



APHIS Evaluation of the
African Horse Sickness (AHS)
Status of the
Kingdom of Saudi Arabia

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United States Department of Agriculture
Animal and Plant Health Inspection Service
Veterinary Services
National Import and Export Services
Regionalization Evaluation Services

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Abbreviations

AHS	African horse sickness
AHSV	African horse sickness virus
APHIS	Animal and Plant Health Inspection Service
CFR	U. S. Code of Federal Regulations
FAO	Food and Agriculture Organization of the United Nations
GCC	Cooperation Council for the Arab States of the Gulf
KSA	Kingdom of Saudi Arabia
MOA	Ministry of Agriculture and Water
OIE	World Organization for Animal Health
USDA	United States Department of Agriculture
VS NIES RES	Veterinary Services, National Import and Export Services, Regionalization Evaluation Services

Section 1: Executive Summary

The Animal and Plant Health Inspection Service (APHIS) currently recognizes the Kingdom of Saudi Arabia (Saudi Arabia) as being affected with African horse sickness (AHS) [1]. As such, APHIS allows the importation of horses (horses, asses, mules and zebras)¹ from Saudi Arabia subject to 60-day quarantine.

In March 2001, the Government of Saudi Arabia requested APHIS evaluate the AHS status of their country. A determination by APHIS that Saudi Arabia is AHS-free could reduce the length of time required for the post-importation quarantine. In October 2009, Saudi Arabia submitted the necessary documentation needed for APHIS to initiate the evaluation [3, 4].

APHIS personnel from the Veterinary Services, National Import and Export Services, Regionalization Evaluation Services (VS NIES RES) visited Saudi Arabia in October 2011. The APHIS personnel were accompanied by representatives of United States Department of Agriculture (USDA), Foreign Agricultural Service (FAS) assigned to the United States Embassy in Riyadh, Saudi Arabia. The purpose of the visit was to obtain and verify information necessary to support the AHS evaluation.

Supporting documentation reviewed for this risk analysis came from the Ministry of Agriculture (MOA), Kingdom of Saudi Arabia; observations made by APHIS technical teams during site visits in October 2011; peer-reviewed articles; and data from the World Organization for Animal Health (OIE) and other technical sources.

This risk analysis was conducted according to OIE guidelines and therefore includes a hazard identification section, a release assessment, an exposure assessment, a consequence assessment, and a risk estimate [7]. The hazard under consideration is AHS virus.² The risk analysis allowed APHIS to decide whether and under what conditions to accept the importation of equids from Saudi Arabia into the United States, in accordance with established regulations [9].

Release Assessment

Saudi Arabia has a large population of equids susceptible to AHS. Clinical signs of AHS have not been reported anywhere in Saudi Arabia since 1989 [10] and AHS vaccination has been illegal for over eleven years [3-5]. Repeated serological surveys have not detected AHS virus (AHSV) activity in a naïve susceptible population [3-6]. These findings support the conclusion that AHS is not endemic in Saudi Arabia.

¹ APHIS uses the term “horses” to include horses, asses, mules, and zebras, as defined in the U. S. Code of Federal Regulations (CFR), Part 9, Section 93.300 [2]. In this document, the term “equids” is used to include horses, asses, mules, and zebras.

² In regards to other regulated equine diseases, APHIS does not consider Saudi Arabia to be affected with contagious equine metritis (CEM) but does consider it to be affected with screwworm [8]. Horses imported from screwworm-affected regions must be treated prior to export and are quarantined at the port of entry for at least 7 days upon arrival into the United States.

APHIS acknowledges the potential for reintroduction of AHSV into Saudi Arabia. The occurrence of AHS in Saudi Arabia has been a rare event even though the vector for its transmission is present. Historical incursions have been associated with the movement of infected horses although theoretically AHSV-infected vectors can be windblown into the country from endemic areas of Africa.

The proximity to AHSV activity in neighboring countries is a risk factor associated with importing equids from Saudi Arabia into the United States. The desert, along much of Saudi Arabia's southern border, likely provides an effective natural barrier separating susceptible equine populations from potential exposure to infected animals or vectors. However, a risk for reintroduction exists in the southwest where susceptible equids inhabit an area that shares a common land borders with an AHS-affected region.

This factor is substantially mitigated because Saudi Arabia prohibits the importation of equids from countries it considers to be AHS-affected, requires post-entry isolation of imported animals, prohibits AHS vaccination, and maintains an AHS Control Zone in the southwest part of the country to serve as a buffer zone.

APHIS concludes that the AHSV is not known to exist in Saudi Arabia and that the risk of exporting AHS-infected equids from Saudi Arabia, excluding the AHS Control Zone, would be very low.

Exposure Assessment

Based on the results of the release assessment, APHIS assessed the likelihood of exposure of susceptible equids in the United States to vector transmission of AHSV from equids originating in and imported from Saudi Arabia, excluding the AHS Control Zone to be very low.

Consequence Assessment

Conversely, APHIS concludes that the biological and economic consequences of an AHS outbreak in the United States could be high. The magnitude of the biologic and economic consequences following an introduction of AHS would depend on the location and time of the year of the introduction; the rate of virus spread; the ability to detect the disease rapidly; equine demographics and movement patterns; and the ease of control and eradication. Additionally, restrictions imposed by international trading partners may result in economic losses and other hardship to otherwise unaffected segments of the equine industry.

Risk Estimation

In summary, although the consequences of a AHS outbreak in the United States would be serious, based on the findings of the release and exposure assessments APHIS believes that AHSV is not known to exist in Saudi Arabia and therefore the risk of exporting AHS-infected equids from Saudi Arabia, excluding the AHS Control Zone, leading to exposure of susceptible equids in the United States to AHSV would be very low.

Section 2: Introduction

History

The Animal and Plant Health Inspection Service (APHIS) currently recognizes the Kingdom of Saudi Arabia (Saudi Arabia) as being affected with African horse sickness (AHS) [1]. As such, APHIS allows the importation of horses (horses, asses, mules and zebras)³ from Saudi Arabia subject to 60-day quarantine. Horses intended for importation from regions APHIS considers to be affected with AHS may enter the United States only at the port of New York, and must be quarantined at the New York Animal Import Center in Newburgh, New York, for at least 60 days. This restriction also applies to horses that have stopped in or transited a region considered affected with African horse sickness.

In March 2001, the Government of Saudi Arabia requested APHIS evaluate the AHS status of their country. A determination by APHIS that Saudi Arabia is AHS-free could reduce the length of time required for the post-importation quarantine. In October 2009, Saudi Arabia submitted the necessary documentation needed for APHIS to initiate the evaluation [3, 4].

APHIS personnel from the Veterinary Services, National Import and Export Services, Regionalization Evaluation Services (VS NIES RES) visited Saudi Arabia in October 2011. The APHIS personnel were accompanied by representatives of United States Department of Agriculture (USDA), Foreign Agricultural Service (FAS) assigned to the United States Embassy in Riyadh, Saudi Arabia. The purpose of the visit was to obtain and verify information necessary to support the AHS evaluation. A report of the site visit is attached (*see* Appendix 1).

Documentation

Supporting documentation reviewed for this risk analysis came from the Ministry of Agriculture (MOA), Kingdom of Saudi Arabia; observations made by APHIS technical teams during site visits in October 2011; peer-reviewed articles; and data from the World Organization for Animal Health (OIE) and other technical sources.

Methodology

This risk analysis was conducted according to OIE guidelines and therefore includes a hazard identification section, a release assessment, an exposure assessment, a consequence assessment, and a risk estimate [7]. The hazard under consideration is AHS virus. The risk analysis allowed APHIS to decide whether and under what conditions to accept the importation of equids from Saudi Arabia into the United States, in accordance with established regulations [9].

³ APHIS uses the term “horses” to include horses, asses, mules, and zebras, as defined in the U. S. Code of Federal Regulations (CFR), Part 9, Section 93.300 [2]. In this document, the term “equids” is used to include horses, asses, mules, and zebras.

Application

AHS is the hazard being evaluated in this analysis. In regards to other regulated equine diseases, APHIS does not consider Saudi Arabia to be affected with contagious equine metritis (CEM) but does consider it to be affected with screwworm [8]. Horses imported from screwworm-affected regions must be treated prior to export and are quarantined at the port of entry for at least 7 days upon arrival into the United States.

Section 3: Hazard Identification

The World Organization for Animal Health (OIE) lists several animal diseases that are considered primary hazards associated with trade of animals and animal products. APHIS regulations mitigate the risk of introduction of these foreign animal diseases in to the United States. As such, APHIS conducts an import risk analysis addressing hazards of primary concern prior to initiating or resuming trade of animal commodities. APHIS considers African horse sickness (AHS) virus to be a potential hazard associated with trade of live equids. AHS is infectious but non-contagious, insect-transmitted, viral disease with extremely high mortality in horses and mules. AHS has never occurred in the United States [10].

Causative agent

AHS results from infection with the virus classified in the genus *Orbivirus* in the family *Reoviridae* [11]. It is in morphology and shares many properties with other orbiviruses such as bluetongue and equine encephalosis viruses.

There are nine serotypes of AHS virus (AHSV). Serotype 9 is the most common serotype and is predominantly found in endemic regions, while serotypes 1 to 8 are only found in limited geographic areas [12, 13]. Serotype 9 has been responsible for the majority of AHS outbreaks outside Africa. Serotype 4 caused one outbreak in Spain and Portugal between 1987 and 1990. While antigenically distinct, these serotypes exhibit some cross-reactivity between 1 and 2, 3 and 7, 5 and 8, and 6 and 9. Cross-reactions with other known orbiviruses have not been observed [11].

Host range

The AHSV can infect horses, donkeys, mules, zebras, camels and dogs. Zebras are considered to be the reservoir host [11, 13]. AHS is often fatal in horses and mules with mortality rate as high as 95% in some forms of this disease [12]. Horses are most susceptible to the disease but mules are less so. Asymptomatic or mild infections can occur in zebras and donkeys, as well as in partially immune horses (previously infected with a different serotype of the virus). Antibodies to AHS have been found in camels, African elephants, and black and white rhinoceroses, but their role in epidemiology is unlikely to be significant [14]. Infections in camels have been reported, but appear to be uncommon and asymptomatic. Dogs have contracted fatal infections after eating infected horse meat, but since they tend not to be affected by *Culicoides* spp., the insect vector, dogs are unlikely to be involved in disease transmission [11].

AHS is endemic in central and southern Africa, habitats for *Culicoides* spp. This disease sometimes spreads to northern Africa and countries around the Mediterranean. Epizootics have occurred in the Middle East (1959-63), Spain (1966, 1987-90), Portugal (1989), Senegal (2007), and in South Africa's Eastern Cape (2008) and Western Cape (2007 and 2011). Outbreaks have also been reported in Yemen (1997), Morocco (1991), Pakistan (1959), India (1965), and the Cape Verde Islands (1999) [10, 11]. Infected animals or insect vectors may carry the virus into

AHS-free regions. Global climate change could increase the risk for spread of AHS because of expansion of the main African vector (*C. imicola*) into the Mediterranean region of Europe [12].

Incubation period

Incubation period is usually 7–14 days, but may be as short as 2 days. The OIE Terrestrial Code considers the infective period for AHSV to be 40 days for domestic horses [7, 11].

Morbidity and mortality

AHS has four clinical presentations: the peracute (pulmonary) form, the subacute edematous (cardiac) form, the acute (mixed) form, and horse sickness fever [11, 12, 14]. The pulmonary and mixed forms are the forms more commonly observed in susceptible horses. The pulmonary form is also the most common form in dogs. The mildest form, horse sickness fever, tends to be seen in horses with partial immunity, mules and donkeys. This form can also occur in zebras, although most cases in this species are asymptomatic. Mortality rate in horses is 70-95%, mules around 50%, and donkeys around 10%.

The pulmonary form of AHS usually is characterized by onset of acute fever, followed by severe respiratory distress. Infected animals often stand with forelegs spread, head extended, dilated nostrils, tachypnea, forced expiration, profuse sweating, spasmodic coughing and a frothy serofibrinous nasal exudate. Dyspnea usually progresses rapidly and the animal dies within a few hours after the respiratory signs appear.

The cardiac form of AHS is characterized by fever that lasts for 3 to 6 days. Shortly before the fever subsiding, edematous swellings appear in the supraorbital fossae and eyelids then spread to involve the cheeks, lips, tongue, intermandibular space, laryngeal region, and sometimes the neck, shoulders and chest. In the terminal stages of the disease, severe depression, colic, ecchymoses on the ventral surface of the tongue and petechiae in the conjunctivae can be observed. Death occurs from cardiac failure but if the animal recovers, the swellings gradually subside over the next 3 to 8 days.

With the mixed form of AHS, symptoms of both the pulmonary and cardiac forms are observed. In most cases, the cardiac form is subclinical and is followed by severe respiratory distress. Occasionally, mild respiratory signs may be followed by edema and death from cardiac failure. The mixed form is rarely diagnosed clinically, but is often seen at necropsy in horses and mules.

The horse sickness fever form is mild. The characteristic fever usually lasts for 3 to 8 days; morning remissions and afternoon exacerbations are often seen. Other symptoms may include mild anorexia or depression, edema of the supraorbital fossae, congested mucous membranes and tachycardia. Animals almost always recover from this form.

Sources of virus and transmission

AHSV can be found in the blood and viscera of infected horses. During viremia the virus is also present in nearly all body secretions, including semen and urine; however, transmission via these

fluids has not been documented. Viremia usually lasts 4–8 days in horses but may extend up to 21 days; in zebras, viremia may last up to 40 days. Recovered animals do not remain carriers of the virus [11].

The AHSV is transmitted by infected insects. The two primary vectors are *Culicoides imicola* and *C. bolitinos*. Other insects are thought to be less involved with transmission of the disease. Mosquitoes can become infected and subsequently transmit the virus. Biting flies, *Stomoxys* and *Tabanus*, may be able to transmit the virus mechanically. During some epidemics, infected midges were found to have been dispersed by the wind. The disease occurrence is both seasonal, appearing late summer or early fall, and cyclical with epizootics associated with periods of drought followed by heavy rain. Potential arthropod vectors exist in the United States and Canada [12].

Inactivation and survival

AHSV is not destroyed by decomposition of blood which may remain infective for more than two years [11]. However, the virus is rapidly destroyed in meat by lowered pH associated with rigor mortis. AHSV is relatively heat stable, especially in presence of protein. The virus can survive in frozen meat, but is inactivated at temperatures greater than 140°F (60°C). The optimal pH for the virus is 7.0 to 8.5 and can survive in the pH range 6.0–12.0. AHSV is inactivated below pH 6.0. The virus is inactivated with acidic disinfectants such as 2% acetic or citric acid.

Vaccination

Attenuated vaccines are routinely used for control in endemic regions, but usually are prohibited in other areas. These vaccines produce a viremia, and the viruses could theoretically reassort with an outbreak virus. Attenuated vaccines may not be safe in AHS-free countries. They are also teratogenic. A killed vaccine has been produced against serotype 4 but is no longer available; no killed or subunit vaccines are currently manufactured commercially [11, 15].

Laboratory Diagnosis

AHS can be diagnosed by isolating the virus or detecting its nucleic acids or antigens [15]. Virus isolation is particularly important when outbreaks are seen outside endemic areas. AHSV can be isolated in embryonated eggs, by intracerebral inoculation of newborn mice, or in cell cultures. Virus isolation in mice is the preferred technique for primary isolation. The isolated virus can be identified by complement fixation or immunofluorescence. The isolate should be serotyped using virus neutralization, ELISAs, RT-PCR. Serology can also be used to diagnose AHS. Antibodies can be detected within 8 to 14 days after infection and may persist for one to four years. Available serologic tests include complement fixation, ELISAs, immunoblotting and virus neutralization. The indirect ELISA and complement fixation tests are the prescribed tests for international trade. AHSV does not cross-react with other known orbiviruses.

Section 4: Release Assessment

4.1. Scope of the evaluation

APHIS considers all of the territory of Saudi Arabia in this evaluation of the AHS risk for importation of equids from Saudi Arabia.

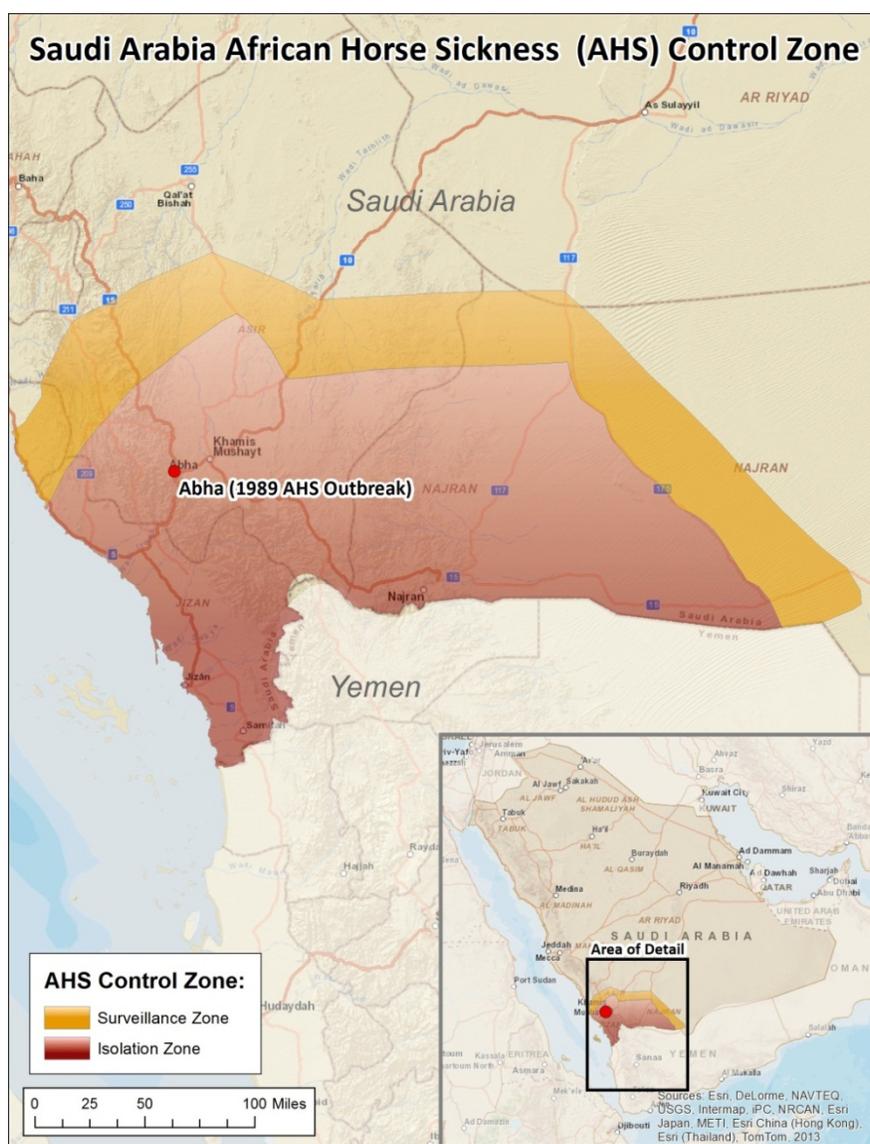
Saudi Arabia covers 2.15 million square kilometers, occupying over 70% of the Arabian Peninsula [16]. This is an area about one fifth the size of the United States. Primarily arid, only about 2% of the country's land mass is covered in vegetation. Saudi Arabia is bounded by the Red Sea in the west; by the Arabian Gulf, Qatar, the United Arab Emirates and Oman to the east; Jordan, Iraq and Kuwait in the north; and Yemen in the south. In the west, it has a mountain range with an altitude up to 5,000 feet. The Rub al Khali, often referred to as the "Empty Quarter," is a virtually uninhabited desert in the south (*see* Figure 1).

Figure 1 – Map of Kingdom of Saudi Arabia



In this evaluation APHIS takes into consideration the impact of the existing AHS control zone (comprised of protection and surveillance zones) established in the southwestern portion of Saudi Arabia (see Figure 2) [3-6, 17]. In 1989, an outbreak of AHS occurred in this region. In the early 1990s, the MOA invited European Union (EU) veterinary officials to review Saudi Arabia's AHS status in order to develop a plan to facilitate exports of horses to the EU for competition and breeding. Based on the EU review, the quarantine program was established and shipments of horses to the EU began in 1999. Protection and surveillance zones in the southwest of Saudi Arabia bordering Yemen were established in accordance with EU import requirements [18]. No equids can move out of the AHS control zone into the remainder of Saudi Arabia. No equids can enter Saudi Arabia from Yemen.

Figure 2 – Map of AHS Control Zone in Saudi Arabia⁴



⁴ A description of the AHS Control Zone is contained in Article 2, EU Commission Decision 1999/228/EC (see Appendix 2).

4.2. Veterinary control and oversight

Organization of veterinary services [3-6]

In Saudi Arabia, the Ministry of Agriculture and Water (MOA) is the central competent authority for animal health. Within the Animal and Plant Quarantine Department of the Ministry, there is a section for equine health which responsibilities include issuance of official health certificates for international horse movements. It is also the authority that conducts AHS surveillance, regulates matters related to equine health, enforces domestic horse movement controls, and sets conditions that regionalize Saudi Arabia for AHS. The budget for the animal health activities is summarized in Table 1.

Table 1: KSA, MOA, Animal and Plant Quarantine Department Budgets, 2011-2014

Year 2011-2012 AD (1432/1433 AH) ⁵	Year 2012-2013 AD (1433/1434 AH)	Year 2013-2014 AD (1434/1435 AH)
\$27,846,942	\$30,945,194	\$32,275,683

Source: KSA MOA, Figures in US Dollars [5]

Saudi Arabia is a member of the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO), and the Cooperation Council for the Arab States of the Gulf (GCC).

Administratively, Saudi Arabia is divided into 13 provinces. The Ministry of Agriculture has an office within each of the provinces, as well as over 190 branch offices and veterinary clinics in local communities throughout the kingdom. A total of 389 veterinarians and 210 veterinary assistants work under the Ministry of Agriculture and Water. These branch offices provide veterinary services for treatment of farm and pet animals, in addition to official animal health control measures, such as vaccination, sampling and agriculture extension work. The Ministry also operates 39 mobile veterinary clinics out of the provincial or branch offices throughout the kingdom. There are also 80 private veterinary clinics in the kingdom.

There are two veterinary colleges in Saudi Arabia, King Faisal University in Al-Hofouf and King Saud University in Al Qassim.

⁵ The Hijri calendar (AH), also referred to as the Islamic or Muslim calendar is a lunar calendar consisting of 12 months in a year of 354 or 355 days. It is used to date events in many Muslim countries. The first year was the Islamic year beginning in AD 622. The current Islamic year is 1434 AH. In the Gregorian calendar, 1434 AH runs from approximately 14 November 2012 (evening) to 4 November 2013 (evening). [19]

Legal authority [3-6, 17]

All legislative authority comes from the Minister of Agriculture and Water who is responsible for issuing ministerial decrees to enact animal health regulations. In particular, the authority to regulate the import and export of live animals, and funding for these activities, is granted through the Decree of the Ministers Council number 50 of 17-3-1410 H. Provision for horse identification and registration authority is described in The Royal Decree number 429 in 27-9-1417 H and is described later in this document.

Notification of AHS and certain other equine diseases⁶ is mandatory. All suspect cases must be reported by private veterinarians or the police to the local veterinary authorities who then report to the MOA headquarters. Local veterinary authorities take immediate action to quarantine and sample animals on the suspect farm. The samples tested for AHS are submitted to OIE reference laboratories outside of Saudi Arabia (usually in Dubai or the United Kingdom).

Local veterinary services [3-6, 20]

During October 2011, the USDA team visited the Ministry's veterinary clinic in Jizan, a city located in the Jazan province in the southwestern-most area of Saudi Arabia bordering Yemen and the Red Sea. Jazan is wholly included in the AHS disease control zone. The team found the clinic to be equipped to handle the routine veterinary services which was provided to the public at no cost. There were three mobile teams that provided veterinary clinical services and were equipped to take samples based on any suspect diagnosis on the farm. The main activity of the teams was to conduct vaccination campaigns against foot and mouth disease (FMD), Rift Valley fever, peste des petits ruminants (PPR), enterotoxaemia, brucellosis and rabies.

Emergency veterinary services were also available through the clinic. The majority of emergency cases have been related to dystocia, mastitis, respiratory illness, and screwworm treatment. Few sick horses are encountered by the clinic's veterinarians. These cases are mainly related to arthritis, colic, and pneumonia.

During routine farm visits, data are collected to maintain a current equine census. The clinic's chief veterinarian explained that he visits with the owners of all 350 horses monthly, often performing physical examinations. He maintains a close collaborative relationship with horse owners in the province.

When asked about how reports of horse deaths are handled, the chief veterinarian explained that official veterinarians from the clinic would immediately visit the farm to record the case history, perform post-mortem examinations in the field and take any required samples in accordance with history and post-mortem findings. If suspicious of a notifiable equine disease, the case would be immediately reported to MOA headquarters. The carcasses would then be buried two-meters deep and covered with lime. MOA officials felt that the frequent contact with horse owners provided the basis for their passive AHS surveillance program.

⁶ By Royal Decree notification must be made of suspicion of African horse sickness, vesicular stomatitis, glanders, dourine, infectious equine encephalomyelitis, equine infectious anemia, equine viral arteritis, and piroplasmiasis.

The team also visited two military equestrian clubs in the Aseer region, located within the southwest AHS control zone. The veterinarian for these two clubs reported a lower frequency of farm visits by official veterinarians than was reported for the Jazan region. MOA officials explained that the increased level of official activities in Jazan was related to eradication and control efforts in response to a significant outbreak of Rift Valley fever in that region. Funding for all veterinary services had been increased as a strategy to promote more frequent veterinary contacts in the area.

Discussion

APHIS finds that the MOA has a strong visible presence with the equine industry and is viewed positively. Ministry officials are respected, charismatic representatives of the government. The USDA team noted the excellent communication channel between the MOA authorities and other government officials, especially with quarantine and customs officers at ports of entry. Saudi Arabia's participation and cooperation with neighboring countries through the GCC provides a regional strategy to prevent and control spread of AHS and other equine diseases. APHIS believes these characteristics indicate the MOA is an effective central veterinary authority.

APHIS believes that MOA's strategy of providing veterinary services, especially in the Jazan area, encourages horse owners to call and report any suspicious signs or symptoms of illness to Ministry officials. This is a characteristic of a strong passive surveillance system.

APHIS noted, however, that continuing education and training opportunities for MOA veterinarians, laboratory technicians and others involved in animal health activities were inconsistently available. APHIS believes these opportunities are necessary so that competencies and state-of-the-art knowledge can be maintained and should be more widely available to all professional personnel within the Ministry.

4.3. Disease history and vaccination practices

Disease history [3-6, 10, 21]

A pandemic of AHS occurred in the Middle East region in the early 1960's, affecting Turkey, Iran, Iraq, Syria, Lebanon and Jordan resulting in the death of more than 300,000 horses. Very little information is available regarding AHS on the Arabian Peninsula, although Saudi Arabia recorded an outbreak in 1959 and again in 1989. Historically, AHS has not been endemic in Saudi Arabia. The outbreak in 1989, the last AHS outbreak in the country, occurred in the city of Abha located in the Asir province in the southwestern corner of Saudi Arabia near the border with Yemen and the Red Sea. The three cases reported in 1989 are believed to have been infected horses legally imported from Yemen.

Surveillance conducted after the 1989 outbreak detected low-level AHS titers in some donkeys in the Asir area in southwest Saudi Arabia. According to Saudi veterinary authorities around the time of the last outbreak, donkeys often moved into the country from neighboring Yemen where AHS outbreaks had occurred. Equid owners in Yemen had been using an AHS vaccine

smuggled from Egypt; however, there were problems with the vaccine. This practice is the likely reason for low-level AHS titers being detected; however, titers never increased and have been declining since and no other cases of AHS occurred. Clinical signs of AHS have not been reported since the 1989 outbreak.

In response to the outbreak, Saudi Arabia implemented a ban on the import of equids from Yemen and enhanced border patrols to curtail illegal smuggling. Furthermore, movement of equids from the southern region to other parts of the country has also been prohibited. These movement controls continue to be maintained.

Culicoides imicola, the main vector of AHSV is present throughout Saudi Arabia and surrounding countries, especially Yemen. Theoretically, AHS-infected vectors could be blown by the wind into southwest Saudi Arabia from the Horn of Africa. Although windborne incursions are not known to have occurred, as a precaution Saudi Arabia established the AHS Control Zone in the southwest region of the country as a buffer zone. This region of Saudi Arabia is the main habitat of *C. imicola*, and is located far from the main concentration of horses in Taif and Riyadh, at distances of over 300 and 600 miles, respectively.

Vaccination

Horses in Saudi Arabia were intensively vaccinated for AHS during the period immediately following the outbreak in 1989. The vaccination program ceased in December 1992, and since that time AHS vaccination has been prohibited in Saudi Arabia.

Discussion

The occurrence of AHS in Saudi Arabia has been a rare event even though the vector for its transmission is present. Historical incursions have been associated with the movement of infected horses although theoretically AHSV-infected vectors can be windblown into the country from endemic areas of Africa.

Because vaccination has been illegal for over eleven years, Saudi Arabia now has a large number of AHS susceptible equids. These animals functionally serve as sentinels for the disease. Because AHS is a clinically severe disease with readily apparent symptoms and high mortality, because asymptomatic chronic carrier animals are not known to occur, and because the disease has no known wildlife reservoir, APHIS believes that if the disease were present in the country, it would be quickly observed and reported by MOA veterinary authorities. APHIS believes the absence of observed disease for nearly a quarter century in a now mostly susceptible equine population is clear evidence that AHS is not currently present in Saudi Arabia.

4.4. Livestock demographics and traceability

Horse demographics [3-6, 20]

The horse population of Saudi Arabia is estimated to be 16,500 by the MOH. The Arabian and Thoroughbred breeds predominate. Most of Saudi Arabia is arid, so its horse population is concentrated in several small areas, such as near the cities of Taif and Riyadh. Major equestrian events and races also occur in these areas.

During the 2011 visit, the USDA team toured the private stables of King Abdullah. The farm manager, who is also the farm's head veterinarian, conducted the tour of the equine hospital and both the Arabian horse and Thoroughbred stable facility. In total the farm stables over 2,100 horses. One attribute of such a large facility is that the veterinary staff can easily detect signs and symptoms of illnesses or problems by observing the trends in the farm's horse population.

The USDA team also visited Khalidia farm owned by Prince Khalid bin Sultan. There is a veterinary hospital on the farm with a complete surgical facility and is fully equipped for diagnostic imaging. The hospital employs 4 full-time veterinarians. The veterinary hospital offers equine surgical and diagnostic services to the general public. The primary surgical cases seen at the hospital are colic, orthopedic problems, tumor removal and reproductive anomalies. The hospital also operates a complete equine breeding program. Artificial insemination is primarily used for breeding mares on the farm. The hospital is equipped for semen collection, processing, and freezing and storage of semen. Semen from Khalidia stallions is shipped all over the world.

The USDA team visited several areas in the AHS Control Zone in southwest part of the country. In the Jazan area, which borders Yemen and the Red Sea, the main animals reared are sheep, goats, cattle, and camels. The horse population is relatively small with around 350 horses located in the city of Jizan. Horse owners in Jizan typically own only one or two horses. All horses are registered and individually identified with implanted microchips. Most horses in this region are kept for pleasure rather than for competition (horses in this region are prohibited from travelling out of the southwest AHS control zone and therefore cannot compete in major equestrian events).

The team visited two military equestrian clubs in Abha, the city where the last AHS outbreak had occurred. These two clubs are located on army and air force bases. Because of the AHS control zone restrictions, horses from these clubs are unable to participate in equestrian and racing competition elsewhere in Saudi Arabia. Equestrian competitions within the AHS control zone are limited. Club representatives cited the negative impact of these restrictions as causing a decline in interest of equestrian sports in the region. Historically both clubs had produced many well-known and highly respected championship horses and riders before the AHS movement controls had been imposed.

Horse identification and registration

All horses in Saudi Arabia must be registered. Royal Decree No. 429 of 27-9-1417 H sets out the rules regarding registration of horses and specifies the breed organizations which registries are recognized. These organizations are internationally recognized, allowing Saudi horses to compete internationally and be recognized for breeding purposes.

Purebred Arabians are registered with the King Abdul Aziz Centre for Arabian horses, which is recognized by the World Arab Horse Organization. Racing Thoroughbreds and Arabians are registered with the Saudi Equestrian Club which is recognized by both the International Horse Race Federation (Thoroughbreds) and the International Arab Horse Racing Authority. Show jumpers, eventers and endurance horses are registered with the Saudi Federation for Equestrian Sports which is affiliated with the Fédération Equestre Internationale (FEI). The Ministry of Municipal and Rural Affairs is the authority to register leisure horses that are not eligible for registration with these other entities. Donkeys are not registered.

Thoroughbreds are identified by passports and Arabian horses are identified through passports and pedigree certificates. All exported horses must be identified through implanted microchips and must have resided at least 90 days in Saudi Arabia prior to export. In addition, all horses in the Jazan province which is located in the AHS Control Zone also have microchip identification.

Discussion

The equine industry in Saudi Arabia is a reliable partner in the control of horse diseases. The high quality and value of the horses in the country provides great incentive for horse owners to seek high standards of animal husbandry and health care for their animals and to avoid risking non-compliance with MOA regulations regarding disease control and prevention. In all the farms visited, the general ethic exhibited was the pursuit of excellence.

APHIS considers the equine identification and mandatory registration system to be strengths in assuring the integrity of Saudi Arabia's internal regionalization for AHS. The use of implanted microchip technology enhances their animal identification system.

4.5. Epidemiological separation from potential sources of infection

Disease status of adjacent regions [1, 6]

Of the countries bordering Saudi Arabia, APHIS considers only Oman and Yemen to be AHS-affected. AHS is endemic in central and southern Africa and periodically spreads to northern Africa and countries around the Mediterranean. Outbreaks have been reported elsewhere including an outbreak in Yemen in 1997. Although little is known about Yemen's animal health status, Saudi officials claim that AHS vaccination is commonly administered in Yemen. If so, then it would be reasonable to conclude that a perceived risk of AHS exists there. The close proximity Yemen to the Horn of Africa gives rise to speculation that AHSV could spread to Yemen if infected vectors are wind-blown from the African continent.

Saudi Arabia is a member of the Cooperation Council for the Arab States of the Gulf (GCC). Members of the GCC cooperate to standardize animal health regulations for international movement of animals, including horses.

Natural and manmade barriers [3-6, 20]

Saudi Arabia is separated from Africa by the Red Sea, with its southwestern corner lying approximately 160 miles from Eritrea. The southwestern coastal region of Saudi Arabia is separated from the remainder of the country by a mountain range. In the south, the Rub al Khali or “Empty Quarter,” a vast uninhabited desert, separates Saudi Arabia from Yemen and Oman.

Saudi Arabia operates 25 border entry posts for importation, including 4 airports, 7 seaports and 14 land border crossing posts. Of these, horses are primarily imported through the King Khalid International Airport in Riyadh and through land border crossings with Arabian Gulf countries in the east. Horses are not permitted entry through seaports.

Importation of equids from Yemen is prohibited. This ban is enforced at the four official land border crossing posts with Yemen. These land border crossings are all located within the AHS Control Zone. The “Empty Quarter” region of Saudi Arabia is adjacent to the remainder of the border with Yemen and the border with Oman, and there are no land border crossings in this region. This uninhabited desert lacks roadways and usable trails. Due to lack of water and high temperatures, attempts to cross this region pose a life threatening risk to people and livestock.

Illegal movements of people and goods, including horses, may occur on remote mountain paths along the southwest border with Yemen; such movements would be extremely difficult due to the mountainous terrain. To deter smuggling, this region is patrolled by Saudi Arabia’s Al Mujahedeen (border guards). Furthermore, illegal entry into this area accesses only the AHS Control Zone.

Movement of equids from the AHS Control Zone (protection and surveillance zones) into the remainder of Saudi Arabia is prohibited, as is movement from the protection zone into the surveillance zone.

Staffed movement control posts along the highways in the southwestern AHS control zone no longer exist. Road signage is placed along the highways informing the public of the prohibition of moving horses north from the protection zone into the surveillance zone and from the surveillance zone to the rest of Saudi Arabia. Highway law enforcement patrols and police stationed at truck weigh stations serve to remind and enforce movement restrictions. There is a strong police presence along the highways to deter smuggling of goods from Yemen. The MOA officials stated that compliance with the movement restrictions is very high. The USDA team was unable to verify these claims although it noticed there appeared to be a high level of awareness of the movement restrictions.

Import practices and trading partners [3-6]

An import permit is required for entry of horses into Saudi Arabia. Import permits are only issued by MOA officials at the international equine quarantine station in Janadria. Copies are sent to the port of entry and to the country of origin. Horses may only be imported from countries that are free of AHS in accordance with the AHS country status reported through OIE and must also be eligible for import into the European Union. Horses move into and out of Saudi Arabia primarily for racing, sporting events, and breeding purposes. Data summarizing equine imports, exports and transits are provided in Tables 2-4.

Table 2: Volume of Saudi Arabia Horse Trade, 1999-2011

YEAR	IMPORTS	EXPORTS
1999	155	83
2000	408	124
2001	479	123
2002	370	162
2003	329	157
2004	387	323
2005	683	264
2006	820	339
2007	788	286
2008	663	478
2009	1190	825
2010	1102	561
2011	363	330

Source: MOA [5]

Table 3: Origin and Destination of Horses Traded with Saudi Arabia, 1999 to 2011

COUNTRY	IMPORTS	EXPORTS
MIDDLE EAST and AFRICA		
Bahrain	453	524
Egypt	662	218
Iraq	0	4
Jordan	163	361
Kuwait	511	420
Lebanon	4	34
Morocco	7	45
Oman	19	2
Qatar	949	939
Syria	561	315
UAE	1319	919
Yemen	0	39
EUROPE		
Albania	0	2
Austria	0	4
Belgium	418	123
Bulgaria	6	0
France	278	34
Germany	475	16
Ireland	32	0
Italy	17	11
Kazakhstan	0	2
Netherlands	137	3
Poland	0	18
Russia	0	2
Spain	14	3
Sweden	9	0
UK	1203	28
AMERICAS		
Argentina	28	2
Brazil	1	0
Chile	6	0
Uruguay	6	0
USA	710	8
Venezuela	0	2
ASIA and OCEANIA		
Australia	4	1
China	0	2
India	0	2
Malaysia	0	1

Source: MOA [5]

Table 4: Total of Horses Transiting Saudi Arabia, 2006 to 2011

HORSES TRANSITING SAUDI ARABIA	
2006	820
2007	788
2008	663
2009	1190
2010	1102
2011	363

Source: MOA [5]

Currently equids may be imported from Arab countries that are not affected by AHS or other equine diseases of concern. No equids are imported from Yemen. At the time of the USDA visit in October 2011, Saudi Arabia prohibited equine imports from Bahrain and Egypt due to other equine diseases or restrictions placed on imports by the EU.

Requirements for entry [3-6]

An import permit, issued by the MOA, is required for horses to enter Saudi Arabia. Importation is allowed only for registered horses⁷ originating from countries that are approved by the MOA and are considered to be AHS-free in accordance with OIE definitions. The permit may be either for permanent or temporary entry. Temporary entry permits are for horses entering the country to participate in equestrian competitions and may only stay in Saudi Arabia for 30 days or less and stabled in facilities approved by the MOA. The importer must notify the MOA no less than seven days prior to entry. Negative test results to AHS, glanders, dourine, equine infectious anemia (EIA) and equine viral arteritis (EVA) are necessary to obtain the permit.

An official veterinary health certificate must be obtained from the competent veterinary authority of the country of origin. This certificate must indicate the country of origin, describe distinguishing marks or otherwise identify the animal, and certify that the animal has been examined prior to shipment and found free of epizootic and contagious diseases. The certificate must be signed and stamped with an official seal.

A copy of the import permit, test results, original health certificate and an equine passport issued by the competent veterinary authority of the country of origin must accompany horses being imported.

AHS-vaccinated horses can enter Saudi Arabia but their health certificate must show a record of vaccination indicating that vaccination had not been given within the previous 12 months and the results of paired serology samples, collected 21-30 days apart, show steady or declining AHS titers. These tests must be performed prior to import into Saudi Arabia.

⁷ Horses must be registered with equivalent entities as required in Saudi Arabia (*see* Section 4.4.).

Imported horses are quarantined on the farm for at least 21 days; the owner must comply with providing access to the imported animals by animal health officials.

Transit of horses is allowed under permit. Transit requirements include the horse passport, and documentation of status for AHS, glanders, dourine, EIA and EVA. All movement is carried out under seal and custom officials will only allow direct movement. Historically transit shipments primarily move between Qatar to Bahrain and UAE to Kuwait (although transit from Bahrain is currently prohibited due to an outbreak of glanders).

Inspection practices and procedures [4-6, 20]

Importation of horses is allowed only through certain road border posts and certain airports as specified on the import permit (importation through seaports is not permitted). These border inspection posts operate under the authority of the MOA and cover both animal and plant health inspections. The Ministry of Finance operates a customs office located at these facilities. Agriculture inspectors work closely with the customs officials in processing the import and export of animals, plants and their products.

All permitted border entry posts, both land crossings and airports, have animal health inspectors (veterinarians) who conduct document and physical inspections. These animal health inspectors are primarily involved with the import of horses.

All documents are checked to make sure that the import permit, health certificate, certificate of origin, and the bill of lading are correct and in order. The import permit is valid for 10 days only and must show all required test results. Animals will then be visually checked by veterinary inspectors and their identity is confirmed with the accompanying documents (equine passport). If there are no problems, then the veterinary inspectors sign a release form and submit it to customs officials. Customs officials primarily check financial forms and documents. The customs officials release the animal shipment to the owners or agents. All paperwork is kept at the border entry post office. Weekly, monthly and yearly summary reports are sent to the Ministry.

After clearing customs, horses are released to the care of the owners or agents. Imported horses are isolated for 21 days by the owner or agent and are examined by official veterinarians prior to release from isolation.

The USDA team visited three animal and plant quarantine facilities (border inspection posts). The team visited facilities at the King Khalid International Airport, near Riyadh; the King Abdul Aziz International Airport in Jeddah; and the land crossing on the King Fahd Causeway at the border with Bahrain, near Dammam. The inspection practices and procedures were essentially the same at each of these inspection posts.

Horses arrive at the Riyadh airport throughout the day, so inspectors are always present or on call. The veterinary inspectors review all documents accompanying shipments of horses to ensure compliance with all necessary regulations. If needed, blood samples are drawn by the veterinary inspectors and sent to the animal disease diagnostic laboratory in Riyadh for

processing. This is usually done to test for parasitic diseases since testing for equine diseases of concern is conducted in the exporting country prior to shipment. Once the inspections are completed then the quarantine official issues a customs release form to customs to release the horses. Original health certificates are kept at the airport quarantine office and all original documents are permanently archived. Manure and bedding from the transport boxes are incinerated on site.

The Animal and Plant Quarantine Office at the King Abdul Aziz International Airport in Jeddah employs 4 veterinarians and 4 agricultural officers. The office operates constantly 24 hours a day, seven days a week. There are three 8-hour shifts each day. Ninety percent of shipments transiting this airport are plants and plant products. Animal and animal products consist mainly of hatching eggs, day-old chicks, animal feeds and bees, with an occasional horse, dogs or cats. In 2010, records indicate that 113 horses were imported through the station. There were no horses exported through the Jeddah airport.

The MOA operates a border inspection post on King Fahd's Causeway which connects Saudi Arabia with Bahrain. The causeway is the only land access point into Bahrain. The post has responsibility for both animal and plant shipments. About 60-70% of shipments passing through the post are plant products. The remainder is comprised of animals, animal products, and birds, of which approximately 70% are live animals. The post is staffed by 11 employees, 4 veterinarians, 2 veterinary assistants, and 5 agricultural specialists inspecting plant products. The post is open 7 days a week from 6:00 am to 2:00 am.

MOA officials at the King Fahd's Causeway inspection post maintain hardcopies of horse health certificates which are retained onsite for 2-3 years before being sent to a storage archive. The original copy of the health certificate accompanies the horse. The post also maintains a computerized database with information on all shipments that moved through. The system allows for pulling records by day for all shipments. Monthly and yearly reports are sent to the Regional ministry office in Dammam.

Over the past 2-3 years, the veterinary inspectors stated that they had not encountered any sick animals attempting to enter from Bahrain. The problems most often encountered were due to missing documents or expired permits. During this time period no horse shipments had been rejected. If documents were missing or not correct, the veterinary inspectors would request the correct documents be provided. Sometimes, this required that horses stay in the customs area for 2-3 days. Regarding the procedure if an equine import permit is expired, the veterinary inspector indicated that the central authorities at the MOA, Animal Quarantine Department would be contacted. In most cases MOA officials would collect blood samples from the horses which would be kept in isolation on the destination farm for a prescribed period of time.

For the eighteen month period prior to the USDA visit, the MOA had prohibited horses from Bahrain to enter or transit Saudi Arabia because of an outbreak of glanders in that country. Re-entry of horses that travelled to Bahrain from Saudi Arabia was also prohibited. The animal movement ban from Bahrain included all animals except sporting birds, live fish and pets (dogs and cats). Therefore the USDA team did not have the opportunity to observe horse inspection procedures at the border crossing. Prior to the prohibition, approximately 1,307 horses annually

moved through the post. Horses moved primarily in order to compete in sporting and racing events.

At this inspection post, there is a diplomatic lane on the causeway reserved for use by Royal families and high government officials. There had been an incident in the previous year when MOA officials intercepted an illegal movement of eight horses from Bahrain. Apparently those horses moved through the diplomatic lane where vehicles are not stopped for inspection. However upon discovering the illegal entry of these horses, MOA officials seized and isolated them at an equine quarantine station at Janadria. This action illustrates the commitment by MOA to enforce its movement controls on horses.

Requirements for export [4-6, 18, 20]

All horses are exported from Saudi Arabia in accordance with the requirements of the importing countries. For example, the European Union (EU) requires that horses be quarantined in a vector-controlled facility for the 40 days prior to export and test negative for AHS on blood samples collected on days 21 and 30 during the quarantine period. Blood samples for AHS testing are sent to the OIE reference laboratory in the United Arab Emirates (UAE). Other countries require a 42 or 60 day quarantine period. Often exported horses are required to be vaccinated against equine influenza.

Because the United States currently considers Saudi Arabia to be affected with AHS, equines imported from there must undergo 60-day quarantine on arrival in the U.S.⁸ Horses will be tested by USDA on arrival for dourine, glanders, equine piroplasmiasis, and equine infectious anemia (EIA). No testing is required prior to the export of horses from another country to the U.S. Horses that test positive by USDA for any of these diseases upon arrival will be refused entry. The U.S. also considers Saudi Arabia to be affected with screwworm for which 7-day post-arrival quarantine would otherwise also be required. As it currently is, horses imported from Saudi Arabia would be monitored and treated for screwworm during the AHS quarantine.

MOA officials supervise and conduct the necessary inspection, certification, quarantine and testing of horses to be exported from Saudi Arabia. Most countries require a health certification which is issued by an official veterinarian of the MOA. The health certificate provides MOA's assurance of the identification of the horse, compliance with requirements for testing, vaccination and/or treatment, and supervision of pre-export quarantine.

The MOA established an international equine quarantine station in 1999. The facility is located in Janadria and is near both the Riyadh international airport and an equestrian club racetrack and exhibition center. The quarantine facility was built and operates to comply with EU import requirements but stables horses awaiting export to other countries around the world, especially to neighboring countries of the Cooperation Council for the Arab States of the Gulf (G.C.C.). The facility consists of two barns, with a total of 20 stalls, and support structures and is completely fenced. Security is provided by guards from the Ministry and the National Guard on a 24 hour

⁸ The United States currently considers Oman, Saudi Arabia, the Yemen Arab Republic, and all countries in Africa except Morocco to be affected with AHS.

basis. Patrols are conducted every 2 hours by the guards. There is a small simple lab for preparing serum for submission to diagnostic laboratories. Facility waste is incinerated by municipal authorities. Horse owners or their representatives (trainers, grooms, or veterinarians) are allowed access to care for their animals during normal business hours but must be checked into and out of the facility by security personnel.

An equestrian club racetrack and exhibition center is located approximately two kilometers away from the international equine quarantine station. Within the equestrian club complex there is a quarantine facility for visiting horses. This quarantine facility consists of ten separate stables each with six stalls. At the time of the USDA visit this facility was not being used for export quarantine as EU approval of the facility was pending. Saudi Arabia will quadruple its equine export quarantine capacity once the facility is operational.

The export process begins when the MOA receives notification from a horse owner or agent of their intention to export a horse. The owner or agent also contacts the importing country to obtain an import permit from that country. In accordance with Saudi Arabian law, only registered horses are permitted to be exported. Therefore, MOA officials contact the appropriate equine registry association to request a letter verifying the registration of the horse to be exported. This letter will be included in the documentation which later accompanies the horse during the customs clearance process.

The horse is quarantined at the Janadria equine quarantine station for a period of time in accordance with the importing country's requirements. While at the quarantine station, an official veterinarian of the MOA examines and issues the export health certificate. Upon completion of the required quarantine period, the horse is transported under official seal to the border inspection post (at land crossing or at the airport) accompanied with the required documentation. There the horses are examined, identity verified, and documents are checked before custom officials release the horses for export.

Discussion

Saudi Arabia borders Oman and Yemen, and APHIS considers both countries to be AHS-affected. While the desert likely provides an effective natural barrier to AHSV spreading from Oman and eastern Yemen, the southwestern region of Saudi Arabia is at risk of AHSV introduction from western Yemen from illegal entry of subclinically-infected donkeys or from viral spread via infected insect vectors from Yemen or even potentially wind-blown from AHS-endemic areas in central and southern Africa. Such introduction if it were to happen would likely occur in the AHS Control Zone in southwest part of the country.

Introduction of AHS through legally imported equids is unlikely to occur since Saudi Arabia limits imports from countries that are AHS-free and requires post-entry isolation of imported animals.

The presence of a naïve susceptible equine population serving as sentinel animals in Saudi Arabia's AHS Control Zone enhances the likelihood of early detection of AHS if reintroduction of the virus occurs. By prohibiting movement of horses from Yemen into Saudi Arabia and from

the Control Zone to the remainder of the country, Saudi Arabia has substantially mitigated the risk of spreading AHS from the Control Zone into the remainder of the country.

APHIS observed a high degree of awareness among horse owners of equine movement restrictions imposed in the AHS Control Zone. Such awareness likely supports compliance with the movement restrictions; however, APHIS noted that MOA lacked a system to measure and verify compliance since MOA relies on the police and highway patrols to enforce movement restrictions. APHIS believes that compliance data could allow the MOA to monitor the situation more closely and to alert it to the need to implement changes in enforcement and education strategies.

The equine export quarantine infrastructure and procedures provide for isolation and testing of horses prior to export under the direct control and supervision of competent officials of the MOA.

4.6. Surveillance practices

Active surveillance [3-6]

Following the AHS outbreak in 1989 in which 3 cases were detected, the MOA implemented a vaccination program which continued through December 1992. Upon cessation of the vaccination program, Al Afaleg et al conducted a study (November 1992 – March 1995) to assess whether the AHSv remained in Saudi Arabia [21]. This study monitored a group of over 100 horses, including 12 sero-negative horses serving as sentinel animals. These horses were stabled in close proximity to where the 3 cases occurred in 1989. Neither evidence of seroconversion nor of virus presence was seen in the sentinel herd nor were cases of AHS reported anyway in Saudi Arabia during the study period. The study concluded that AHSv was not endemic in Saudi Arabia.

The MOA conducted several AHS surveillance surveys in subsequent years (1997, 1999, 2001-2002, 2005, 2008 and 2009). The 1997 survey was conducted in accordance with recommendations of the European Union and tested samples for multiple equine diseases (AHS, Glanders, Dourine, and equine infectious anemia). A total of 750 animals (460 donkeys and 290 horses), out of an approximate population of 13,000, were sampled giving 99% confidence of detecting infection at 1% prevalence. Donkeys were targeted for increased sampling since that species would have an increased likelihood of subclinical infection and their population was higher in the southwest AHS control zone. The results indicated that no active AHS infection was present in the sampled animals. Several animals had positive titers, so they were retested in a month without finding any increase in titers. These findings suggest that positive titers were most likely due to persistence of vaccine antibodies.

Subsequent surveys produced similar results and demonstrated lack of active AHS infection in the sample population. A smaller survey was conducted in 1999 that focused less on donkeys and the southwest AHS control zone. The 2001-2002 survey targeted both animals in the control zone and competition horses primarily stabled in the Riyadh area. This study, like the others,

found no evidence of viral activity; however, there was indication that some limited illegal vaccination had occurred within the AHS Control Zone. A follow-up study in 2005 again found no evidence of viral activity and also showed no evidence of illegal vaccination. The 2008 and 2009 surveys focused on animals in the AHS Control Zone and reported similar findings as the 2005 study.

Another important stream of active surveillance derives from the pre-export testing of horses leaving Saudi Arabia. All horses exported to other countries in Europe and other regions of the world are tested for AHS with negative results, as well as horses that are permanently exported to neighboring Middle East countries. To date, all test results have been negative for AHS.

Passive surveillance [3-6, 20]

Notification of AHS suspicion is compulsory in Saudi Arabia. Passive surveillance is enhanced by MOA veterinarians frequently visiting stables and maintaining close contact with horse owners. However, this practice was more evident in some areas of the country, such as Jizan, than others.

Discussion

Clinical signs of AHS have not been reported anywhere in Saudi Arabia since 1989. Repeated serological surveys have not detected AHSv activity in a naïve susceptible population. These findings support the claim that AHS is not endemic in Saudi Arabia.

4.7. Diagnostic laboratory capabilities [3-6, 20]

Saudi Arabia does not conduct diagnostic testing for AHS. All samples collected for all AHS diagnostics, surveillance and export purposes are sent to OIE reference laboratories usually in Dubai or the United Kingdom.

There are 22 veterinary diagnostic laboratories distributed throughout the country. These laboratories report their activities monthly to the Laboratory Section at MOA headquarters. The regional laboratories are mainly involved in diagnosis of bacterial and parasitic diseases of livestock and rarely receive samples from equids.

The USDA team visited the Regional Animal Health Diagnostic Laboratory in Jizan. This laboratory consists of two separate buildings housing three diagnostic sections, bacteriology, virology, and entomology. The bacteriology laboratory has the capacity to process 30-40 samples per day. Testing includes bacterial identification (animal and plant), blood parasite identification, Brucella, Pasteurella, enterotoxemia, Escherichia coli, Trypanosoma, mange, and internal parasites. The virology laboratory is capable of testing for Rift Valley fever, foot and mouth disease, and PPR. The entomology laboratory conducts mosquito studies as surveillance for Rift Valley fever. Traps are strategically placed within the Jazan area and mosquitoes are collected and tested by PCR. These traps also collect *Culicoides* species although no tests for AHSv are currently conducted on them. The laboratory personnel confirmed that the laboratory has the

necessary PCR equipment and potentially could conduct AHS vector studies since insects are being collected.

The laboratory director in Jizan mentioned that he had attended training courses twice during the previous 2-3 years. However, there was no structured training program for other laboratory technicians.

The USDA team also visited the regional animal health diagnostic laboratory in Jeddah which serves as the main laboratory in the western region. The laboratory has virology, bacteriology, histopathology, entomology/parasitology, poultry and toxicology sections. The MOA provides annual funding for the laboratory based on a budget request prepared by the laboratory director. In cases of financial shortfall or unexpected expenses, the director may submit a supplemental funding request for approval. The laboratory is staffed by six PhD specialists and six laboratory technicians.

Equine samples are rarely submitted to the laboratory for virology testing, even for diagnostic support for sick horses. In fact, the specialist mentioned that he has been working in the laboratory for 10 years and has never had a sample submitted for AHS diagnostic testing. The laboratory primarily runs ELISA tests for FMD and PPR, but the team was informed that virus isolation (VI) for FMD and PPR is sometimes conducted on submitted samples.

The bacteriology laboratory consisted of a hood, incubator, staining station, ELISA readers, and a refrigerator. Most bacteriology testing is conducted for brucellosis, hemorrhagic septicemia, mastitis and enterotoxemia. On average, the laboratory processes 200 samples per month.

The laboratory specialist reported that the histopathology laboratory handles about 110 samples per year. However in reviewing the records, the USDA team could only confirm that 55 samples were analyzed in 2010 and 32 samples in 2011 as of the date of the visit (October 2011).

The poultry laboratory conducts PCR testing for highly pathogenic avian influenza (HPAI). While Saudi Arabia is considered free of H5N1 virus, H5N2 strains and Newcastle disease (ND) virus are present. Random poultry farm checks are conducted every 3 months. ELISA is used to test for other poultry diseases.

The toxicology laboratory is new and equipment is still being acquired. Unlike the other sections, the toxicology laboratory protocols and procedures were clearly posted on the laboratory doors and a sampling directive was available.

In general, biosecurity controls were lacking at the facility. The laboratory specialist interviewed did not seem to have an understanding of international standards for classification of laboratory biosecurity level. Except as noted above, the laboratory did not have written procedures and protocols or quality control standards. The USDA team observed poor sample identification procedures were used in all sections except for the histopathology laboratory. There was no protocol for handling, storage and destruction of samples.

No evidence was provided regarding proficiency testing and oversight. The specialist stated that every few years the laboratory receives a proficiency test panel from the MOA as a quality control check; however, the USDA team could not verify this process due to lack of documentation.

In the event of emergency situations, the specialist stated that the laboratory would be able to request supplemental from the MOA in order to meet the surge demand. Surge capacity to handle emergencies could not be verified, and a written emergency response plan, outlining the emergency procedures to be implemented, was lacking.

Discussion

Saudi Arabia addresses its need for AHS laboratory diagnostic capacity by sending all samples for processing at OIE reference laboratories in third countries. APHIS accepts the credentials of OIE reference laboratories as evidence of their proficiency in AHS diagnostic testing.

However, if in the future the MOA authorizes AHS diagnostic testing to be conducted at laboratories in Saudi Arabia, APHIS would not have confidence in the test results due to the deficiencies observed by the USDA team during the October 2011 visit. Correction of those deficiencies, subject to verification and evaluation by APHIS, would be necessary before APHIS could consider the results of AHS testing conducted in Saudi Arabia to be valid.

4.8. Emergency preparedness and response

Although the MOA requires mandatory reporting of AHS suspicion, it lacks a written emergency response plan (contingency plan) for an outbreak of AHS [20].

In addition, foreign animal disease training is not conducted routinely in Saudi Arabia. And when it is available, training is only offered to Saudi veterinarians and not offered to foreign veterinarians working for the government. Saudi officials justified this practice by explaining that foreign veterinarians are considered by MOA to be technical experts and therefore do not need periodic training on foreign animal disease response. Some of the foreign veterinarians have worked for the MOA for more than ten years [20].

Discussion

APHIS acknowledges that the MOA has experience from its response to contain and eradicate the 1989 AHS outbreak. That outbreak response included implementation of movement controls to enforce internal regionalization of a protection and surveillance zone in the area of the outbreak and a surveillance program, active and passive, to detect reintroduction of the AHSv into Saudi Arabia. Those programs continue to date. The MOA also implemented an intensive emergency vaccination program in the protection zone which ceased in 1992 once it was apparent that the virus was no longer a threat [3-6].

Given the importance of horses to the culture and history of Saudi Arabia, MOA officials believe that funding would be available in the event of any reintroduction of AHS into the country [20].

Recently, MOA responded to other animal disease outbreaks, such as Rift Valley Fever (2000-2001, 2004 and 2010) and highly pathogenic avian influenza (2007). The MOA successfully brought these outbreaks under control [10, 22, 23].

MOA's response to these events gives APHIS confidence in MOA's abilities to handle animal health emergencies. However, APHIS believes that Saudi Arabia would benefit by having a written AHS emergency response plan, along with periodic training and scenario exercises to simulate its implementation, which would enhance Saudi Arabia's ability to quickly respond in the event of reintroduction of AHS. A quick response to detect, contain, and eradicate any AHS reintroduction would minimize disruption of trade.

4.9. Release assessment conclusions

APHIS concludes that the AHSv is not known to exist in Saudi Arabia. Clinical signs of AHS have not been reported anywhere in Saudi Arabia since 1989. Repeated serological surveys have not detected AHSv activity in a naïve susceptible population. These findings support the conclusion that AHS is not endemic in Saudi Arabia.

However, the proximity to AHSv activity in neighboring countries is a risk factor associated with importing equids from Saudi Arabia into the United States. APHIS considered this risk factor in the context of the potential for counterbalancing circumstances or applying appropriate risk mitigations to further reduce the risk of introducing and establishing AHS in the United States.

Risk Factor – Proximity to AHS viral activity in neighboring countries

APHIS acknowledges the potential for reintroduction of AHSv into Saudi Arabia. The occurrence of AHS in Saudi Arabia has been a rare event even though the vector for its transmission is present. Historical incursions have been associated with the movement of infected horses although theoretically AHSv-infected vectors can be windblown into the country from endemic areas of Africa.

However, the existence of common land borders with AHS-affected regions in the south presents a risk for reintroduction. Saudi Arabia borders Oman and Yemen, and APHIS considers both countries to be AHS-affected. While the desert likely provides an effective natural barrier to AHSv spreading from Oman and eastern Yemen, the southwestern region of Saudi Arabia is at risk of AHSv introduction from western Yemen from illegal entry of subclinically-infected donkeys or from viral spread via infected insect vectors from Yemen or even potentially wind-blown from AHS-endemic areas in central and southern Africa. Such introduction if it were to happen would likely occur in the southwest part of the country.

This factor is substantially mitigated because Saudi Arabia prohibits the importation of equine from countries it considers to be AHS-affected and requires post-entry isolation of imported animals. Furthermore, Saudi Arabia has established an AHS Control Zone in the southwest part

of the country which serves as a buffer zone to separate the area where reintroduction of AHS would most likely occur.

Because vaccination has been illegal for over eleven years, Saudi Arabia now has a large number of AHS susceptible equids. These animals functionally serve as sentinels for the disease. APHIS believes the number of unvaccinated equids is sufficiently high that AHS would be observed if it were present.

The presence of a naïve susceptible equine population serving as sentinel animals in Saudi Arabia's AHS Control Zone enhances the likelihood of early detection of AHS if reintroduction of the virus occurs. By prohibiting movement of horses from Yemen into Saudi Arabia and from the Control Zone to the remainder of the country, Saudi Arabia has substantially mitigated the risk of spreading AHS from the Control Zone into the remainder of the country.

Conclusions of Release Assessment

APHIS concludes that the AHSv is not known to exist in Saudi Arabia and that the risk of exporting AHS-infected equids from Saudi Arabia, excluding the AHS Control Zone, would be very low.

Section 5: Exposure Assessment

An exposure assessment as defined by the OIE describes the biological pathway(s) necessary for exposure of animals and humans in an importing country to the hazards released from a given risk source, and estimates the likelihood of the exposure(s) occurring [7]. APHIS' regulatory authority is limited to animal health, so potential risks to animals are the primary focus of this evaluation.

APHIS considers that the most likely pathway of exposure of domestic equids to AHSV would be vector transmission of the virus from imported infected equids. AHS is not considered to be contagious by contact [11]. APHIS considers it unlikely for an insect vector harboring viable AHSV to move into the United States, either with an imported animal or windblown from an AHS affected region.

5.1. Imported Infected Equids

The likelihood of exposure of equids (all are assumed to be susceptible as AHS vaccination is not available in the United States) is dependent on several factors. If an AHS-infected equid was imported into the country and the infection was not detected prior to release from import quarantine,⁹ then a competent insect vector would be necessary in order to transmit the AHSV from the imported infected equid to the susceptible equid.

The likelihood that an AHS-infected equid is imported and the infection is undetected during import quarantine is dependent on the species of equid, the date of onset of infection relative to the date of import, and duration of quarantine. Incubation period is usually 7–14 days, but may be as short as 2 days. However, the OIE Terrestrial Code considers the infective period for AHSV to be 40 days for domestic horses [24]. The mildest form, horse sickness fever, tends to be seen in horses with partial immunity, mules and donkeys. This form can also occur in zebras, although most cases in this species are asymptomatic [11, 12, 14]. The more severe clinical presentations are seen in horses without immunity and illness would be readily apparent. Mortality rate in horses is 70-95%, mules around 50%, and donkeys around 10% [12, 14]. So the period of time that an AHS-infected horse would escape detection would be relatively short before the horse became clinically ill. However, this period of time potentially could be longer for horses with partial immunity, mules, donkeys, and zebras, listed in increasing progression.

Vector transmission of AHSV is dependent on exposure of a competent insect vector to an AHS-infected equid during viremia. Viremia usually lasts 4–8 days in horses but may extend up to 21

⁹ Equids imported into the United States are subject to quarantine conditions as described in 9 CFR 93.308 which describes the duration of quarantine required to address several equine diseases. In addition, during the quarantine equids must undergo tests, inspections, disinfections, and precautionary treatments that may be required by the Administrator to determine their freedom from communicable diseases. APHIS requires a minimum 60-day post-import quarantine for importation of equids from regions considered to be AHS-infected. Testing for AHS during quarantine is not usually conducted. Irrespective of any quarantine period required for AHS, equids imported from Saudi Arabia are subject to seven day quarantine because Saudi Arabia is considered to be affected with screwworm.

days; in zebras, viremia may last up to 40 days [11]. It is important to note that recovered animals do not remain carriers of the virus.

The two primary vectors for AHSV are *Culicoides imicola* and *C. bolitinos*. Other insects are thought to be less involved with transmission of the disease. Mosquitoes can become infected and subsequently transmit the virus. Biting flies, *Stomoxys* and *Tabanus*, may be able to transmit the virus mechanically. *Culicoides* spp. are present in the United States and are involved with the transmission of orbiviruses similar to AHSV, such as bluetongue virus. The North American species *C. variipennis* is an efficient vector of AHSV in the laboratory [11]. Therefore, APHIS assumes that insect vectors capable of transmitting AHSV are present in the United States.

5.2. Conclusion

APHIS considers importation of AHS-infected equids to be a potential pathway for AHS introduction with a high unmitigated risk. However the risk is substantially mitigated by current U.S. regulations requiring a minimum post-import quarantine period of 60 days for all imported equids from regions considered to be AHS-affected (9 CFR 93.308). This period of quarantine exceeds the incubation period of AHS and therefore is considered to be of sufficient duration for detection of AHS infection if present in the imported equid. APHIS does not consider a 60-day post-import quarantine necessary for regions that are free of AHS.

Based on the results of the release assessment, APHIS assessed the likelihood of exposure of susceptible equids in the United States to vector transmission of AHSV from equids originating in and imported from Saudi Arabia, excluding the AHS Control Zone to be very low.

Section 6: Consequence Assessment

This consequence assessment, conducted in accordance with OIE guidelines [7], describes the direct and indirect consequences of introducing AHS into the United States. The magnitude of the biologic and economic consequences following an introduction of AHS would depend on the location and time of the year of the introduction; the rate of virus spread; the ability to detect the disease rapidly; equine demographics and movement patterns; and the ease of control and eradication. Additionally, restrictions imposed by international trading partners may result in economic losses and other hardship to otherwise unaffected segments of the equine industry.

6.1. Effects on animal health and production

AHS is infectious but non-contagious, insect-transmitted, viral disease with extremely high mortality in horses and mules. AHS has never occurred in the United States [10]. AHS has four clinical presentations: the peracute (pulmonary) form, the subacute edematous (cardiac) form, the acute (mixed) form, and horse sickness fever [11, 12]. The pulmonary and mixed forms are the forms more commonly observed in susceptible horses. The pulmonary form is also the most common form in dogs. The mildest form, horse sickness fever, tends to be seen in horses with partial immunity, mules and donkeys. This form can also occur in zebras, although most cases in this species are asymptomatic. Mortality rate in horses is 70-95%, mules around 50%, and donkeys around 10% [11, 12]. The effects on animal production parameters will result in loss of infected and exposed animals.

6.2. Control and eradication costs

Outbreaks of foreign animal diseases in previously free regions have historically been associated with large economic costs, including production and trade losses, as well as the costs of control and eradication. The overall costs of control and eradication will depend on numerous factors, including the magnitude of the outbreak, the control options utilized, the extent of spread and the prevalence of infection prior to detection, the density and types of equids affected, and which control and eradication strategies are ultimately implemented.

The time of introduction is an important determinant whether and how the disease will spread, depending on temperature and vector season. A higher temperature accelerates the epidemic, while a higher horse density increases the extent of the epidemic. Due to the short infectious period in horses, the obvious clinical signs and the presence of non-susceptible hosts, detection of AHS would likely occur shortly after introduction, which allows control measures to be targeted towards elimination of infection sources. Although other than equine imports, there are no active AHS surveillance programs for horses or insect vectors in the United States.

Potential control measures include quarantines and movement restrictions, euthanasia of infected horses with severe clinical signs, vector abatement, emergency vaccination, surveillance and laboratory testing [12].

In Africa, immunization and quarantine of infected equids are used to minimize the spread of AHS during outbreaks. However in the United States AHS vaccines are not commercially available, so a vaccine supply would need to be made available for an emergency response. Attenuated live vaccines are commercially available in several African countries, and newer inactivated or recombinant vaccines are future possibilities [15]. Control of insect vectors through pesticide treatments and elimination of insect-breeding sites may enhance AHS control. Also stabling horses in screened barns from dusk to dawn, when *Culicoides* are most active, is a particularly important outbreak response measure [12].

AHS has never occurred in the United States, so the lack of sufficient data and the complexity of the factors involved in spread, control and eradication make reliable estimation of the potential control and eradication costs difficult or impossible. Results of this qualitative assessment, however, suggest that the costs would be substantial.

6.3. Market Impacts

Potential market impacts of an AHS outbreak include lost revenues due to market disruptions related to alterations in equine breeding, racing, competitions and recreational activities, and export losses as a result of trade restrictions. The extent of market impacts will depend on a number of factors, including outbreak size, location, and season, the industry segments affected, the efficacy of control measures, and the reaction of trading partners.

A 2005 economic study conducted by Deloitte Consulting LLP for the American Horse Council Foundation estimated the U.S. horse population to be 9.2 million, including horses used for racing, competition, breeding, recreation and work [25]. The study concludes that 4.6 million Americans are involved in the horse industry which produces nearly \$39 billion annually in goods and services, contributing a total annual economic impact of \$101.5 on the U.S. economy. The overall value of the horse industry in the United States is in the billions of dollars. The most valuable subgroups of the horse industry are racing, competition and recreation [25].

The U.S. exported 99,095 live horses (all breeds) in 2007, valued at over \$444 million. From January through October 2008 the U.S. exported 128,696 live horses, valued at over \$353 million. In both 2007 and 2008 over 90 percent of exports were sent to Mexico and Canada [26, 27]. The impact that an AHS outbreak would have on the number of horses moving into and out of the U.S. is uncertain, however, the costs to comply with movement restrictions imposed by trading partners would be expected to increase significantly.

In conclusion, the market impacts of an AHS outbreak will vary based on the extent of the outbreak and the reaction of domestic markets and trading partners.

6.4. Effects on public health

Although public health consequences are not issues under APHIS' regulatory authority, the subject is briefly addressed in this assessment. Direct public health consequences are negligible because no human cases of AHS have been reported [12]. The World Health Organization does not consider AHS to be a zoonotic threat to humans [28].

A substantial foreign animal disease outbreak can result in severe psychosocial effects on farmers and farming communities. The impact of foreign animal diseases on mental health is best documented for foot and mouth disease, but would likely be similar following a large outbreak of any foreign animal disease. Effects such as grief over losing animals, feelings of isolation and loss of control, fear of new outbreaks, disruptions in community life, loss of trust in authority, short- and long-term financial stress, and symptoms of depression and post-traumatic stress disorder have been documented [29-32]. Animal health emergency responders may also experience stress reactions and distress as a result of participating in or witnessing the culling of animals or having to deal with distraught owners of the animals [33].

6.5. Effects on the environment

Environmental effects have been considered under all applicable environmental review laws in force in the United States. These are considered in a separate, but related, environmental assessment. The environmental assessment complies with the National Environmental Policy Act (NEPA) and implementing regulations [34].

6.6. Conclusion

The consequences of AHS introduction into the United States would be high.

Section 7: Risk Estimation

Risk estimation consists of integrating the results from the release assessment, exposure assessment, and consequence assessment to produce overall measures of risk associated with the hazards identified at the outset. Thus, risk estimation takes into account the whole risk pathway from hazard identification to the unwanted event [7].

Saudi Arabia has a large population of equids susceptible to AHS. Clinical signs of AHS have not been reported anywhere in Saudi Arabia since 1989 and AHS vaccination has been illegal for over eleven years. Repeated serological surveys have not detected AHSv activity in a naïve susceptible population. These findings support the conclusion that AHS is not endemic in Saudi Arabia.

APHIS acknowledges the potential for reintroduction of AHSv into Saudi Arabia. The occurrence of AHS in Saudi Arabia has been a rare event even though the vector for its transmission is present. Historical incursions have been associated with the movement of infected horses although theoretically, AHSv-infected vectors can be windblown into the country from endemic areas of Africa.

The proximity to AHSv activity in neighboring countries is a risk factor associated with importing equids from Saudi Arabia into the United States. The desert, along much of Saudi Arabia's southern border, likely provides an effective natural barrier separating susceptible equine populations from potential exposure to infected animals or vectors. However, a risk for reintroduction exists in the southwest where susceptible equids inhabit an area that shares a common land borders with an AHS-affected region.

This factor is substantially mitigated because Saudi Arabia prohibits the importation of equine from countries it considers to be AHS-affected, requires post-entry isolation of imported animals, prohibits AHS vaccination, and maintains an AHS Control Zone in the southwest part of the country to serve as a buffer zone.

APHIS concludes that the AHSv is not known to exist in Saudi Arabia and that the risk of exporting AHS-infected equids from Saudi Arabia, excluding the AHS Control Zone, would be very low.

Based on the results of the release assessment, APHIS assessed the likelihood of exposure of susceptible equids in the United States to vector transmission of AHSv from equids originating in and imported from Saudi Arabia, excluding the AHS Control Zone to be very low.

Conversely, APHIS concludes that the biological and economic consequences of an AHS outbreak in the United States could be high. The magnitude of the biologic and economic consequences following an introduction of AHS would depend on the location and time of the year of the introduction; the rate of virus spread; the ability to detect the disease rapidly; equine demographics and movement patterns; and the ease of control and eradication. Additionally,

restrictions imposed by international trading partners may result in economic losses and other hardship to otherwise unaffected segments of the equine industry.

Conclusion

In summary, although the consequences of a AHS outbreak in the United States would be serious, based on the findings of the release and exposure assessments APHIS believes that AHSV is not known to exist in Saudi Arabia and therefore the risk of exporting AHS-infected equids from Saudi Arabia, excluding the AHS Control Zone, leading to exposure of susceptible equids in the United States to AHSV would be very low.

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Appendices

Appendix 1: APHIS Report: African Horse Sickness Review of the Kingdom of Saudi Arabia,
October 2011..... A-2

Appendix 2: European Commission Decision 1999/228/EC..... A-20

Appendix 1:

**APHIS Report:
African Horse Sickness Review
of the
Kingdom of Saudi Arabia
October 2011**



APHIS Report:

African Horse Sickness
Review of the
Kingdom of Saudi Arabia

October 2011

United States Department of Agriculture
Animal and Plant Health Inspection Service
Veterinary Services
National Center for Import and Export
Regionalization Evaluation Services

**APHIS REPORT:
AFRICAN HORSE SICKNESS (AHS) REVIEW OF THE
KINGDOM OF SAUDI ARABIA
OCTOBER 2011**

INTRODUCTION

Animal and Plant Health Inspection Service (APHIS) personnel from the Veterinary Services, National Center for Import and Export, Regionalization Evaluation Services Staff (VS NCIE RES) visited the Kingdom of Saudi Arabia, October 7-16, 2011. The APHIS personnel were accompanied by representatives of United States Department of Agriculture (USDA), Foreign Agricultural Service (FAS) assigned to the United States Embassy in Riyadh, Saudi Arabia. The purpose of the visit was to obtain and verify information necessary to support the evaluation of the African Horse Sickness (AHS) status of Saudi Arabia.

USDA Team Members: Drs. Hatim Gubara and Chip Wells, USDA APHIS NCIE; Dr. Tawhid Al-Saffy, Hussein Mousa and Riyaz Yoosuff, USDA FAS, Agricultural Trade Office, U.S. Embassy, Riyadh, Saudi Arabia.

Ministry of Agriculture, Kingdom of Saudi Arabia, hosts: Drs. Mohamed Alhamad and Khalid Al Yahyan

Schedule:

Thursday, Oct 6	<ul style="list-style-type: none"> Team arrives in Riyadh, Saudi Arabia
Saturday, Oct 8	<ul style="list-style-type: none"> Visit headquarters for Ministry of Agriculture; meet with Dr. Abdul Ghani Al-Fadhl, Director-General of Animal & Plant Quarantine Department; meet with Deputy Minister for Animal Resources; meet with Minister of Agriculture; review site visit itinerary with hosts.
Sunday, Oct 9	<ul style="list-style-type: none"> Visit International Horse Quarantine Center at Janadria; presentations, discussion and tour of facility. Visit King Abdulaziz Racecourse; tour visiting horse center in Janadria. Visit animal and plant quarantine facility at King Khalid International Airport in Riyadh; interview official veterinarian, tour facility and review records. Visit King Abdullah Stables; tour stable and equine hospital and interview head veterinarian/farm manager.
Monday, Oct 10	<ul style="list-style-type: none"> Visit Regional Agriculture District of Jazan; interview regional official veterinarian and review records. Visit Regional Animal Health Diagnostic Laboratory in Jizan; tour facility, interview laboratory technicians and review records. Visit family stable in Jazan; tour stable and interview horse owners. Visit borderline crossing areas of Jazan; observe roadway signage.
Tuesday, Oct 11	<ul style="list-style-type: none"> Visit military equestrian clubs in Aseer; tour stables and equine clinic,

	and interview private veterinarian and stable managers.
Wednesday, Oct 12	<ul style="list-style-type: none"> • Visit animal and plant quarantine inspection station, King Fahad Causeway, on border with Bahrain, near Dammam; interview official veterinary inspectors and review records.
Thursday, Oct 13	<ul style="list-style-type: none"> • Visit Khalidia Farm; tour stable, equine hospital and wildlife park; interview head farm veterinarian. • Visit Nofa Equestrian Resort; tour stable, racetrack, equine hospital, horse quarantine facility; interview head farm veterinarian.
Friday, Oct 14	<ul style="list-style-type: none"> • Rest day
Saturday, Oct 15	<ul style="list-style-type: none"> • Visit Agricultural Affairs Department of Makah Region; meet regional director. • Visit regional animal health diagnostic laboratory; tour facility, interview laboratory technicians, and review records.
Sunday, Oct 16	<ul style="list-style-type: none"> • Visit headquarters for Ministry of Agriculture; meet with Minister of Agriculture; discuss visit impressions with Deputy Minister for Animal Resources; closing meeting with hosts to discuss findings and recommendations.
Monday, Oct 17	<ul style="list-style-type: none"> • Team departs Saudi Arabia

Observations:

Saturday, Oct. 8

The USDA team visited the headquarters of the Ministry of Agriculture and had courtesy meetings with the Minister of Agriculture, the Deputy Minister for Animal Resources, and with Dr. Abdulghani, Chief Veterinary Officer (CVO). All officials expressed support for the mission and high hopes for a positive review by APHIS of the African horse sickness (AHS) status in Saudi Arabia.

Dr. Abdulghani presented a brief overview of Saudi Arabia's AHS quarantine and surveillance program. Saudi Arabia has been working on the AHS issue since the early 1990's following the AHS outbreak that occurred in 1989 close to the border with Yemen. At that time donkeys had been introduced from neighboring Yemen where AHS outbreaks had occurred. Equine owners in Yemen used an AHS vaccine smuggled from Egypt; however, there were problems with the vaccine. The practice resulted in AHS titers being detected in the Aseer area of Saudi Arabia; however, titers never increased and have been declining since.

In the early 1990s, the Ministry invited European Union (EU) veterinary officials to review Saudi Arabia's AHS status in order to develop a plan to facilitate exports to the EU for competition and breeding. Based on the EU review, the quarantine program was established and shipments of horses to the EU began in 1999. A protection area in the south of Saudi Arabia bordering Yemen was established as required by the EU. No equines can move out of the protection area into the remainder of Saudi Arabia. No equines can enter Saudi Arabia from Yemen.

All horses offered for export to the EU must be quarantined for 40 days and blood samples are taken twice during the quarantine period and sent to the reference lab in the UAE. The official quarantine center is located in Janaderia area (near the Riyadh international airport) and the quarantine director, Dr. Alhamad, is the sole official responsible for signing health certifications of exported horses. In addition to the EU, Saudi Arabia exports horses to other countries, especially to neighboring Cooperation Council for the Arab States of the Gulf (G.C.C.) countries. All horses are exported in accordance with the requirements of the importing countries.

Sunday, Oct. 9

The Ministry of Agriculture established an international equine quarantine station in 1999. The facility is located in Janaderia and is near both the Riyadh international airport and racetrack and festival sites. The quarantine facility was built and operates to comply with EU import requirements. The facility consists of two barns, with a total of 20 stalls, and support structures and is completely fenced. Security is provided by guards from the Ministry and the National Guard on a 24 hour basis. Patrols are conducted every 2 hours by the guards. There is a small simple lab for preparing serum for submission to diagnostic laboratories. Facility waste is incinerated by municipal authorities, although an onsite incinerator is planned to be constructed within the next 60 days. Horse owners or their representatives (trainers, grooms, or veterinarians) are allowed access to care for their animals during normal business hours but must be checked into and out of the facility by security personnel.

At the time of the visit, there were 8 horses quarantined that had been introduced illegally from Bahrain. The horses have been there for several months.

For export to the EU, horses are required to be quarantined in a vector-controlled facility for 40 days with negative results for samples collected at 21 and 30 days for AHS testing at United Arab Emirates (UAE) reference lab. For the United States, the requirement is 60 days in KSA prior to export. Vaccination and health records accompany each exported animal. Other countries require a 42 or 60 day quarantine period. Exported horses must be vaccinated against equine influenza. The export certificate is issued by quarantine director at end of quarantine period and horses are moved under seal directly to the airplane.

All horses in Saudi Arabia must be registered. Thoroughbreds are identified by passports and Arabian horses are identified through passports and pedigree certificate. All exported horses must be identified through implanted microchips and must have resided at least 90 days in Saudi Arabia prior to export.

On the import side, an import permit is required for all imported horses. Import permits are issued at the international quarantine station only. Copies are sent to the port of entry and to the country of origin. Horses may only be imported from countries that are free of AHS in accordance with the AHS country status reported through OIE and must also be eligible for import into the EU.

Currently equine may be imported from Arab countries that are not affected by AHS or other equine diseases of concern. No equine are imported from Yemen. Currently Saudi Arabia prohibits equine imports from Bahrain and Egypt due to other equine diseases or restrictions placed on imports by the EU.

Imported horses are quarantined on the farm for at least 6 days; the owner must comply with providing access to the imported animals by animal health officials.

Transit of horses is allowed under permit. Transit requirements include the horse passport, and documentation of status for AHS, glanders, dourine, EIA and EVA. All movement is carried out under seal and custom officials will only allow direct movement. Historically transit shipments primarily move between Qatar to Bahrain and UAE to Kuwait (although transit from Bahrain is currently prohibited due to an outbreak of glanders).

An equestrian club racetrack and exhibition center is located approximately two kilometers away from the international equine quarantine station. Within the equestrian club complex there is quarantine facility for visiting horses. This quarantine facility consists of ten separate stables each with six stalls. This facility is currently is not used for export quarantine because it has not been approved by the EU for that purpose. However, the Ministry of Agriculture is seeking EU approval which is contingent upon construction of a highway entrance into the quarantine facility separate from the highway entrance for all other equine. Once granted Saudi Arabia will quadruple its equine export quarantine capacity.

The USDA team visited the animal and plant quarantine facility at King Khalid International Airport. The quarantine facility operates under the authority of the Ministry of Agriculture and covers both animal and plant health inspections. The Ministry of Finance operates the customs office at the airport. Customs officials primarily check financial forms and documents. Agriculture inspectors work closely with the customs officials in processing the import and export of animals, plants and their products.

Animal health inspectors are veterinarians who primarily are involved with the import of horses. Horses arrive in Riyadh throughout the day, so inspectors are always present or on call. The veterinary inspectors review all documents accompanying shipments of horses to ensure compliance with all necessary regulations. Horses are examined and their identity is confirmed with the accompanying documents (equine passport). If needed, blood samples are drawn by the veterinary inspectors and sent to the animal disease diagnostic laboratory in Riyadh for processing. This is usually done to test for parasitic diseases since testing for equine diseases of concern is conducted in the exporting country prior to shipment. Once the inspections are completed then the horses the quarantine official issues a customs release form to customs to release the horses. Original health certificates are kept at the airport quarantine office and all original documents are permanently archived. Manure and bedding from the transport boxes are incinerated on site.

After clearing customs, horses are released to the care of the owners or agents. Imported horses are isolated for 6 days by the owner or agent and are examined by official veterinarians prior to release from isolation.

The USDA team was invited to tour the private stables of King Abdullah. The farm manager who is also the farm's head veterinarian conducted the tour of the equine hospital and both the Arabian horse and thoroughbred stable facility. In total the farm stables over 2,100 horses. One attribute of such a large facility is that the veterinary staff can easily detect signs and symptoms of illnesses or problems by observing the trends in the farm's horse population.

Monday, Oct. 10

The Jazan area is the southwestern-most area of Saudi Arabia bordering Yemen and the Red Sea. This area is included in the southwest AHS disease control zone. In this region the main animals reared are sheep, goats, cattle, and camels. The horse population is relatively small with around 350 horses located in the city of Jizan. Horse owners in Jizan typically own only one or two horses. All horses are registered and individually identified with implanted microchips. Most horses in this region are kept for pleasure rather than for competition (horses in this region are prohibited from travelling out of the southwest AHS control zone and therefore cannot compete in major equestrian events).

The Ministry of Agriculture operates regional veterinary clinics throughout Saudi Arabia. The USDA team visited the Ministry's veterinary clinic in Jizan. The clinic seemed to be adequately equipped to handle the routine veterinary services which primarily are offered at no cost to the public. There were three mobile teams that provided veterinary clinical services to the public and were equipped to take samples based on any suspect diagnosis on the farm. The main activity of the teams is to conduct vaccination campaigns against foot and mouth disease (FMD), Rift Valley fever, peste des petits ruminants (PPR), enterotoxemia, brucellosis and rabies.

An equine census is conducted during vaccination visits and there seemed to be close collaboration with horse owners. The clinic's chief veterinarian explained that he visits with the owners of all 350 horses monthly, often performing physical examinations.

Emergency veterinary services are also available through the clinic. The majority of emergency cases have been related to dystocia, mastitis, respiratory illness, and screwworm treatment. Few sick horses are encountered by the clinic's veterinarians. These cases are mainly related to arthritis, colic, and pneumonia.

Only paper medical records are maintained at the clinic.

When asked about how reports of horse deaths are handled, the chief veterinarian explained that official veterinarians from the clinic immediately visit the farm to record the case history, perform post-mortem examinations in the field and take any required samples in accordance with history and post-mortem findings. The carcasses are then buried two-meters deep and covered with lime. It did not appear to the USDA team that Saudi Arabia requires horse owners to report death of horses found on the farm, although Saudi officials felt that the frequent contact with horse owners provided ample basis for their passive AHS surveillance program.

The chief veterinarian was asked how an AHS suspect case is ruled out. The veterinarian responded that Saudi Arabia had been free of AHS for a number of years. This suggests to the USDA team that a lack of awareness of the risk of AHS reintroduction exists. The chief veterinarian reported that the Regional Animal Health Diagnostic Laboratory in Jizan is capable of testing for AHS and that it is an AHS reference laboratory which can report back test results in generally 1-2 days. However in the past ten years, not a single case was classified as an AHS suspect. When asked how a suspect case will be handled if detected, we were told that the affected farm and neighboring farms would be quarantined and the Ministry of Agriculture central authorities would be immediately notified via a facsimile transmission.

Saudi Arabia does not have a written AHS emergency response and contingency plan. In addition, foreign animal disease training is not conducted routinely. For training that is available, only Saudi veterinarians are offered opportunities to attend while foreign veterinarians are not provided any training. Dr. Alhamad explained the reason for this practice is those foreign veterinarians are hired as experts, implying that they don't need to be trained. Some foreign veterinarians have been working for the ministry for more than ten years.

The Regional Animal Health Diagnostic Laboratory in Jizan consists of two separate buildings housing three diagnostic sections, bacteriology, virology, and entomology. The bacteriology laboratory has the capacity to process 30-40 samples per day. Testing includes bacterial identification (animal and plant), blood parasite identification, Brucella, Pasteurella, enterotoxemia, Escherichia coli, Trypanosoma, mange, and internal parasites.

The virology laboratory is capable of testing for Rift Valley fever, foot and mouth disease, PPR, and AHS. The section chief explained that the testing methodology utilized is serology, PCR, RT-PCR, and blocked ELISA test for AHS.

The USDA team was informed by the laboratory director that the laboratory does not handle tissue samples for AHS. When asked about how many AHS samples the lab conducted, the director responded that no AHS samples are processed in the lab whether serology or tissue samples. The director's comments contradicted what the USDA team had been told by the regional official veterinarian about AHS samples being sent to the Jizan laboratory, especially in regards to the Jizan laboratory being an AHS reference laboratory. The laboratory director further stated that the role of the laboratory is to process samples not to set policies and that they cannot be responsible for samples that are not submitted. This comment suggested that the diagnostic experts are not consulted on policies or sample handling. It appears to the USDA team that all AHS testing is conducted at the OIE reference laboratories outside of Saudi Arabia, a finding consistent with the information previously submitted by the Ministry of Agriculture.

The laboratory director mentioned that he had attended training courses twice during the previous 2-3 years. However, there was no structured training program for other laboratory technicians.

The entomology laboratory conducts mosquito studies as surveillance for Rift Valley fever. Traps are strategically placed within the Jazan area and mosquitoes are collected and tested by PCR. These traps also collect culicoides species although no tests are currently conducted with

them. The USDA team suggested that the Ministry of Agriculture might consider this as an opportunity for AHS vector studies since the insects are being collected and the laboratory has the necessary PCR equipment.

Before leaving the Jazan area, the USDA team visited a small family stable. The barn manager confirmed the frequent visits to the farm and the veterinary services offered by the regional veterinary clinic.

Tuesday, Oct. 11

Abha is part of the Aseer southern region located just north of Jazan. Both Abha and Jazan are located within the southwestern AHS control zone of Saudi Arabia. No AHS cases have been detected in the Aseer region.

The USDA team visited two military equestrian clubs in Abha located on the army and air force bases. A major complaint of clubs' officials is that the AHS protection and surveillance control zone restrictions prevent the clubs from participating in equestrian and racing competition elsewhere in Saudi Arabia. This has negatively impacted the equine industry in the region as interest in equestrian sports is declining. Historically both clubs had produced many well-known and highly respected championship horses and riders before the AHS movement controls had been imposed. However under the current controls, the two equestrian clubs cannot take their horses to competitions in other parts of Saudi Arabia and competition within the AHS control zone is limited.

There was a very noticeable difference in available resources and services between Aseer and Jizan regions. The veterinarian for the two clubs mentioned the lack of resources available for veterinary controls. He also reported that official veterinarians do not conduct frequent farm inspection visits as was done in Jizan. The manager for one of the club's mentioned that there was a lack of available medications and that routine vaccination campaigns have not been carried out. Dr. Alhamad explained that the difference in the level of service in Jazan and Aseer was because Jazan experienced a large outbreak of Rift Valley fever resources had been directed to that area. Although the emphasis was on eradication and control efforts for Rift Valley fever, increased funding for all veterinary services was given in order to promote more frequent veterinary contacts in the area.

A yearly AHS serological surveillance survey is conducted in the southwest AHS control zone. This survey is conducted to comply with EU equine import requirements. Dr. Alhamad determines the sampling protocol each year and samples are sent to the OIE reference laboratory in the UAE for testing. Passive surveillance activities appeared to be minimally supported. Usually if a horse dies on a farm in Aseer, it will be buried on the farm often without being seen by a veterinarian. There are no requirements for reporting dead horses, although AHS is a reportable disease if symptoms are suspected.

Horses are prohibited to move from Yemen into Saudi Arabia and it was explained to the USDA team that movement controls posts are located along each of the highways between the two countries. Staffed movement control posts along the highways in the southwestern AHS control

zone no longer exist, although signage is placed along the highways informing the public of the prohibition of moving horses north from the protection zone into the surveillance zone and from the surveillance zone to the rest of Saudi Arabia. The team observed several of these signs along the road although some appeared to be newly installed (one sign was even installed facing the wrong direction). These findings can likely be explained by recent highway construction along these routes.

The USDA team was informed that police stationed at truck weigh stations and inspection points along this highway serve to enforce the movement restrictions, as do the police mobile highway patrols. There is a strong police presence along the highways to deter smuggling of goods from Yemen. The Ministry of Agriculture officials stated that compliance with the movement restrictions is very high. The USDA team was unable to verify these claims although it noticed there appeared to be a high level of awareness of the movement restrictions.

Wednesday, Oct. 12

The Ministry of Agriculture operates a border inspection post on King Fahad's causeway which connects Saudi Arabia with Bahrain. The causeway is the only land access point into Bahrain. The post has responsibility for both animal and plant shipments. About 60-70% of shipments passing through the post are plant products. The remainder is comprised of animals, animal products, and birds, of which approximately 70% are live animals. The post is staffed by 11 employees, 4 veterinarians, 2 veterinary assistants, and 5 agricultural specialists inspecting plant products. The post is open 7 days a week from 6:00 am to 2:00 am.

For the last year and a half prior to the site visit, the Ministry of Agriculture has prohibited animals from Bahrain to enter or transit Saudi Arabia because of an outbreak of glanders in Bahrain. Re-entry of horses that travelled to Bahrain from Saudi Arabia is also prohibited. The animal movement ban from Bahrain includes all animals except sporting birds, live fish and pets (dogs and cats). Therefore the USDA team did not have the opportunity to observe horse inspection procedures at the border crossing. Prior to the prohibition, approximately 1,307 horses annually moved through the post. Horses moved primarily in order to compete in sporting and racing events.

An import permit is required for horses entering Saudi Arabia. Negative test results to certain equine diseases are necessary to obtain the permit. A copy of the import permit, test results, original health certificate and an equine passport must accompany horses being imported. AHS-vaccinated horses can enter Saudi Arabia but their health certificate must show a record of vaccination indicating that vaccination had not been given within the previous 12 months and the results of paired serology samples, collected 21-30 days apart, show steady or declining AHS titers. These tests must be performed prior to import into Saudi Arabia. The interaction between Ministry of Agriculture inspectors and customs officials was similar to what the USDA team observed at Riyadh international airport station. Veterinarians inspect the animals and paperwork and communicate with customs before the animals are released.

At the border crossing inspection post, there is a diplomatic lane on the causeway reserved for use by Royal families and high government officials. There had been an incident last year when

Ministry of Agriculture officials intercepted an illegal movement of eight horses from Bahrain. Apparently those horses moved through the diplomatic lane. Those eight horses continue to be housed at the equine quarantine station at Janaderia. There appear to be no control over vehicle movement in the diplomatic lane.

The USDA team received an explanation of the export process which begins with the Ministry of Agriculture receiving a notification from the horse owner or agent of their intention to export the horse. The owner or agent also contacts the importing country to obtain an import permit. Saudi Arabia law permits only registered horses to be exported. The Ministry of Agriculture contacts the appropriate equine registry association to request a letter verifying the registration of the horse to be exported is sent to customs officials. The horse is quarantined at the Janaderia equine quarantine station for a period of time in accordance with the importing country's requirements. While at the quarantine station, Dr. Alhamad examines and issues the export health certificate. Upon completion of the required quarantine period, the horse moves to the border inspection post (at land crossing or at the airport) accompanied with the required documentation. There the horses are examined, identity verified, and documents are checked before custom officials release the horses for export.

At the border inspection post on the King Fahad's causeway, a hardcopy of horse health certificates are filed and maintained for 2-3 years before being sent to a storage archive. The original copy of the health certificate accompanies the horse. Two additional copies of the health certificate stay in the form book at the export quarantine station and are destroyed after 2 years.

The border inspection station maintains a computerized database to collect information on all shipments which move through the post. The system allows for pulling records by day for all shipments. Monthly and yearly reports are sent to the Regional ministry office in Dammam.

Thursday, Oct. 13

The USDA team visited Khalidia farm owned by Prince Khalid bin Sultan. The farm operates three divisions, an agribusiness division, a horse production division and a wildlife preserve. The agribusiness division consists of palm tree production, citrus orchards, and a sheep farm raising more than 30,000 sheep. The wildlife preserve contains game animals such as zebras, giraffes, wildebeest, antelopes, and monkeys. The preserve's wild animals are imported directly without going into quarantine.

The equine division raises Arabian horses exclusively. Currently the farm stables approximately 850 Arabian horses on site and plans to increase its herd to more than 1,000 horses in 2012. There is a flat racetrack on the farm plus a 120 km endurance race course. The farm hosts an international festival during January of each year, with horses from all over the world competing. Visiting horses are isolated in separate stables away from the farm's horses.

There is a veterinary hospital on the farm with a complete surgical facility and is fully equipped for diagnostic imaging. The hospital employs 4 full-time veterinarians. The veterinary hospital offers equine surgical and diagnostic services to the general public. The primary surgical cases seen at the hospital are colic, orthopedic problems, tumor removal and reproductive anomalies.

The hospital also operates a complete equine breeding program. Artificial insemination is primarily used for breeding mares on the farm. The hospital is equipped for semen collection, processing, and freezing and storage of semen. Semen from Khalidia stallions is shipped all over the world.

The farm manager discussed the importance of the U.S. horse industry to the Arabian horse breed. Worldwide there is great interest in purchasing valuable U.S.-bred Arabian horses, especially mares. However, the farm manager pointed out the difficulty with sending mares from Saudi Arabia to be bred in the U.S. because of the current APHIS 60-day quarantine requirement. This requirement also discourages horses from travelling to the U.S. to compete as the quarantine period interrupts the horses training. In addition, horse owners do not want to be separated from their horses for such a long period. This also discourages horse owners in the U.S. from temporarily sending their horses to compete in Saudi Arabia. Saudi Arabia plans to introduce a series of new international competitions into the Arabian Horse Show Circuit. The farm manager pointed out that relaxation of the 60-day quarantine requirement would benefit both the U.S. and Saudi Arabian horse industries.

The USDA team visited the neighboring Nofa Equestrian Resort that belongs to a businessman who is not a member of the royal family. Thoroughbreds are primarily raised on the farm. Due to the late hour of the day, the team only briefly visited the on-site veterinary hospital and toured a couple of stables. The on-site hospital was well-equipped but only provides veterinary services for the farm. The hospital primarily handles cases of colic and orthopedic injuries. A thoroughbred racetrack is located on the farm and hosts a series of prestigious thoroughbred races.

Saturday, Oct. 15

The USDA team paid a courtesy visit to the Agricultural Affairs Department of Makah Region and met with the regional director.

The team then visited the regional animal health diagnostic laboratory in Jeddah which serves as the main laboratory in the western region. The laboratory has virology, bacteriology, histopathology, entomology/parasitology, poultry and toxicology sections. The Ministry of Agriculture provides annual funding for the laboratory based on a budget request prepared by the laboratory director. In cases of financial shortfall or unexpected expenses, the director may submit a supplemental funding request for approval. The laboratory is staffed by 6 PhD specialists and 6 laboratory technicians.

The laboratory is not involved in AHS-testing for export purposes as those samples are submitted to the OIE reference laboratory outside of Saudi Arabia. Equine samples are rarely submitted for virology testing, even for diagnostic support for sick horses. In fact, the specialist mentioned that he has been working in the laboratory for 10 years and has never had a sample submitted for AHS diagnostic testing. The laboratory primarily runs ELISA tests for FMD and PPR, but the team was informed that virus isolation (VI) for FMD and PPR is sometimes conducted on submitted samples. The lab is not biosecure. In fact, the specialist did not conceptualize the need

for a biosecure facility and did not seem to know about the standards for bio-security level classification for laboratories.

There were no written procedures and protocols and no quality control standards available in the laboratory. Moreover, once test results are sent out there are no copies of the results retained in the laboratory. The specialist stated that there was no need to rerun tests or check because he is a PhD and his work is not subject to review.

Regarding proficiency and oversight, again the specialist said that there is no need for such procedures; however, every year someone from the ministry comes to conduct an environmental check and to inventory the instruments and testing kits. The specialist claimed that every few years the laboratory receives a proficiency test panel from the Ministry as a quality control check. There is no documentation of either, so the USDA team could not confirm this claim.

During emergency situations, the specialist said that the laboratory sends in a supplemental funding request to the Ministry and the request is usually approved. Again, the specialist did not comprehend the need for written procedures particularly during emergencies.

The bacteriology laboratory consisted of a hood, incubator, staining station, ELISA readers, and a refrigerator. Most bacteriology testing is conducted for brucellosis, hemorrhagic septicemia, mastitis and enterotoxemia. On average, the laboratory processes 200 samples per month. There were no written protocols and the USDA team observed very poor sample identification procedures. The specialist assigns the same identification number to samples from a single farm and thereby is unable to specifically identify or trace the sample back to a particular animal. When asked, the specialist was unable to show us the submission records for a sample selected randomly from a test plate currently being processed in the laboratory. There was no protocol for storage and destruction of samples.

Sample identification in the histopathology laboratory seemed to be adequate. However, there were no written procedures for handling and analyzing tissues samples received by the laboratory. On average, the laboratory handles about 110 samples per year. In reviewing the laboratory records, it appeared that 55 samples were analyzed in 2010 and 32 samples in 2011 as of the date of the visit. There is no surge capacity to handle emergencies.

The poultry laboratory conducts PCR testing for highly pathogenic avian influenza (HPAI). While Saudi Arabia is considered free of H5N1 virus, H5N2 strains and Newcastle disease (ND) virus are present. Random poultry farm checks are conducted every 3 months. ELISA is used to test for other poultry diseases.

The toxicology laboratory is new and equipment is still being acquired. Laboratory protocols and procedures were clearly posted on the laboratory doors and a sampling directive was available.

The Animal and Plant Quarantine Office at the King Abdul Aziz International Airport in Jeddah employs 4 veterinarians and 4 agricultural officers. The office operates constantly 24 hours a day, seven days a week. There are three 8-hour shifts each day.

Ninety percent of shipments transiting this airport are plants and plant products. Animal and animal products consist mainly of hatching eggs, day-old chicks, animal feeds and bees, with an occasional horse, dogs or cats. In 2010, records indicate that 113 horses were imported through the station. There were no horses exported through the Jeddah airport.

Regarding the import inspection procedure, first all documents are checked to make sure that the import permit, health certificate, certificate of origin, and the bill of lading are correct and in order. The import permit is valid for 10 days only and must show all required test results. Animals will then be visually checked by veterinary inspectors. If there are no problems, then the veterinary inspectors sign a release form and submit it to customs officials. The customs officials release the animal shipment to the owners or agents. All paperwork is kept at the airport quarantine office. Weekly, monthly and yearly summary reports are sent to the Ministry.

Over the past 2-3 years, the veterinary inspectors stated that they had not encountered any sick animals. The problems most often encountered were due to missing documents or expired permits. During this time no horse shipments had been rejected. If documents were missing or not correct, the veterinary inspectors would request the correct documents be provided. Sometimes, this required that horses stay in the customs area for 2-3 days.

Regarding the procedure if an equine import permit is expired, the veterinary inspector indicated that the central authorities, Dr. Alhamad, at the Ministry of Agriculture, Animal Quarantine Department would be contacted. Dr. Alhamad then added that in most cases he would instruct that blood samples be drawn from the animals and then the animals would be kept in isolation on the destination farm for a prescribed period of time.

A member of the USDA team interviewed a private veterinarian who explained that he primarily uses a human diagnostic laboratory to run routine blood tests, mainly complete blood counts (CBC), liver function assays, hematology, and blood chemical profiles. The private veterinarian also submits uterine swabs for bacteriology culturing (around 200 samples per year). During the 10 years the veterinarian has worked in the field, he has not encountered a major problem with horses. If he needs to submit samples for export testing or if he encounters a major problem he calls the Ministry, mainly Dr. Alhamad. If there is a major surgical problem, he sends the horses to the Khalidia farm hospital.

Sunday, Oct. 16

The USDA team returned to the headquarters of the Ministry of Agriculture for closing meetings. The Minister of Agriculture and the Deputy Minister for Animal Resources each received the team for a courtesy meeting during which the team shared their impressions of the visit. Both officials expressed gratitude for the USDA visit and again expressed high hopes for a positive review by APHIS of the AHS status in Saudi Arabia. The team then met with their hosts to discuss in more detail the key findings, recommendations and information needs described in the following summary.

Key Findings:

Strengths

- The equine export quarantine infrastructure consists of an excellent facility for isolation and testing of horses prior to export under the direct control and supervision of competent officials of the Ministry of Agriculture. There is an opportunity to expand the current quarantine capacity (2 barns) by modification to entrance of a nearby isolation facility (10 barns).
- The identification and registration system for horses in Saudi Arabia is strong. The use of implanted microchips and the mandatory registration of horses enhance the integrity of the animal identification system.
- The equine industry in Saudi Arabia is a reliable partner in the control of horse diseases. The high quality and value of the horses in the country provides great incentive for horse owners to seek high standards of animal husbandry and health care for their animals and to avoid risking non-compliance with Ministry of Agriculture regulations regarding disease control and prevention. In all the farms visited, the general ethic exhibited was the pursuit of excellence.
- Cooperation with neighboring countries, such as that provided through the Cooperation Council for the Arab States of the Gulf (G.C.C.), provides a regional strategy to prevent and control spread of equine diseases.
- The Ministry of Agriculture had a strong visible presence with the equine industry and was viewed positively. Dr. Alhamad and his associates are respected, charismatic representatives of the Ministry. The USDA team noted excellent communication channel between the Ministry quarantine officials and the customs officers at the ports of entry.
- The Ministry of Agriculture follows a strategy of frequent contact with horse owners in the Jizan area through the provision of veterinary services. This practice encourages horse owners to call and report any suspicious signs or symptoms of illness to Ministry officials. These are characteristics of a strong passive surveillance system. While this level of contact was high in the Jizan area, it was not as evident in other areas of the southwest control zone or in the rest of the kingdom.
- The USDA team observed a high degree of awareness of the equine movement restrictions imposed in the southwest control zone. Such awareness supports compliance.

Weaknesses

In general, the USDA team observed weaknesses in the systems and processes necessary for rapid detection of a reintroduction of AHS into Saudi Arabia. If detection was delayed and AHS spread, then the result may be a more prolonged disruption of trade affecting a more extensive area of the Kingdom.

- The Ministry of Agriculture lacks a written emergency response plan (contingency plan) for an outbreak of AHS. A written plan, along with periodic training and scenario exercises to simulate its implementation, would enhance the Saudi Arabia's ability to

quickly respond in the event of reintroduction of AHS. A quick response to detect, contain, and eradicate any AHS reintroduction would minimize disruption of trade.

- The internal equine movement control system (i.e. system to enforce the prohibition of equine movement from the southwest AHS control zone into the remainder of Saudi Arabia) lacks a means to verify and measure compliance. The USDA team understands that enforcement of the movement controls is the responsibility of police. The team also observed a high level of awareness of the movement prohibition among horse owners of the southwest control zone. Such awareness is supported by the strategic placement of signage along the highways transiting the boundaries of the southwest control zone. However, the system lacks a means to measure and verify compliance. Compliance records provide a tool for the Ministry of Agriculture to assess the impact of any potential decline in awareness among horse owners or an increase in their complacency as to the importance of the movement restriction and consequences of non-compliance.
- The passive surveillance system, while stronger in the Jizan area where official veterinarians have frequent contact with horse owners, is limited in the remainder of the southwest control zone and elsewhere in the Kingdom where contact with official veterinarians is less frequent. Horse owners are not required to report the death of a horse, so detection of reintroduction of AHS may be delayed. This problem may be exacerbated by complacency that usually increases in areas when a disease has not been present for an extended period of time.
- The animal health laboratory network lacks sufficient oversight to ensure maintenance of proficiency in diagnostic technique. Although the laboratories employed a highly skilled and knowledgeable staff, a system for routine auditing of the laboratories and proficiency testing of the technicians was lacking. The laboratories visited by the USDA team lacked written standard operating procedures and protocols to ensure continuity in techniques and laboratory operations.
- Continuing education and training opportunities for Ministry of Agriculture veterinarians, laboratory technicians and others involved in animal health activities were inconsistently available. These opportunities are necessary so that competencies and state-of-the-art knowledge can be maintained.
- The laboratories visited lacked the capability to perform AHS diagnostic testing. The laboratories lacked the necessary testing reagents, procedures, and technical staff trained and proficient in performing the AHS diagnostic tests. Any samples submitted during an investigation of a suspicious case could not be tested for AHS in Saudi Arabia.
- The laboratories visited generally lacked sufficient bio-safety containment systems and procedures necessary to prevent inadvertent release of disease agents such as foot-and-mouth disease (FMD) virus.
- Communications between the laboratory technicians and the diagnostic veterinarians in the field appeared to be minimal. Diagnostic laboratory technicians provide a critical perspective to an epidemiological investigation. Their involvement is particularly important during investigation of an unusual case, such as an outbreak of a foreign animal disease.

Recommendations

- Develop a written emergency response plan for AHS. Periodically conduct training and scenario exercises to simulate its implementation.
- Establish a system whereby horse owners have an incentive to report the death of a horse, especially in the southwest control zone. The frequent contact of official veterinarians with horse owners in the Jizan area provides a good model.
- Conduct a complete review of the Ministry of Agriculture's animal disease diagnostic laboratory network. Consider conducting this review in consultation with international laboratory experts who can recommend appropriate procedures, facility modifications and processes to address the diagnostic needs of Saudi Arabia and to bring the laboratories into appropriate level of bio-safety compliance. Assess options to develop capacity to conduct AHS testing for investigation of horse deaths. Establish written diagnostic protocols and standard operating procedures for the animal health laboratories. Develop a system for periodic auditing of the animal health laboratories and for proficiency testing of the technicians.
- Establish a system for continuing education and training opportunities for Ministry of Agriculture veterinarians, laboratory technicians and others involved in animal health activities so that competencies and state-of-the-art knowledge can be maintained. These opportunities should be widely available to all professional personnel within the Ministry.
- Develop a foreign animal disease diagnostician (FADD) program. Access to a pool of veterinarians trained for rapid deployment to investigate any suspicion of a foreign animal disease, like AHS, would also enhance Saudi Arabia's ability to quickly respond in the event of reintroduction of AHS. An FADD program would benefit from written emergency response plans, written standard operating procedures for field investigations, and involvement of animal disease laboratory technicians who maintain proficiencies in the diagnosis of foreign animal diseases.
- Under the current southwest control zone regionalization plan, develop a system of recording compliance and enforcement actions by police that can be verified and analyzed by the Ministry of Agriculture officials. As needed, conduct activities to enhance awareness and compliance with the equine movement controls.
- Consider options to reassess the current AHS control plan by conducting a risk analysis that assesses the risk of reintroduction of AHS into the Kingdom. The risk analysis may consider such options as vector monitoring in targeted areas (i.e. in the Jizan area near Yemen and Africa, targeted active surveillance, and/or movement of horses from the southwest control zone after AHS testing with negative results while in a vector-controlled quarantine facility. These alternatives might offer options to relieve the burden that the current movement prohibition places on horses in the southwest control zone while enhancing the Kingdom's capability for early AHS detection. Consideration of the findings of a risk analysis would best be done in consultation with Saudi Arabia's trading partners.
- Consider seeking technical expertise, training and capacity building assistance available through international governments and organizations. USDA may be able to offer technical expertise in emergency response management, targeted surveillance design, animal diagnostic laboratory procedures and protocols, and epidemiology and risk analysis.

Information Needs

- Description of the veterinary infrastructure of Saudi Arabia, including an organization chart illustrating the structure of the Ministry of Agriculture's official veterinary services.
- Demographic information on the equine population in Saudi Arabia, distinguishing the number of kind of equine located within the southwest control zone and the remainder of the Kingdom.
- Description of the Ministry of Agriculture's annual budget for veterinary services. Please provide 3 year history, including previous, current and upcoming year's budgets. Please indicate the amount of funds available for animal health emergency contingencies.
- Description of the structure, operation and governance of the animal health laboratory network in Saudi Arabia.
- Description of AHS surveillance sampling conducted in Saudi Arabia. Are these yearly surveys? If so, please describe who collects the samples, how are animals selected for sampling, and what is the survey methodology. Where are the samples tested?
- Please provide a copy of the PowerPoint presentation given at the horse quarantine center at Janadria on October 9.
- Please provide an electronic copy of the veterinary law of the Cooperation Council for the Arab States of the Gulf (G.C.C.).

Appendix 2:

European Commission Decision

1999/228/EC

COMMISSION DECISION

of 5 March 1999

amending Council Decision 79/542/EEC and Decisions 92/160/EEC, 92/260/EEC and 93/195/EEC and 93/197/EEC with regard to the animal health conditions for the temporary admission, re-entry and imports into the Community of registered horses from certain parts of Saudi Arabia

(notified under document number C(1999) 496)

(Text with EEA relevance)

(1999/228/EC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to Council Directive 90/426/EEC of 26 June 1990 on animal health conditions governing the movement and imports from third countries of *equidae*⁽¹⁾, as last amended by the Act of Accession of Austria, Finland and Sweden, and in particular Articles 12, 13, 15, 16 and 19(ii) thereof,

Whereas by Council Decision 79/542/EEC⁽²⁾, as last amended by Commission Decision 98/622/EC⁽³⁾, a list of third countries from which Member States authorise imports of bovine animals, swine, *equidae*, sheep and goats, fresh meat and meat products has been established;

Whereas by Commission Decision 92/160/EEC⁽⁴⁾, as last amended by Decision 97/685/EC⁽⁵⁾, the Commission has established the regionalisation of certain third countries for imports of *equidae*;

Whereas the health conditions and veterinary certification for the temporary admission, re-entry and imports of registered horses are laid down respectively in Commission Decisions 92/260/EEC⁽⁶⁾, 93/195/EEC⁽⁷⁾ and 93/197/EEC⁽⁸⁾, all as last amended by Decision 98/594/EC⁽⁹⁾;

Whereas following a Commission veterinary inspection mission to Saudi Arabia the animal health situation appears to be under the satisfactory control of the veterinary services and in particular the movement of *equidae* from certain parts of the territory into the rest of the country appears to be well controlled;

Whereas the veterinary authorities of Saudi Arabia have provided a written undertaking to notify within 24 hours by fax, telegram, or telex to the Commission and the Member States the confirmation of any infectious or contagious disease in *equidae* mentioned in Annex A to Directive 90/426/EEC, which are compulsorily notifiable in the country, and within due time any change in the vaccination or import policy in respect of *equidae*;

Whereas following a serological survey carried out over the entire territory of Saudi Arabia, the country should be considered free of glanders and dourine for at least six months; Venezuelan equine encephalomyelitis and vesicular stomatitis have never occurred, however serological evidence was found for equine viral arteritis;

Whereas taking account of the results of the above survey, parts of Saudi Arabia have been free from African horse sickness for more than two years and vaccination against this disease has not been carried out in the country during the last 12 months and is officially banned; whereas, however, certain parts of Saudi Arabia cannot be considered free of the disease;

Whereas the competent authorities of Saudi Arabia have notified to the Commission the official approval of an insect-protected quarantine station near Riyadh and the specimen signatures of the official veterinarians entitled to sign international export certificates;

Whereas for reason of the health situation in certain parts of Saudi Arabia it appears appropriate to regionalise the country concerned, so as to allow importation into the Community of registered horses only from the disease-free part of the territory of Saudi Arabia;

Whereas the animal health conditions and veterinary certification must be adopted according to the animal health situation of the third country concerned; whereas the present case relates only to registered horses;

⁽¹⁾ OJ L 224, 18. 8. 1990, p. 42.

⁽²⁾ OJ L 146, 14. 6. 1979, p. 15.

⁽³⁾ OJ L 296, 5. 11. 1998, p. 16.

⁽⁴⁾ OJ L 71, 18. 3. 1992, p. 27.

⁽⁵⁾ OJ L 287, 21. 10. 1997, p. 54.

⁽⁶⁾ OJ L 130, 15. 5. 1992, p. 67.

⁽⁷⁾ OJ L 86, 6. 4. 1993, p. 1.

⁽⁸⁾ OJ L 86, 6. 4. 1993, p. 16.

⁽⁹⁾ OJ L 286, 23. 10. 1998, p. 53.

Whereas for clarity the ISO country code should be used for amendments of lists of third countries;

Whereas Decision 79/542/EEC and Decisions 92/160/EEC, 92/260/EEC, 93/195/EEC and 93/197/EEC must be amended accordingly;

Whereas the measures provided for in this Decision are in accordance with the opinion of the Standing Veterinary Committee,

HAS ADOPTED THIS DECISION:

Article 1

In Part 2 of the Annex to Decision 79/542/EEC, special column for registered horses, the following line is inserted in accordance with the alphabetical order of the ISO country code:

'SA		Saudi Arabia		X		(')
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Article 2

The following words are added to the Annex to Decision 92/160/EEC:

Saudi Arabia

the whole of the territory, excluding the protection and surveillance zones established in accordance with the provisions of Article 13(2)(a) of Directive 90/426/EEC, and delineated as follows:

1. Protection zone

1.1. Province Jizan

— the whole province, except the part north of the road control post at Ash Shuqaiq at road No 5 and north of road No 10.

1.2. Province Asir

— the part of the province delineated by road No 10 between Ad Darb, Abha and Kamis Mushayt to the north, except the equestrian clubs at the air and military bases,

— the part of the province delineated to the north by road No 15 leading from Kamis Mushayt through Jarash, Al Utfah and Dhahran Al Janoub to the border with the province of Najran,

— the part of the province delineated to the north by the road leading from Al Utfah through Al Fayd to Badr Al Janoub (Province Najran).

1.3. Province Najran

— the part of the province delineated by the road from Al Utfah (province Asir) to Badr Al Janoub and to As Sebt and from As Sebt along Wadi Habunah to the conjunction with road No 177 between Najran and Riyadh to the north and from this conjunction by road

No 177 leading south to the conjunction with road No 15 from Najran to Sharourah,

— the part of the province south of road No 15 between Najran and Sharourah and the border with the Yemen.

2. Surveillance zone

2.1. Province Jizan

— the part of the province north of the road control post at Ash Shuqaiq at road No 5, controlled by the road control post at Al Qahmah, and north of road No 10.

2.2. Province Asir

— the equestrian clubs at the air and military bases,

— the part of the province between the border of the protection zone and road No 209 from Ash Shuqaiq to the road control post Muhayil on road No 211,

— the part of the province between the control post on road No 10 south of Abha, the city of Abha and the road control post Ballasmer 65 km from Abha on road No 15 leading north,

— the part of the province between Khamis Mushayt and the road control post 90 km from Abha on road No 255 to Samakh and the road control post at Yarah, 90 km from Abha, on road No 10 leading to Riyadh,

— the part of the province south of a virtual line between the road control post at Yarah on road No 10 and Khashm Ghurab on road No 177 up to the border of the province of Najran.

2.3. Province Najran

— the part of the province south of a line between the road control post at Yarah on road No 10 and Khashm Ghurab on road No 177 from the border of the province of Najran until the road control post Khashm Ghurab, 80 km from Najran, and west of road No 175 leading to Sharourah'.

Article 3

Decision 92/260/EEC is amended as follows:

1. The list of third countries in Group E of Annex I is replaced by the following:

'United Arab Emirates (AE), Bahrain (BH), Algeria (DZ), Egypt (EG), Israel (IL), Jordan (JO), Kuwait (KW), Lebanon (LB), Libya (LY), Morocco (MA), Malta (MT), Mauritius (MU), Oman (OM), Qatar (QA), Saudi Arabia (SA), Syria (SY), Tunisia (TN), Turkey (TR)'.

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2. The title of the health certificate set out in Annex II(E) is replaced by the following:

'HEALTH CERTIFICATE

for the temporary admission of registered horses into Community territory from United Arab Emirates, Bahrain, Algeria, Egypt⁽¹⁾, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Malta, Mauritius, Oman, Qatar, Saudi Arabia⁽¹⁾, Syria, Tunisia, Turkey⁽¹⁾ for a period of less than 90 days'.

Article 4

Decision 93/195/EEC is amended as follows:

1. The list of third countries in Group E of Annex I is replaced by the following:

'United Arab Emirates (AE), Bahrain (BH), Algeria (DZ), Egypt⁽¹⁾ (EG), Israel (IL), Jordan (JO), Kuwait (KW), Lebanon (LB), Libya (LY), Morocco (MA), Malta (MT), Mauritius (MU), Oman (OM), Qatar (QA), Saudi Arabia⁽¹⁾ (SA), Syria (SY), Tunisia (TN), Turkey⁽¹⁾ (TR)'.

2. The list of third countries under Group E in the title of the health certificate set out in Annex II is replaced by the following:

'United Arab Emirates, Bahrain, Algeria, Egypt⁽¹⁾, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Malta, Mauritius, Oman, Qatar, Saudi Arabia⁽¹⁾, Syria, Tunisia, Turkey⁽¹⁾'.

Article 5

Decision 93/197/EEC is amended as follows:

1. The list of third countries in Group E of Annex I is replaced by the following:

'United Arab Emirates⁽²⁾ (AE), Bahrain⁽²⁾ (BH), Algeria (DZ), Egypt⁽¹⁾⁽²⁾ (EG), Israel (IL), Jordan⁽²⁾ (JO), Kuwait⁽²⁾ (KW), Lebanon⁽²⁾ (LB), Libya⁽²⁾ (LY), Morocco (MA), Malta (MT), Mauritius (MU), Oman⁽²⁾ (OM), Qatar⁽²⁾ (QA), Saudi Arabia⁽¹⁾⁽²⁾ (SA), Syria⁽²⁾ (SY), Tunisia (TN)'.

2. The title of the health certificate set out in Annex II(E) is replaced by the following:

'HEALTH CERTIFICATE

for imports into Community territory of registered horses from United Arab Emirates, Bahrain, Egypt⁽¹⁾, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia⁽¹⁾, Syria and of registered *equidae* and *equidae* for breeding and production from Algeria, Israel, Morocco, Malta, Mauritius, Tunisia'.

Article 6

This Decision is addressed to the Member States.

Done at Brussels, 5 March 1999.

For the Commission

Franz FISCHLER

Member of the Commission