The international movement of horses and its influence on the spread of infectious diseases

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Summary: During the last thirty years a significant increase in the international movement of horses has occurred. The majority of horses are transported by air and this has contributed to the spread of certain infectious diseases. Measures to control their transmission is the responsibility of government veterinary services who certify that horses, and the locality from which they are to be exported, are free of specified equine diseases. The regulations appear to have been successful over the last fifteen years in preventing the spread of several of the important notifiable diseases including African horse sickness and Venezuelan equine encephalomyelitis. However, many of the less severe equine infections which rarely cause mortality, such as influenza and contagious equine metritis, have become widely disseminated as a result of international horse movements.

In order to achieve greater control, continuous epidemiological surveillance of the world's equine population is necessary. This must be supported by competent laboratory facilities to confirm the cause of local outbreaks of disease. Once this is achieved each outbreak should be reported nationally, and also internationally, if it is considered that the outbreak poses a threat to the trade of horses. Better communication needs to be established within each country between the official veterinary services and the equine industries and also at an international level to ensure that accurate information is provided rapidly to prevent misconceptions from arising.


INTRODUCTION

Horses are moved from one country to another for a number of reasons including the sale of the animal, to compete at equestrian events and for breeding purposes. During the last decade there has been a significant increase in the movement of horses as a response to the greater role the horse plays in the leisure-time activities that are increasingly available to many people. These activities not only include the traditional equestrian sports of racing and showing but other more diverse ones such as eventing, show jumping, trail riding and the organized equine programmes for young children and teenagers. As a consequence there has been a tremendous growth in equestrian competitions at both a national and international level. Many of these competitions, especially the international events, are under the jurisdiction...
of the International Equestrian Federation (IEF) which is responsible for their coordination and supervision.

Also within the last decade, the thoroughbred horse has assumed great economic value as a consequence of its racing and breeding potential and has acquired the status of a commodity to be traded as such on the international market. In order to improve its value, this select group of animals is frequently transported around the world to complete racing and breeding engagements. The majority of horses accept transportation with equanimity, unperturbed by the extensive journeys which they undertake and adapting favourably to the constantly changing environment.

Within a country, horse transportation is usually by road but, for greater distances between continents, air transport plays an important part. Formerly sea transport over long distances imposed a useful quarantine period but the increasing use of air transport has contributed to the spread of equine disease, the most obvious example being equine influenza.

The advancement of laboratory methods to assist in the diagnosis of equine infectious disease has resulted in the recognition of a number of "new" equine pathogens. They include the causal agents of contagious equine metritis (CEM), Potomac fever (equine monocytic ehrlichiosis) and Getah virus infection. The distribution of these diseases is gradually unfolding as laboratories throughout the world develop the techniques necessary to confirm a diagnosis.

**RECENT PROBLEMS ASSOCIATED WITH THE MOVEMENT OF HORSES**

During the last twenty-five years there is documented evidence of the influence that the movement of horses has had on the spread of a number of infectious and contagious diseases (Table I). Other diseases including strangles, equine rhinopneumonitis and ringworm, which are endemic in many horse populations and not routinely reported, are often disseminated as a result of international movement.

**African horse sickness (AHS)**

Following the successful eradication of AHS in Spain at the beginning of 1967, there have been no further reports of the disease occurring outside the endemic area of Africa. As a further precaution, several countries, including many of the European nations prohibit the importation of horses from countries considered to be infected with the disease or where vaccination against AHS is undertaken.

**Contagious equine metritis (CEM)**

After the initial reports of CEM in England and Ireland during the early part of 1977, the disease has become recognized in several European countries, Scandinavia, the United States of America, Japan and Australia (5). Effective control has been achieved by the implementation of the Codes of Practice which recommend methods for identification and treatment of infected animals. The greatest threat that currently exists for the continued spread of CEM is in young colts about to commence their breeding career and which were born to dams infected with the disease at the time they nursed the foal. Between 1978 and 1982 Timoney and Powell (8) documented the isolation of the CEM organism from sixteen colts which had no previous sexual experience and further cases have occurred since that time. These
observations emphasize the importance of a thorough bacteriological examination of the genital tract of all colts prior to export as recommended in the International Zoo-Sanitary Code published by the Office International des Epizooties (OIE). The causal organism of CEM previously named *Haemophilus equigenitalis* has now been officially classified as *Taylorella equigenitalis* (type strain NCTC11184) (1).

**TABLE I**

**Recent disease outbreaks following the movement of horses**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Recipient country(ies)</th>
<th>Date and source</th>
</tr>
</thead>
<tbody>
<tr>
<td>African horse sickness (AHS)</td>
<td>Middle East, S.W. Asia, India, Cyprus</td>
<td>1959 Extension of epidemic in Africa</td>
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<td></td>
<td>Spain</td>
<td>1966 Extension of epidemic in North Africa</td>
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<tr>
<td>Contagious equine metritis (CEM)</td>
<td>UK, Ireland</td>
<td>1977 Importation of carrier mare</td>
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<td></td>
<td>Australia</td>
<td>1977 Importation of carrier animal from Europe</td>
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<tr>
<td></td>
<td>USA</td>
<td>1978 Importation of carrier stallions from Europe</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td>1980 Importation of carrier animal from Europe</td>
</tr>
<tr>
<td>Equine infectious anaemia (EIA)</td>
<td>UK</td>
<td>1974 Importation of carrier mare</td>
</tr>
<tr>
<td>Influenza</td>
<td>USA</td>
<td>1963 New subtype 2 imported from South America</td>
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<tr>
<td></td>
<td>Singapore and Malaysia</td>
<td>1977 Subtype 1 imported from Europe</td>
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<tr>
<td></td>
<td>UK</td>
<td>1979 Subtype 2 imported during international horse show</td>
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<tr>
<td>Piroplasmosis</td>
<td>USA</td>
<td>1959 Importation of Cuban horses infected with <em>B. caballi</em></td>
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<tr>
<td>Venezuelan equine encephalomyelitis (VEE)</td>
<td>USA</td>
<td>1971 Extension of epidemic from South and Central America</td>
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</tbody>
</table>

**Equine infectious anaemia (EIA)**

Several countries including the USA, France and Japan have significantly reduced the incidence of EIA among their equine population utilizing the immunodiffu-
sion (ID) diagnostic test in association with a regulatory programme prohibiting the movement of ID positive animals. In the United States the percentage of positive samples has decreased from 3.8 percent in 1972 to 0.6 percent in 1982 (4). Following the Fourth International Conference on Equine Infectious Diseases held in France during 1976, agreement was reached on the preparation of an international reference serum to check the sensitivity of the ID test. This serum is available from specified laboratories within the United States, Japan and France. Recent progress in the diagnosis of EIA includes the development of an enzyme-linked immunosorbent assay (ELISA) (7) which is considered to be a sensitive method for detection of EIA specific antibody. The assay also has the advantage of being able to test a large number of samples within a short space of time.

Influenza

No major pandemics of influenza have occurred since the emergence of the subtype 2 strain in North America during 1963. Since that time epidemics have occurred on several continents, notably North America, Europe and Malaysia, at irregular intervals attributable to either subtype 1 or 2. A study of recent subtype 2 isolates (3) from a variety of sources has indicated that the majority are antigenically distinguishable from the prototype Miami strain. Differences, however, are of a minor nature and are thought unlikely to have been a major factor in the development of outbreaks of influenza which occurred among vaccinated and non-vaccinated horses. Although it is accepted that vaccination has reduced the severity of disease as well as its potential to be transmitted, protection has been shown to be short-lived and levels of humoral antibody are low following primary and booster vaccination, especially to subtype 2 antigens.

Piroplasmosis

Equine piroplasmosis is recognized as a disease occurring in tropical and subtropical areas of the world but has also been diagnosed in temperate zones. It is widely distributed and has been reported in the Americas, Asia, India, Europe, the Soviet Union, Australia, the Middle East, and the Caribbean. The disease is transmitted by the tropical horse tick Dermacentor nitens which is found predominantly in the ears of horses and also during heavy infestations in the nasal diverticulum, mane, perineal region and along the ventral mid-line.

Venezuelan equine encephalomyelitis (VEE)

VEE ranks with AHS as having the potential for causing the greatest mortality within a susceptible population and, in addition, is a zoonosis causing human mortality. It is endemic in most tropical forests and swamp lands and has caused repeated epizootics within northern South America between 1920 and 1967. In Florida, USA, Mexico and South and Central American countries, VEE viruses have been associated with enzootic cycles involving continuous low level transmission between rodents and mosquitoes (6). A serological system for distinguishing between VEE virus isolates has shown that antigenic classification correlates with epidemiological and ecological features of the disease. Strains classified as IA, IB and IC have been associated with epizootics whereas the remaining varieties of subtype I and subtypes II, III and IV are associated with sporadic equine and human infection (9). By determining the strain, especially those within the subtype I viruses, it has been possible to assess the potential for spread of an epizootic.
CURRENT METHODS OF CONTROL

Horses are presently moved from one country to another under the authority of a licence issued by the government veterinary service of the exporting country. Within Europe and Scandinavia horses may be moved under a general licence which requires identification of the horse and also certifies freedom from certain diseases. The licence also gives a declaration of the disease status of the country of export — i.e. the country was free of a particular disease during a previously stipulated period. To export horses between continents it is the usual practice for the importing country to request from the exporting country a specific licence for the individual animal which covers one importation and is time limited. Each importing country stipulates its own requirements usually based on guidelines outlined in the most recent edition of the International Zoo-Sanitary Code.

Some countries have formulated a common importation policy, a notable example being the Tripartite Group comprising the United Kingdom, France and Ireland. This informal agreement which has been in existence since 1974 is between the respective government veterinary services and covers a common list of notifiable diseases and a common import policy. A recent example of this common policy was the temporary suspension during the summer of 1984 of equine imports from the United States as a result of the outbreak of equine viral arteritis among thoroughbred mares and stallions in the state of Kentucky. This suspension was lifted allowing horses to be imported from the United States under strict veterinary conditions.

Information concerning the incidence of specific equine diseases in various countries is available through the OIE and via the many informal contacts which exist between individuals involved in equine disease investigation from many parts of the world. To facilitate the exchange of information at a scientific level, four international conferences on equine infectious disease took place in 1966, 1969, 1972, and 1976 under the auspices of several organizations including the Grayson Foundation (USA), the Société d’Encouragement (France) and the OIE. The proceedings of the meetings have been published and have provided an indispensable reference for those seeking information on equine infectious disease.

FURTHER DEVELOPMENT OF THE PRESENT SYSTEM

It would appear that the current regulations to control the spread of certain major notifiable equine diseases, such as AHS and VEE, have been effective in limiting their activity over the last fifteen years to their enzootic areas. Their continued control is very much dependent on intensive surveillance within the enzootic area. Definitive identification of VEE and AHS viruses is important epidemiologically and serological tests using specialized antibody preparations coupled with biochemical techniques have proved of great value in the characterization of VEE virus (2). A similar argument applies to the epidemiological surveillance of equine influenza viruses on a world-wide basis. Twenty-three years have elapsed since a major antigenic shift or recombinant occurred within the equine influenza A virus. On the basis of the behaviour of the virus in the human and other animal species the potential for evolution of a third influenza A equine subtype is ever present. Early identification is therefore imperative if a serious pandemic is to be averted in what would be a completely susceptible population. The need for surveillance was
endorsed at a meeting held in Newmarket, England during 1983 under the auspices of the World Health Organization (WHO) and the Animal Health Trust where it was emphasized that all equine influenza isolates should be submitted to one of the two WHO Collaborating Centres in either London, England or Memphis, USA. The OIE has also established a reference laboratory for equine influenza at the Veterinary School, Munich, Germany which will assist in surveillance and with the preparation of reference reagents for diagnostic purposes.

The situation with respect to other equine disease is less precise. Strangles, rhinopneumonitis, viral arteritis, piroplasmosis, salmonellosis, and CEM are a serious cause of economic loss and a major outbreak of any one could seriously disrupt the movement of horses. A more effective system of reporting these and some of the newly emergent equine diseases is required in order to institute proper control measures and to allay some of the misconceptions which can so readily arise. At a meeting held in Ireland during 1984, sponsored by the Grayson Foundation, it was agreed to establish a system of communication for non-notifiable equine diseases. Twenty countries with an interest in the international movement of horses, as well as the OIE and FEI, have been asked to participate and a collating centre situated in Europe has been proposed. The success of the project depends on the quality of information generated at a national level supported by competent laboratory diagnosis. To this end better liaison needs to be established between the equine industries in each country and the government veterinary services responsible for export certification. By providing a rapid and accurate flow of information concerning the incidence of equine infectious diseases, a greater degree of control will be achieved without allowing bureaucratic and industrial over-reaction to unnecessarily inhibit the safe movement of horses.

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REFERENCES


