ, however it is an indication that minor modifications to quarantine conditions to increase economic opportunities can be made without compromising the effectiveness of quarantine.

The sustainability of EI during PEQ and PAQ can be understood from first principles. While the OIE code suggests a 21 day infectious period, numerous references indicate that the period of viral shedding is only up to 7 days in non-vaccinated horses and up to 4 days in vaccinated horses. Incubation periods are also short and references quote 1 to 4 days. In all horses, viral shedding will be maximal in the first few days after becoming infectious. In horses with good immunity the level and duration of viral shedding will be minimal, however in a recent trial in Newmarket, virus was detected with RT-PCR in all vaccinated horses infected with the Australian EI strain (James Watson personal communication).

Figures 3 and 4 are a schematic representation of the EI disease cycle in naïve and vaccinated horses respectively. The colour changes represent the level of infectivity with red being most infective and green being non-infectious.



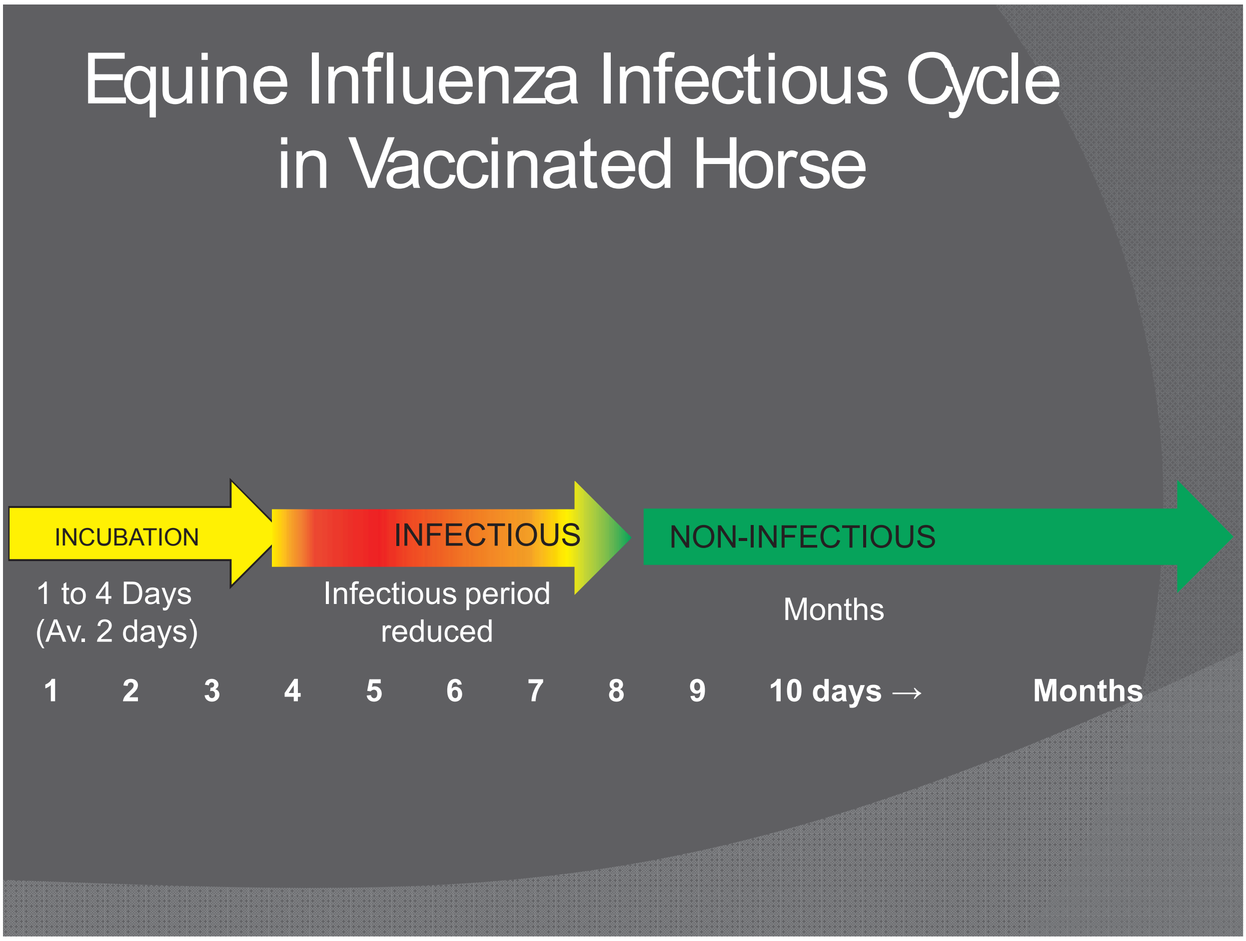


Figure 4 Schematic of EI infection cycle in vaccinated horse

One of the first conclusions from first principles is that a group of horses is required to sustain the virus. A single vaccinated horse should become non-infectious approximately 8 days after exposure. This means that in theory at least four horses are required to sustain the EI virus for 28 days. This would rely on a recently exposed horse entering quarantine and then transmitting disease to one companion only, at day eight. In turn this horse would need to transmit disease at day 8 to another horse and so on. In horses with poor immunity, viral shedding may be increased in intensity and duration which may alter the number of horses required to sustain infection. If this is the case, the chance of such horses showing clinical signs, transmitting to other horses and being detected by RT-PCR will increase. This will reduce the chance of infected horses being present and undetected at the end of quarantine.

Figure 5 shows a theoretical EI transmission cycle in quarantine. In reality the average incubation period is likely to be less than 4 days and transmission of disease is more likely to occur in the period of peak viral excretion. So on average more than four horses will be needed to sustain EI for more than 28 days. If disease transmission occurred four days after exposure, which is realistic as incubation is likely to two days on average and peak viral excretion is likely to be reached within two days after exposure, then seven horses will be required to sustain EI virus for 28 days. This is demonstrated in Figure 6.

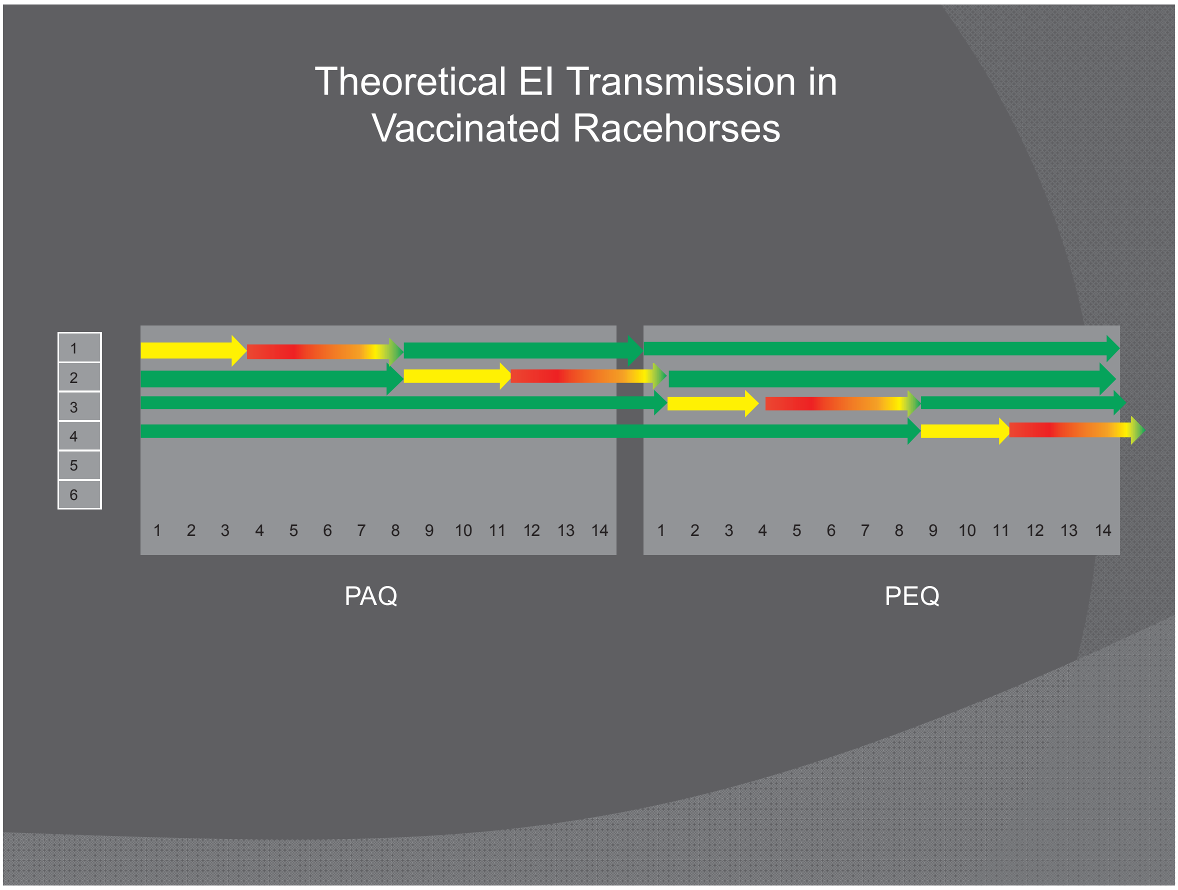


Figure 5 Theoretical EI transmission in vaccinated horses

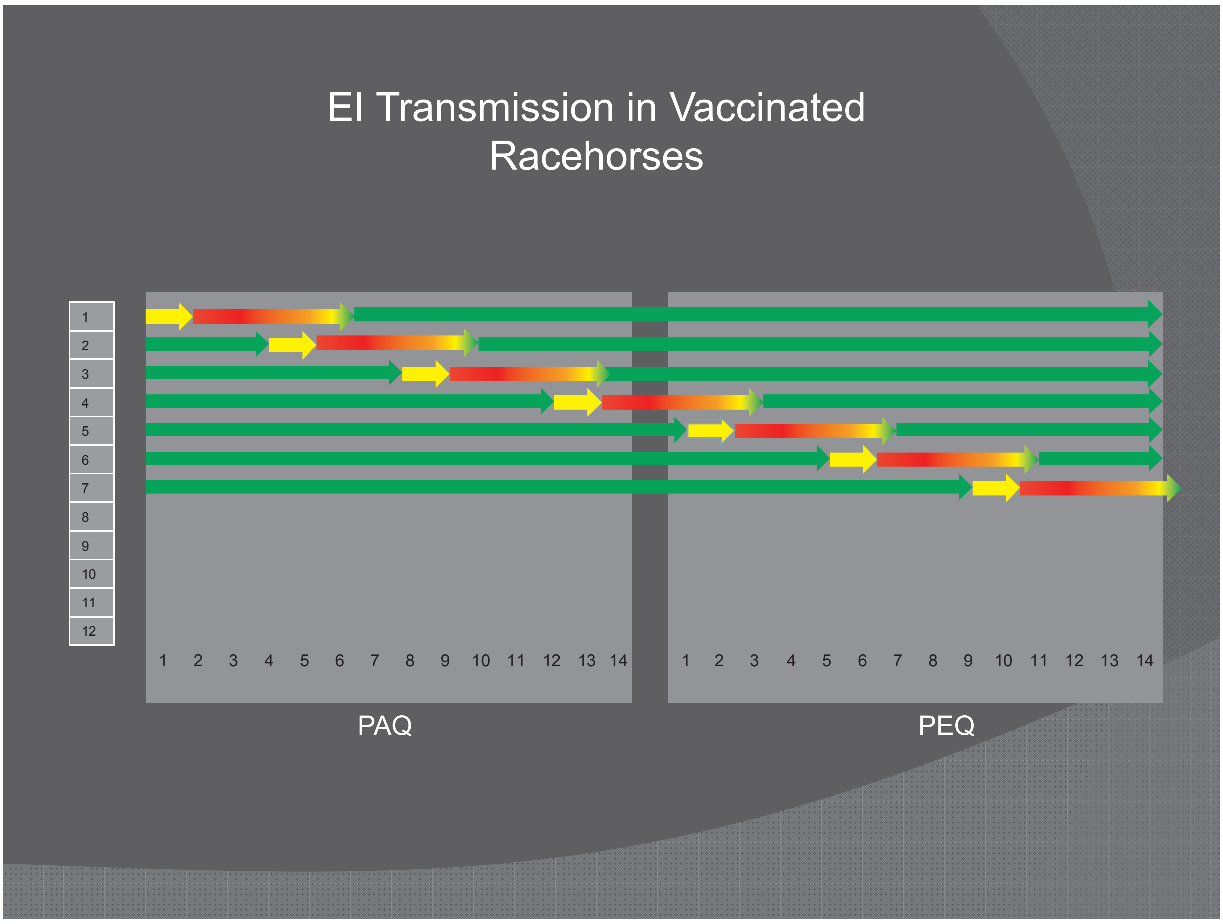


Figure 6 Theoretical EI transmission in vaccinated horses

The disease transmission principles outlined above can be applied to multiple PEQ shipments. If it is assumed that a minimum of four horses, and more realistically at least six or seven horses, are required to sustain EI for 28 days and the total number of horses is less than this, whether or not the horses come from different PEQ sites is largely irrelevant. This is demonstrated in Figure 7.

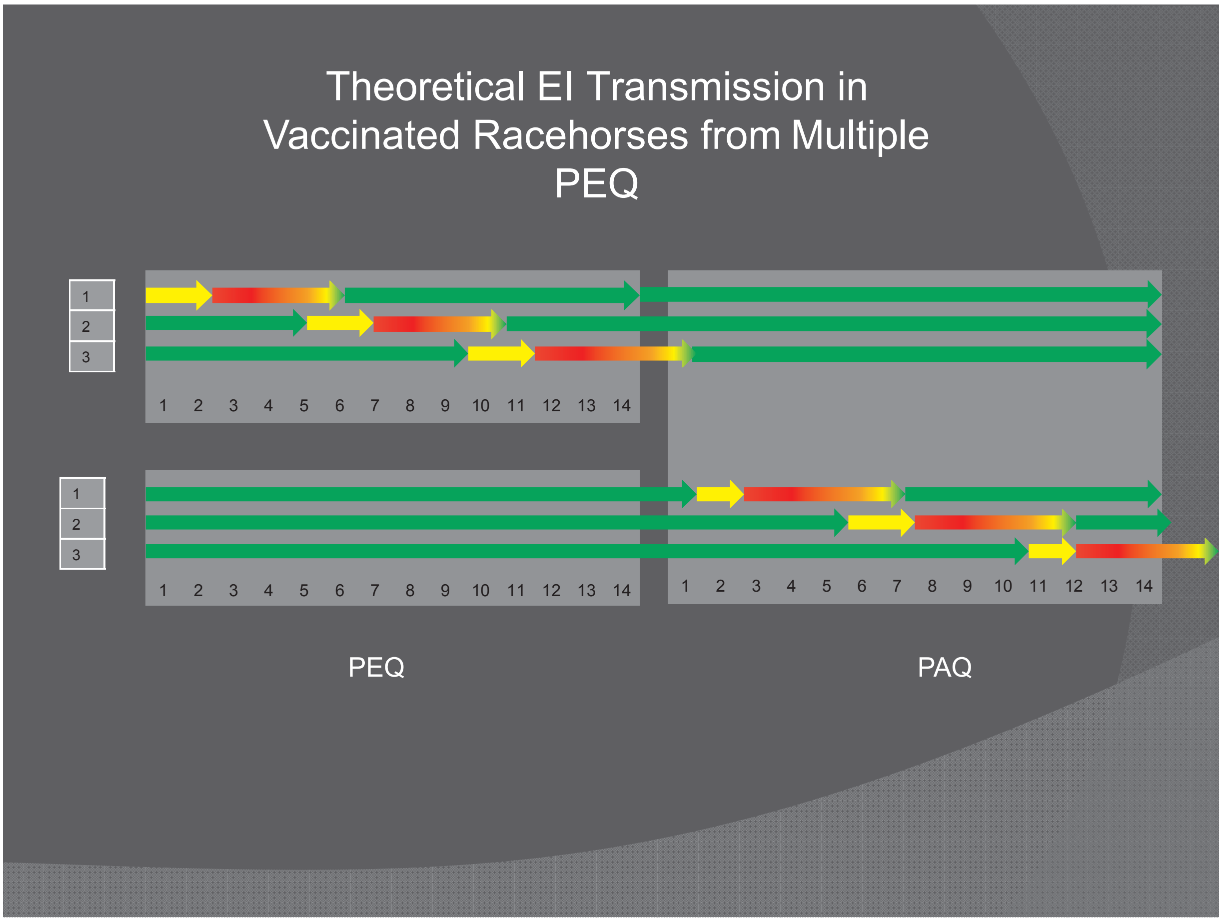


Figure 7 Multiple PEQ Shipments

The scenario in Figure 7 is not probable as EI transmission is not likely to occur at the end of the infectious period on five different occasions. So the number of horses required to sustain EI is likely to be greater than 6 horses. One potential scenario is illustrated in Figure 8. This shows a reduced period of transmission with on average one horse becoming infected approximately every 3 days. If EI spread is more random, which is more likely than the linear spread in Figure 5, 6, 7 and 8, then the number of horses required to sustain infection will increase further. It should be noted that whether or not horses come from multiple PEQ sites, if there are not enough horses to sustain EI throughout quarantine then an infected horse will not be released from quarantine. Also worthy of comment is in the racing situation, there are often only two or three horses in a PEQ location. In the case of two horses it is highly likely that EI will burn out in PEQ and with three horses it is still likely to burn out.

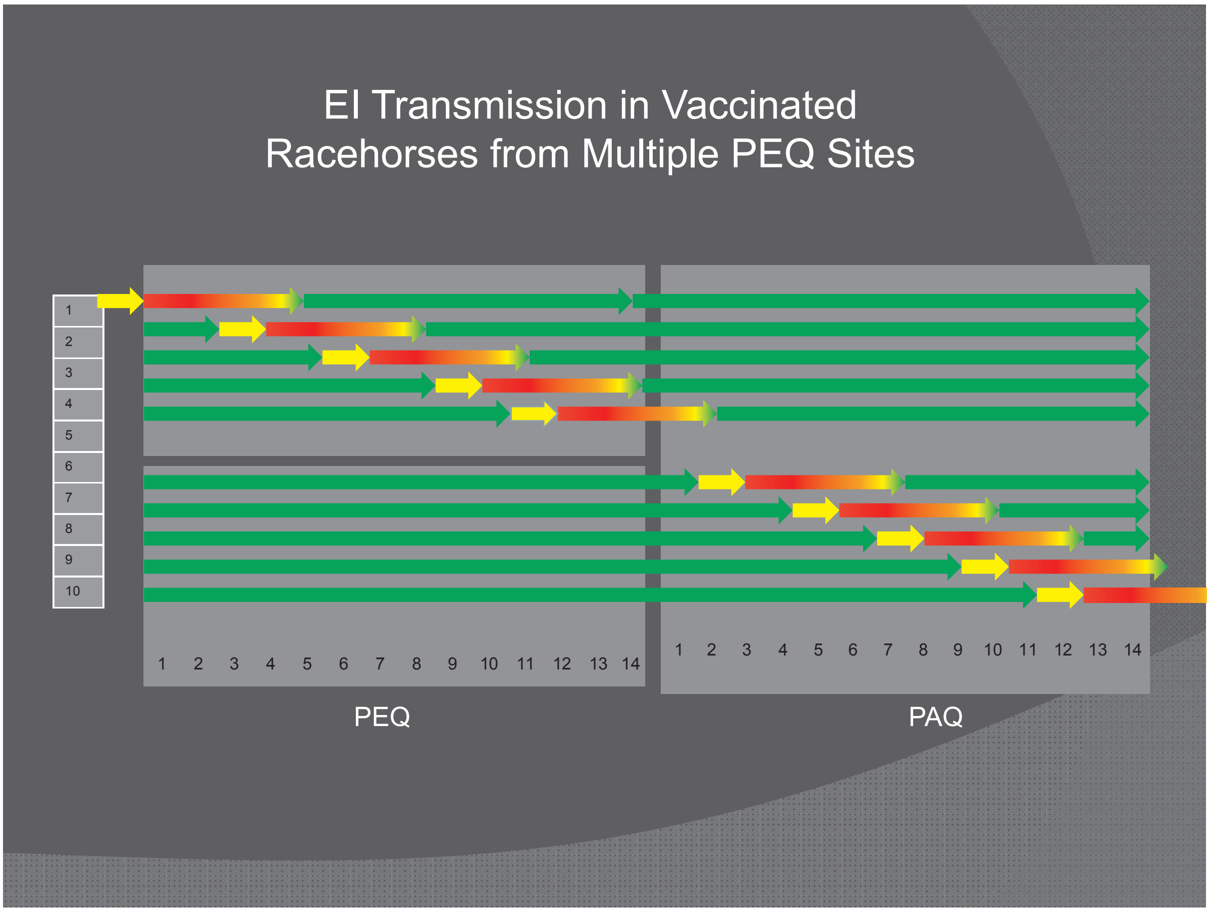


Figure 8 EI transmission with one horse becoming infected approximately every three days.

The scenarios outlined above suggest that EI will burn out during a 28 day quarantine period in groups of approximately nine horses or less. When it is considered that transmission is not likely to be linear, as schematically depicted, the number of horses required to sustain infection will be further increased.

The final requirement for horses to be released from PAQ while infected, is that disease is undetected during PEQ and PAQ. In the quarantine situation EI can be detected by clinical signs and/or antigen detection. Clinical signs are often not present although historical analysis suggests that some clinical signs of EI have always been present when quarantine has failed. In the example of Figure 8, a group of ten horses would have been subject to at least 50 RT-PCR tests, had temperatures recorded approximately 560 times, shared air spaces during travel and been observed for clinical signs of disease while in full training. History suggests that some clinical signs would have been detected, which would have prompted increased investigation and possibly prolongation of the PAQ period.

Antigen detection tests are increasingly used during quarantine and will reduce the chance of EI infected horses going undetected. As the number of infected horses increases the chance of detecting EI will also increase. So with larger groups of horses, as the chance of disease burning out decreases, the chance of disease detection increases.

Critical to the detection of EI by diagnostic tests is the sensitivity of the tests. It is stated in the draft IRA that RT-PCR testing is more sensitive than viral isolation and rapid antigen detection tests. While the sensitivity is difficult to obtain based on available information, it is probably above 95% if applied during the peak viral shedding period. It is suggested that information on sensitivity is obtained from expert veterinarians such as James Watson from the CSIRO and Richard Newton from the Animal Health Trust in the UK. In personal communication with Richard Newton, he has stated that depending on the time of testing the NP Elisa test utilized in the UK properly applied probably has sensitivity greater than 95% and that PCR tests have a higher sensitivity.

In the draft IRA, details of risks created by mixed PEQ shipments are not clearly specified, however it is recommended that a 21 day PAQ is necessary for these shipments. Reasons that may make single PEQ consignments safer than mixed PEQ relate to the time of exposure to the virus. In mixed shipments if one shipment is infected and the other is not the horses coming from the disease free PEQ will not be exposed to EI until they commence travel or enter PAQ. This delay may reduce the time available for the disease to burn out and for clinical signs in infected animals to manifest. This could increase the opportunity for an infected horse(s) to be released from PAQ. For example, in a scenario of two shipments of 7 to 10 horses each, EI could circulate in the first group and then be close to burning itself out by early PAQ. If the other shipment is not exposed until this time they may be able to sustain infection till the end of the PAQ period. By way of contrast, if there were 14 to 20 horses that completed PEQ together any disease present in the group would be likely to be transmitted sooner and so either burn out or be detected before PAQ finished as compared to the mixed PEQ shipment.

An increased risk posed with mixed PEQ shipments may be real, however in practice this risk has never manifested in release of an infected horse from quarantine. Additionally, even if the there is an increased risk of delayed transmission between horses, or delayed diagnosis, with larger shipments this risk is off-set by the increased chance of detecting disease. So, it is acknowledged that larger mixed PEQ shipments can potentially increase risk, however this risk is unlikely to manifest in release of infected horses.

In conclusion, based on first principles current PEQ quarantine requirements are likely to be highly effective in preventing horses infected with EI from arriving in Australia. Further, should an infected horse arrive in Australia, a 14 day PAQ period should enable disease to either burn out or be detected, and so allow appropriate actions to be taken to prevent release of disease. Concerning mixed shipments, until the total number of horses reaches a level that can sustain EI for 28 days, increasing PAQ to 21 days will not influence the possibility of release of EI infected horses to the local population.

In making this conclusion it is assumed that PEQ and transport biosecurity have been effective and that EI was present at the commencement of PEQ. In relation to biosecurity breaches the timing of any breaches may be relevant. If a breach occurs close to the end of PEQ or during transport mixed PEQ will have minimal influence. If the breach occurred at the commencement of PEQ there will be some increase in risk.

In addition to the comments in this submission AusVet Animal Services have provided comment on the increased PAQ for mixed shipments. This can be found in Appendix 2.

To better understand the risks involved in quarantine, and particularly in relation to mixed PEQ shipments, quantitative analysis has been investigated in a later section.

Quarantine Barrier Failure

The number of quarantine barrier failure scenarios that may be lead to quarantine failure is high. To analyse all these scenarios extensive time is required. Rather than do that, some comments are made on particular recommendations in the draft IRA.

Distance from PEQ to Local horses

The 100 meter distance from local horses is probably adequate to prevent aerosol transmission of EI during PEQ. While there are instances of alleged aerosol transmission over significant distances, in Australia the situation in an epidemic is very different to the PEQ situation. In an epidemic there are large quantities of virus and naïve horses as opposed to PEQ situations, where horses in PEQ are vaccinated and most horses in the area around PEQ are also likely to be vaccinated.

Considering the low incidence of EI in endemic countries, particularly countries such as Dubai, it is reasonable to provide some relaxation to this requirement on a case by case basis. Historically, AQIS have taken this approach.

Presence of Local Horses in PAQ

Reasons for no longer permitting local horses into PAQ are not provided. Presumably there may be concerns regarding viral amplification by non-vaccinated horses that could place pressure on quarantine borders. In consideration of the small numbers of horses in racing shipments and that local horses may act as sentinels there does not seem to be a strong basis for this restriction.

Presence of Local Horses in PEQ

Reasons for this are not specified however considering the review of first principles, there does not seem to be a need for this restriction.

Training Locations

In some PEQ situations horses train on areas that are used by local horses. Restrictions on this are imposed which make training logistically difficult. Considering the incidence of disease and the likelihood of transmission from the ground it is recommended that risks associated with training location are review.

Quantitative Analysis

In a well run quarantine system the chain of events necessary for quarantine to fail and EI to be transmitted should be mutually exclusive. If the probability of some of these events can be calculated, or reasonably estimated, quantitative analysis can be utilized.

The most relevant scenario to the racing industry comments in the draft IRA, is the release of an infected horse(s) from quarantine. This is examined from a quantitative perspective. Quarantine failure associated with other scenarios are not examined from a quantitative perspective, however it is respectfully suggested that some investigation of the impact of biosecurity breaches during PEQ and PAQ are investigated on a quantitative basis by BA and AQIS.

Release of Infected Horses from Quarantine

Assuming that there is not a biosecurity failure during PEQ, for an infected horse or horses to be released from quarantine a specific sequence of events must occur. This sequence of events lends itself to modeling and Racing Victoria Limited has developed a model for this purpose. The model is not intended to be a complete model of quarantine failure, but rather is intended to provide an alternative way of looking at steps in the quarantine process and to encourage the development of more complete models of quarantine risk.

Steps necessary to quarantine failure are without quarantine barrier breakdowns:

1. An infected horse or horses must enter quarantine: The probability of this occurring will be proportional to the incidence of disease in a population in a given period times, the sum of the average incubation period and average infectious period divided by the given period. Assumptions are that all horses entering quarantine have been vaccinated.
2. Disease does not burn out in PEQ: The probability of this will increase as the total number of horse's increases. This selection of probabilities for this is somewhat subjective and errs on the conservative side.
3. The presence of an infected horse or horses must go undetected during PEQ: Assumes all horses have twice daily temperature monitoring, clinical examination and two RT-PCR tests during PEQ. Detection of EI can be on clinical grounds supported by diagnostic testing or on testing alone. For the purposes of this model it is assumed that clinical signs are not detected so RT-PCR testing is the only means of detection. Different test sensitivities and durations of viral excretion can be entered into the model. The probability of disease going undetected will decrease as the total number of horse's increases. Also in the model as the number of horses in a shipment increases, it is assumed that not all horses will become infected and this number can be adjusted accordingly. The probability of EI not being detected will decrease as the total number of infected horses increases.
4. Disease does not burn out in PAQ: The probability of this will increase as total number of horse's increases. The
5. Disease is not detected during PAQ. Same conditions as PEQ except three RT-PCR tests.

In a well run quarantine operation these events are mutually exclusive. If quarantine is poorly run the events are probably not mutually exclusive and will reflect systemic failure. In the model developed by RVL, input parameters can be altered, which allows easy review of different scenarios.

Significant insight into quarantine risk can be gained through use of the model. What is particularly interesting is that under a range of scenarios the probability of EI outbreaks in the model is consistent with that indicated by historical outbreaks. It also reveals that application of diagnostic testing would be expected to have a significant effect on detection of horses in quarantine. One particularly useful output of the model is that reducing the number of PAQ tests for non-mixed shipments from three to two will reduce the chance of detecting EI. Concerning the increase in PAQ to 21 days, the model indicates that the risk associated with small shipments of horses is very small and this increase is not justified. Finally, the model can be used to examine the effects of increasing the number of EI tests during PEQ and PAQ. Doing this may allow quarantine periods to be safely adjusted. For example in a small group of horses, it may be safer to do seven days of PEQ and three tests than it is to 14 days and 2 tests.

The racing industry will welcome the opportunity to discuss this model with the authors of the IRA.

Conclusion

From a horse industry perspective, effective quarantine should prevent introduction of disease but support the economic opportunities associated with international horse movements. There are a number of ways in which this can be achieved.

Fundamental to effective quarantine is an understanding of the risk. In Australia's case, the risk of EI is of particular importance. Knowledge of EI is continually improving, and from an Australian perspective particularly so since the 2007 EI outbreak. Instrumental to this understanding has been the development of highly sensitive tests for the presence of EI virus. As the understanding and nature of these tests changes, and the ability to accurately identify infected animals increases, new paradigms for quarantine operations should evolve. While it is unlikely that quarantine will ever be completely replaced by diagnostic testing, modifications to quarantine operations that improve both quarantine effectiveness and efficiency should be possible.

The IRA process is very cumbersome and does not lend itself to such dynamic situations. As such, the racing industry would like to meet with the authors of the IRA to discuss alternative approaches to managing quarantine risk.

APPENDIX ONE

The following extracts are taken from various sources including George Wilson's Review of Equine Influenza.

South Africa

Equine influenza entered South Africa in a consignment of 6 horses from Kentucky, USA. The horses were quarantined on a farm in Kentucky for 4 weeks prior to road transport to Toronto, Canada and airlifted to Johannesburg via Paris, arriving on 8 December 1986.

The EI vaccination history of the horses varied and 3 had been vaccinated within 3 months, 2 within 6 months and 1 only 11 months prior to export. Two horses began coughing on the flight.

On arrival, a veterinarian examined the horses and the affected horses were considered to be suffering from travel sickness.

The Johannesburg quarantine station did not have an "all-in all-out" policy but no direct contact between horses was permitted and different stable personnel were used between each consignment (Further papers on this outbreak have shown that infected horses were stabled approximately four metres from horses that were two days away from completing quarantine).

On December 10, 2 recently vaccinated horses that had arrived from England were released from quarantine and transported to Turffontein, a major racing centre. These horses were infected with sub-clinical EI at the time of release from quarantine and introduced the virus to the racing and training centre. Viral spread from the quarantine station to Turffontein was also suspected to have resulted from veterinary examination and treatment of the sick USA origin horses in quarantine.

The float carrying the infected horses to Turffontein then loaded other thoroughbreds and began a 1600 km journey to the Cape Province dropping off horses at 4 major studs and a large training complex in the Western Cape area. Influenza erupted at all these drop off points. On its return journey, the same float transported horses to the Orange Free State. On 11 December, a float loaded horses from Turffontein and the surrounding area and traveled to the Eastern Cape infecting the Port Elizabeth area, including 4 major studs.

India

Influenza was similarly introduced into India by horses imported from France. The infection spread throughout northern India, with a morbidity of 80% and mortality of approximately 1%. Once a diagnosis had been made, equestrian events were banned and horse movement restricted, particularly along the interstate border between Madhya Pradesh and Andhra Pradesh. Thoroughbred horses were vaccinated with imported vaccine. The epizootic did not spread to the southern states of India and there have been no confirmed outbreaks since 1987.

The extensive outbreaks in South Africa and India both occurred as a result of failure to identify horses incubating the disease before shipping, inadequate quarantine at the port of entry and completely susceptible equine populations. The mortality recorded in India was unusually high and was associated with secondary bacterial complications or the poor health status of some equids.

China

In March 1989, a severe outbreak of respiratory disease occurred in horses in the Jilin and Heilongjiang provinces of northeast China. Morbidity was 81% and mortality was as high as 20% in some herds. A second outbreak occurred in April 1990 in the Heilongjiang province with 41% morbidity and no mortality. Both outbreaks were caused by Influenza viruses of the H3N8 subtype that were antigenically distinguishable from the prototype, A/Equine/Miami/1/63 (H3N8) strain.

Serological studies done on acute and convalescent horse sera indicated that this H3N8 Influenza virus was not present in China before 1989. Antigenic and sequence analyses along with phylogenetic evidence of the Influenza viruses isolated from horses in northeast China in 1989 and 1990 suggest that these viruses were of avian origin. The Jilin/89 viruses was antigenically most closely related to H3 viruses of avian origin and closely resembled duck H3 viruses. Since 1990, no new cases have been identified and it is suspected that this unusual virus has failed to sustain itself in the equine population. It is likely that the Jilin/89 virus is an equine/avian Influenza recombinant, which couldn't maintain long term in equines, or birds.

Hong Kong

An outbreak occurred in Hong Kong in November 1992. The Royal Hong Kong Jockey Club (RHKJC) suspended all racing and ceased all movement and import of horses. Hong Kong's international races (the Hong Kong Invitation Cup and Invitation Bowl) scheduled for 13 December were cancelled. Australian horses had been invited to compete in these races and would have been re-imported directly from Hong Kong to Australia.

All horses which race in Hong Kong are imported as space and environmental limitations preclude horse breeding. About 200-250 horses are imported annually, approximately 50% from Europe and USA and 50% from Australasia.

At the time of the outbreak, 958 racehorses were stabled in the training complex at Sha Tin and 300 equestrian horses were kept at 9 riding schools. The disease spread rapidly and by 30 November 1992, all stables of the 23 trainers at the Sha Tin racing complex were affected. Because of the close commingling of horses from different stables in the exercise warm up area prior to training and the intensive management conditions, isolation of affected horses was impossible. By 10 December 1992, 318 of the 958 racehorses had been treated for virus-related symptoms since the start of the outbreak and over 400 horses had shown symptoms. At Beas River, 50% of 170 horses had been affected. Due to strict controls on movement, horses at the other 8 riding schools (including one within 4 km of the Sha Tin complex) were still unaffected on 22 December. Fifteen recently imported un-vaccinated Australian hacks and ponies at the Beas River Riding School and Spelling Station were most severely infected. All recovered except one, which was euthanased due to pleuropneumonia.

All racing horses are vaccinated by the RHKJC against Equine Influenza, Japanese Encephalitis and Tetanus. Duvaxyn (Duphar) Influenza vaccine was used according to manufacturer's recommendations. The original Duvaxyn was a killed trivalent vaccine which contained the vaccine strains A/equi/l/Prague, A/equi/2/Miami and A/equi/2/Kentucky. Racing horses were boosted in June during the break in the racing season.

As Hong Kong had been free of EI and all horses were vaccinated and had received a booster dose by June 1992, EI was not suspected initially. The outstanding features of the Hong Kong outbreak was the rapid spread and mildness of disease in these vaccinated horses.

Concern was expressed that the outbreak may have been caused by A/equi/Jilin/2/89(H3N8). Hong Kong does not import horses from China and the epidemiology and serology and mild disease in vaccinated disease in Hong Kong all suggested that the most likely source of virus was United Kingdom rather than China. The University of Hong Kong medical virologist isolated influenza and the EI virus was designated A/Influenza/equine/Hong Kong/1/92 and was later characterised as similar to Suffolk/89.

Groups of horses had been imported in October from United Kingdom and Eire where Equine Influenza had been recorded recently. They were not subjected to Government post arrival quarantine but were kept by the RHKJC for 14 days in stables immediately adjacent to the main stable complex. Grooms caring for horses in 'quarantine' also attended to other horses in the racing stables without strict attention to de-contamination procedures. "All in/all out" quarantine procedures were not practiced prior to the Hong Kong outbreak. The first group of horses was released on 29 October and the second group on 5 November. The accuracy of some international vaccination records was also questioned.

Europe, UK and Ireland

In mainland Europe, most countries have experienced repeated outbreaks during the last five years although the severity and frequency of outbreaks has varied between countries. Localised outbreaks of very mild disease have been recognised almost annually in vaccinated horses in France since 1979. Between 1979 and 1991, five outbreaks of A/equine 2 were diagnosed in Italy, mainly in the northern regions and the 1991 outbreak was the most severe experienced in that country since the 1979 epizootic. Persistence of influenza in Italy was attributed to the lack of vaccination of horses within the non-thoroughbred population and to the frequent movement of horses both within the country and to equestrian events abroad.

In Germany, where high proportions of thoroughbred and non-thoroughbred horses are vaccinated, there was very little influenza activity between 1979 and 1989. In 1989, when horses in many other countries were badly affected the outbreak in Germany produced mild disease only in vaccinates.

In Scandinavia, influenza has been diagnosed in 7 of the last 12 years. The infection is believed to be endemic in the riding horse populations, which are largely unvaccinated, and periodically the infection transfers to the vaccinated racing population. Since 1988, influenza has been detected in both unvaccinated and properly vaccinated horses.

Unlike the situation in mainland Europe, the UK and Ireland enjoyed an influenza-free period for some 10 years, in spite of constant movement of horses to and from the continent for competition. However, in the summer of 1989, influenza A/equine 2 was diagnosed in London and Dublin and the virus isolated was designated Suffolk/89. In the UK, the infection spread rapidly with outbreaks identified throughout the country within a 2-week period. Since then, sporadic outbreaks have been diagnosed in the UK and Ireland. While a history of regular vaccination resulted in milder clinical signs, some horses became infected within 4 weeks of booster vaccination.

Equine Influenza and Jamaica 1989

The following is an extract from a paper written by the Government Veterinary Officer at the time of an EI epidemic.

"In November 1989, two Jamaican race horses, a filly called "Lady Geeta" and a colt named "Aim to Please" traveled from Jamaica to Puerto Rico to take part in the "Clasico International del Caribe" at El Comandante Racecourse in San Juan. The horses entered Puerto Rico under a "Piroplasmosis Waiver" and were thus kept in strict USA supervised quarantine, along with some of the other horses competing from various Caribbean nations.

The horses were perfectly healthy throughout their stay in Puerto Rico and returned to Jamaica on the 4th December 1989 after competing in the race on the 3rd. The horses were taken to the Jamaican Government quarantine station where they were to be kept for 10 days. A2 Equine Influenza had not occurred in Jamaica and the vaccine was not licensed to be used by the Government authorities.

Both horses had not been vaccinated against EI, nor had any of the horses at the Jamaican racetrack, except for a few which had been imported from the USA. The quarantine was uneventful during the first eight days. On the 12th December 1989, a group of mares and yearlings, which had come from Kentucky, were imported into Jamaica and brought to the Government quarantine station. These horses had apparently been delayed on their journey to Miami and the young horses apparently had a nasal discharge and signs of mild upper respiratory disease.

On the 14th December 1989, "Lady Geeta" and "Aim to Please", both apparently healthy, were released from quarantine and returned to their stables at Caymanas Park. Approximately 1,000 horses are stabled within the racing complex. It subsequently turned out that on the 16th December 1989, the trainer of "Aim to Please" discovered that the horse was off-colour, had a nasal discharge and a cough. Two days later, all the horses in his barn were showing similar symptoms and three days later, I was informed that a large number of horses in the area near where "Aim to Please" was stabled were presenting symptoms which indicated that an outbreak of EI was occurring in the racing complex.

I immediately contacted the Government Veterinary Services and requested that the area be quarantined, which it was. There was restricted access by personnel, with only trainers, grooms and veterinarians being allowed into the complex. On the 21st December, I estimated that approximately 200 horses were affected. Over the next five days, the infection spread to affect virtually the entire equine population within the complex. The rapidity of the spread of infection was very striking, as was the fact that recently imported and vaccinated horses exhibited much milder symptoms. It was, in my opinion, a classic example of a totally susceptible population succumbing to a new, highly infectious disease.

About 10 days later, three stud farms which were within a two-mile radius of the racing complex also became infected. Although this spread may have been due to infected personnel, it also coincided with an unexpected change of the prevailing wind in the direction of these farms. Interestingly, the disease appeared much less severe in those animals, which were living at pasture, as opposed to those living in stables in the dusty environment of Caymanas Park. However, the quarantine arrangements and ban on the movement of horses prevented the disease spreading to other parts of the island, which would include a large equestrian centre and three major stud farms on the north coast of the island.

Racing was closed down for more than three months from the 22nd December until it was resumed in April 1990. A compulsory vaccination program was introduced by the Jamaica Racing Commission in February 1990."

The Outbreak of Equine Influenza in Japan

Outline of Outbreak

The outbreak of Equine Influenza from December of 1971 encompassed 9 prefectures in a short period of approximately 4 weeks involving 6,559 horses. This was attributed to two factors - Japan has never been contaminated with this disease and none of the horses was inoculated.

The first outbreak at the Japan Racing Association was December 15 at its Equestrian Park in which 30 horses developed fever in one day. Since then, investigations revealed that there had been sporadic cases of feverish horses from about December 4 at the Fukushima Racecourse.

Later, the disease spread to both the Tokyo and Nakayama racecourses at which 1,986 horses came down with the disease. However, there have been no cases since January 6, 1972.

Source of Infection

It is thought that this disease spread when 5 imported riding horses, after release from animal quarantine, developed fever the day after their arrival at their destination. The horses in question were in animal quarantine together with imported horses from Europe. This matter is still under investigation by the Ministry of Agriculture and Forestry and the source of this disease is unknown.

Cause of Disease

On December 22, the Ministry of Agriculture and Forestry and the Japan Racing Association, through nasal mucous, have isolated the virus and identified the cause of the disease as Equine Influenza A/equi 2 Miami Type.

APPENDIX TWO

Comments on Draft Import Risk Analysis Report for

Horses from Approved Countries

Background

Biosecurity Australia has recently (30 November 2009) released a "Draft Import Risk Analysis Report for Horses from Approved Countries". This draft risk analysis considers a wide range of potential hazards which could be introduced with or by imported horses and recommends biosecurity measures to be imposed to ensure that the final risk for these hazards meets Australia's Acceptable Level of Protection (ALOP) of *Very Low*. Stakeholders have until 1 February 2010 to provide written comments on the draft report.

Racing Victoria has expressed concern about specific post-arrival quarantine (PAQ) measures for equine influenza, in particular the duration of PAQ for mixed consignments of horses and has requested that AusVet review the draft report in relation to EI and provide an opinion on the appropriateness of the requirements imposed.

The key issue

The specific issue of concern is that single consignments (not commingled with other consignments from different sources) require only 2 weeks PAQ, whereas mixed consignments (from multiple sources) require an additional week of PAQ. The additional time for mixed consignments may act as a deterrent for owners considering whether to send racehorses to Australia.

Comments

Our comments are limited to the risk assessment and risk management for EI only. We have not considered other hazards or risk management measures not related to EI. Overall, the risk analysis in relation to EI appears to be a well reasoned and clearly documented analysis.

The key issue identified above (additional one week of PAQ for mixed consignments) is the only matter where, in our opinion, the draft IRA has not presented a well reasoned and documented justification for the recommendation of an additional week of PAQ. Other measures imposed, including requirements for PEQ & PAQ, clinical monitoring, rectal temperature monitoring and PCR testing appear appropriate and reasonable.

In relation to the duration of PAQ, the draft report states that, for consignments entering PAQ from a single PEQ facility, "the duration of PAQ can be limited to 14 days". However, if horses originate from multiple PEQ facilities "an increased PAQ period of at least 21 days is necessary". This is argued on the basis that "the longer PAQ period for commingled consignments allows increased time for mixing of horses from different PEQ groups to occur". The extended PAQ is combined with an additional PCR test within 24 hours of entry to PAQ, in addition to PCR tests at 4-6 days after entry and within 4 days prior to exit (required for all consignments).

Overall, the combination of measures imposed was deemed to reduce the release likelihood (likelihood of entry of EI into Australia) to *Very Low*, consistent with the ALOP for Australia.

The principles of the Sanitary and Phytosanitary Agreement include that import conditions imposed for any commodity may not be any more restrictive than required to meet our ALOP. This means that if 2 weeks PAQ would be sufficient for mixed consignments to meet our ALOP, then there is no justification for extending PAQ to 3 weeks.

We could find no evidence in the draft report that any formal or structured assessment was performed to determine the likelihood or risk under varying conditions (non-mixed consignments vs mixed consignments, and two vs three weeks of PAQ) in order to arrive at a justified and documented conclusion that the extra week of PAQ was warranted for mixed consignments and not warranted for non-mixed consignments. The decision to recommend a third week of PAQ for mixed consignments therefore appears to be arbitrary and possibly not warranted.

In view of the above considerations, it is our opinion that this issue could legitimately be raised with Biosecurity Australia as one which requires further clarification and discussion, to enable determination of the effect of a 2-week PAQ for mixed consignments on the overall release likelihood for EI, compared to the proposed 3-week requirement.

Evan Sergeant	Nigel Perkins
Director	Director

AusVet Animal Health Services

28 January 2010