REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF HORSES

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The Committee met from 12:30pm to 6:00pm, Sunday, November 6, 2005. A total of 29 committee members and 45 visitors were present. Chair Peter Timoney presided assisted by Vice Chair James Watson. Committee members were recognized and allowed to introduce themselves. The program focused on a selective number of diseases and disease-related issues of current and future significance, affording extended time for discussion on each of the papers presented. Two time-specific papers were presented and the full texts of these papers are included in these proceedings. Dr. Brian McCluskey, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Centers for Epidemiology and Animal Health (CEAH),National Surveillance Unit (NSU) gave a paper entitled “Equine Disease Surveillance and Reporting.” The second time-specific paper entitled “Biosecurity at Racetracks and other Performance Venues -- Control of Infectious Disease Outbreaks” was presented by Dr. Barry Meade, Gluck Equine Research Center, University of Kentucky. Dr. Steven Halsted, Michigan Department of Agriculture and Chair of the Equine Infectious Anemia Subcommittee, gave the Subcommittee Report. The Subcommittee report was approved by the committee and is included in these proceedings.

Dr. Josie Traub-Dargatz, Colorado State University and USDA-APHIS-VS-CEAH provided an update on the National Animal Health Monitoring System (NAHMS) Equine 2005 Study. In planning this study, the intent was to extend the NAHMS Equine 1998 study, which provided valuable information on the health and health-management practices of the equine population. The same 28 states that participated in the Equine 1998 study were also included in the Equine 2005 study. The study consists of two components that focus on equine events and on-farm health management factors relating to the control of equine infectious diseases. The event component began in spring 2005 at selected equine gatherings, sales, shows or events in 6 of the 28 participating states (California, Colorado, Florida, Kentucky, New York and Texas). Up to 60 events from each of the six states were selected to participate in the study. Data were gathered by state and federal veterinary medical officers regarding the number and type of equine events in each of the six states, the use of health documents at events together with the description, origin and vaccination history of the attending equids and the movements and traceability of equids upon leaving particular events. Data collection is on going and the final report should be available in summer 2006. The on-farm component, which began in summer 2005, has as its focus collection of information on infection-control strategies to overcome occurrence of selected equine diseases. Premises included in the study were selected by the National Agricultural Statistics Service (NASS) from the 2002 Census. Relevant data collected in 2005 are to be compared to data collected during the Equine 1998 study. It is hoped that comparisons will help identify trends in equine health management related to infectious-disease control and the economic consequences of selected equine diseases. Findings from the on-farm study should be available in spring/summer 2006.

Dr. Robert Stout, Kentucky Department of Agriculture, gave a presentation on Certificates of Veterinary Inspection (CVI) and discussed their value as a risk-management tool for monitoring, surveillance and management of diseases. A range of applications was identified with such certifications including test verification, verification of vaccination, animal's health status, movement records and restricting/allowing movement during a disease outbreak. The CVI is an important tool, especially during a crisis. It should be regarded as meaningful and informative, enabling the safe movement of animals. The basis of veterinary inspection and certification has remained unchanged for many years and in certain respects, is in need of revision. Consideration needs to be given to the period covered by the CVI and its relevance to those diseases of greatest concern. The CVI is frequently perceived to be of low importance by the equine industry. Often inadequate attention is paid to the exposure status of the animal(s) being certified. Accredited Veterinarians should have greater appreciation for the significance of what they are certifying and have up-to-date knowledge of relevant state regulations. Revision of accreditation standards for veterinarians is overdue.

Ms Amy Mann, American Horse Council, presented a paper on the need to develop regulations governing the importation of non-competition, entertainment horses into the United States from Contagious Equine Metritis (CEM)-affected countries. The need has arisen as a result of the increasing number of requests USDA-APHIS-VS receives to allow entry of such animals into the country for extended periods of time, without having to meet the full import-testing requirements for CEM. The category of horses in question comprises those imported solely for entertainment purposes, which are ineligible to compete in any performance event for whatever reason. Currently, USDA-APHIS-VS staff must negotiate individual agreements that allow non-competition entertainment horses entry and permit them to meet their scheduled performance engagements. Concern was expressed over the continued granting of special waivers as they entail significant commitment on the part of the USDA to monitor such horses following entry into the United States. It was considered preferable to develop a standard protocol to deal with exemption requests for entertainment horses through regulation. A resolution to that effect was proposed as the appropriate means of addressing this particular import requirement.

The final paper on the program, entitled "Federal and State Policies with respect to Importation of Piroplasmosis Infected Horses," was presented by Dr. Timothy Cordes, USDA-APHIS-VS. In addressing his topic, Dr. Cordes reviewed the outcomes of two special conferences on Equine Piroplasmosis that were held under the auspices of USDA in August 2003 and February 2005. Among the more significant developments concerning piroplasmosis in recent years was the application of the cELISA for *Babesia* spp antibody detection and initiation of the National Tick Survey. Reference was made to the new reporting system for animal diseases instituted by the International World Organization for Animal Health (OIE) diseases and the obligations under the new system to report any listed disease or infection in a country declaring itself free of that disease, the case in point being equine piroplasmosis in the United States. The state animal health program in Florida for dealing with piroplasmosis-positive horses was reviewed and suggested as a model that other states might consider adopting. There was discussion on the concept of "threshold" as it relates to the level of infected horses and ticks that are required to establish a focus of endemicity whereby transmission of infection and possibly disease expression would occur. Based on available field and experimental data, there is the potential for tick transmission of equine piroplasmosis in areas of the United States. It was recognized that in the years that the Complement Fixation Test (CFT) was the screening sero-diagnostic test for this infection, an undefined number of horses persistently infected with *B. caballi* or *B. equi* or both escaped detection at time of entry and were released into the country. Among the points actively discussed by the committee were: Whether states should implement post-entry testing of horses for piroplasmosis as is currently required by Florida; the timeliness and value of a national serosurvey for equine piroplasmosis; whether the time is appropriate for developing a Uniform Methods and Rules (UM&R) and VS Memorandum for Equine Piroplasmosis; and, finally, the urgent need for research on the efficacy of treatment for elimination of the parasite in horses chronically infected with *B. caballi* and/or *B. equi.* There were strong concerns that action was needed to develop a protocol that states could use in dealing with horses found positive for equine piroplasmosis.

Two resolutions were approved by the Committee and forwarded to the Committee on Nominations and Resolutions for approval by the general membership. These resolutions addressed:

1. Development of specific regulations governing the importation of horses categorized as non-competition, entertainment horses into the United States from CEM-affected countries.
2. The need for USDA-APHIS in partnership with USDA Agricultural Research Service (ARS) to fund research into treatment modalities for clearing the parasite in horses chronically infected with *B. caballi* or *B. equi*.

The Committee approved a recommendation concerning the need for the USDA-APHIS-VS to maintain a database of information on all imported stallions and mares that are confirmed carriers of *Taylorella equigenitalis* (the causal agent of CEM) detected on post entry quarantine and testing. Animal health officials in states detecting CEM-carrier stallions/mares should be required to provide information (breed, age, gender, country of origin and diagnostic procedures used to confirm the carrier state) on all such cases to the USDA's Center for Import Export.

The committee approved a motion requesting the Committee Chair to appoint a subcommittee on equine piroplasmosis to address growing concern over how horses found seropositve for infection with *B. caballi* or *B equi* should be handled at the national or state level. Finally, the committee requested the Chair to nominate an appropriately qualified person to represent the interests of the equine industry on the Advisory Committee of the USDA-APHIS-VS-CEAH National Surveillance Unit.

National Animal Health Surveillance System: Equine Disease Surveillance and Reporting

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Animal Health Surveillance may be defined as the ongoing systematic collection, collation, analysis, and interpretation of data and dissemination of information to those who need to know so that action can be taken. Animal health surveillance implies an active system, where directed action will be taken if the data indicate that disease prevalence or incidence exceeds a predetermined threshold. In contrast, disease monitoring describes ongoing efforts at assessing the health status of specific animal populations. The line between disease monitoring and disease surveillance is neither very wide nor straight. Both activities are commonly used in combination with intervention strategies in government-administered disease control programs.

Principle 1a of the *Animal Health Safeguarding Review, October 2001*, states that "A comprehensive, coordinated, integrated surveillance system is the foundation for animal health, public health, food safety, and environmental health." A number of specific recommendations followed this principle that if instituted would move Veterinary Service closer to such a surveillance system.

A strategic plan for the National Animal Health Surveillance System (NAHSS) was completed in December 2004. Four goals were identified in the plan and they include: 1) early detection and global risk surveillance of foreign animal diseases, 2) early detection and global risk surveillance of emerging animal diseases, 3) enhanced surveillance for current program diseases, and 4) monitoring and surveillance for diseases of major impact on production and marketing. An excerpt from the strategic plan highlights the concept of comprehensive surveillance and its purpose:

> The goal of the NAHSS is to establish and maintain a system that will rapidly detect and survey foreign and emerging diseases; evaluate and enhance surveillance for current disease control and eradication programs; monitor disease trends and threats in the U.S. and other countries; and provide timely and accurate animal health information. A comprehensive, coordinated, integrated surveillance system is the foundation for animal health, public health, food safety and environmental health. The NAHSS, as one of many components both within and outside of agriculture working closely with the Department of Homeland Security, will dramatically improve the ability to detect indicators that suggest the development of a bio-threat amidst the background noise of bio-events.

The transition from current surveillance activities to this comprehensive integrated NAHSS requires an institutional and cultural change. This change will require a shift in the culture of Veterinary Services and animal health community from viewing surveillance as compartmentalized efforts surrounding one disease, to viewing animal disease surveillance in a systems approach. This will be a very complex undertaking that will involve the integration of many activities and partnerships. New methods and approaches need to be implemented. The National Surveillance Unit, located at the Centers for Epidemiology and Animal Health in Fort Collins, Colorado, has been identified as the coordinating entity for activities related to animal health surveillance in the U.S. and to be a focal point for the collection, processing and delivery of surveillance information.

The key to enhancing surveillance is in the specific application of three concepts: probability based surveillance, hierarchical surveillance and targeted surveillance. Probability based surveillance requires a clear picture of the risks of introduction of disease into an area. This area may be the entire country, a state or even an individual farm. Gaining this clear picture requires disease specific risk assessments; disease pathways analyses and disease spread modeling. In order to appropriately apply surveillance strategies, understanding the most likely location and method of introduction is imperative.

Hierarchical surveillance applies varying intensities of testing or sample/data collection based on the threat or risk identified in the disease specific risk assessments. During periods of low risk, a baseline level of continuous surveillance should be conducted to inform the risk assessments. But with indications of increased risk of introduction surveillance activities must be intensified. This may include the "turning on" of active surveillance components (mass screening of samples for the pathogen of interest collected through other surveillance activities, biosensors, use of sentinel farms).

Targeted surveillance is the application of various surveillance strategies in the populations in which the pathogen is most likely to be introduced and/or spread. Populations at highest risk may be defined by their geographic location, type or age of animal, or production stream.

On the heels of yet another Vesicular Stomatitis outbreak in the Western United States in 2004, the USAHA Committee on Infectious Diseases of Horses presented a resolution to the USDA requesting that Veterinary Services, "enhance its current program of gathering data on outbreaks of infectious diseases with the cooperation of the states in order to provide up-to-date information on such outbreaks, as well as state and international movement restrictions and other pertinent information to stakeholders and state animal health officials on a regular and timely basis." Veterinary Services responded to this resolution by establishing a webpage at the National Surveillance Unit, dedicated to the presentation of data and information on equine infectious diseases.

Currently this page maintains general disease and disease surveillance information for Vesicular Stomatitis, West Nile Virus and Equine Infectious Anemia. Situation reports for the 2005 Vesicular Stomatitis outbreak have been posted since May 3, 2005. In addition, maps indicating the location of vesicular stomatitis positive premises by state have been posted. Additional resources included on this page include 2005 emergency management warnings, international and domestic movement requirements, and information on laboratory testing.

West Nile Virus information includes fact sheets on the disease, surveillance data and maps and surveillance plans and methods. Veterinary Services is currently investigating expanding and improving the West Nile Virus reporting system and intends to include surveillance information on other equine encephalitides.

Information on Equine Infectious Anemia includes an interactive mapping application that allows the user to use a web browser to interact with the data, creating a customized map view, and then printing the map or saving it as a graphic for use in another application. Static maps of EIA events are also available. Also included are the current USDA's EIA program Uniform Methods and Rules.

The Equine Animal Health Surveillance Information page will continue to mature as new web based data collection applications are developed, equine disease surveillance components are designed and implemented and as the National Surveillance Unit investigates methods to integrate existing equine health data into the National Animal Health Surveillance System.

Biosecurity at Racetracks & Other Performance Venues - Control of Equine Infectious Disease Outbreaks

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Disease outbreaks in equine populations, particularly among horses congregated at racetracks or other similar performance venues, are reported regularly to state and federal animal health authorities. Normally, at least one documented outbreak of equine disease reaches the attention of the general public on a yearly basis. This past year, the outbreak of Equine Herpes Virus 1 (EHV-1 myeloencephalopathy) at Churchill Downs just prior to the Belmont Stakes drew the attention of the national media.

While this particular disease event was not unique with respect to severity or duration of illness among individually affected horses, the use of a relatively new and highly sensitive diagnostic testing protocol raised issues about the period of communicability and the regulatory response needed to ensure cessation of transmission; specifically, whether the use of the nested Polymerase Chain Reaction (PCR) assay for detection of viral DNA was reflective of infectious virus and the risk of transmission in PCR positive horses.

In past years, outbreaks of equine disease have elevated concern among animal health officials, equine industry stakeholders, and researchers, motivating them to pursue development of guidelines for disease control at racetracks in the United States (US). Following a widespread occurrence of equine viral arteritis (EVA) in 1993 among horses stabled at Arlington Racetrack in Chicago, Illinois, industry, state and federal regulatory authorities, racing commission veterinarians and researchers met to develop an Action Plan for the purpose of addressing issues pertaining to the diagnosis, reporting and control of outbreaks of an infectious disease at racetracks in the United States[1]. While these guidelines provided a framework for addressing notification and movement controls, it was not intended to nor did it, examine the dynamics of disease initiation or persistence among horses congregated at such venues.

Disease occurrence and transmission is classically described in epidemiological terms as the interaction of the host, the environment and the causative agent. With specific regard to the agent, characteristics of interest would include its mode(s) of transmission (aerosol versus fecal-oral), incubation period, and its persistence in the environment. Host specific characteristics would include immune status with regard to the agent of interest, whether from past exposure or through immunization, as well as the animal's overall health status. Though rarely appreciated, the environment is the ecological niche where animal and agent interact and, for diseases like the equine viral encephalomyelitides, representing the most significant component of the epidemiological triad.

On a population basis, disease persistence and spread are influenced by similar types of factors and their interactions. During the course of an outbreak, it may be difficult to determine which factors contribute most significantly to the dissemination of disease. For each situation, the attributes of the population at risk and the environment in which the outbreak is occurring will undoubtedly be unique. It is also worth noting that there are many competing interests involved with efforts to resolve the disease event; each has its own priorities such as cost, time, or manpower considerations which may seem peripheral to the termination of the outbreak. Nevertheless, all of these concerns must be factored into the control effort if the outbreak is to be brought to a successful conclusion.

It may be more productive and certainly less difficult to consider calculating, prior to the occurrence of a significant equine health event, a series of quantitative prediction parameters to estimate disease transmission. This methodology is currently being used in human health to evaluate control strategies for both Severe Acute Respiratory Syndrome (SARS) and Influenza [2-3]. Some common indices used to evaluate the effects of quarantine and immunizations on control of these respiratory pathogens include estimates of the reproductive number (R_0), the disease generation time (T_g), and Theta (θ), which is the proportion of transmission occurring prior to the onset of symptoms [4].

There is no reason to believe similar modeling would not have application in animal health. Conceptually, the basic reproduction number, R_0, is regarded as the number of secondary infections generated by a primary infection in a susceptible population. It measures the transmissibility of an infectious agent and implies that for an epidemic or outbreak to spread, more than one secondary case ($R_0>1$) has to be generated by the primary case [5].

The disease generation time (T_g) is the mean time interval between infection of one animal and infection of its contacts; it represents the time scale for the growth of an epidemic. In concert with the onset and duration of viral shedding, this parameter constitutes the period of communicability [4].

The number of animals in the exposed population and the movement of others into and out of the spatially defined area will constitute the pool of potentially susceptible animals. Larger populations increase the rate of random contacts among susceptible animals, thus increasing the number of cases that are generated and potentially lengthening of the duration of an outbreak.

Theta (θ) is the proportion of infection that is transmitted prior to symptom onset; it can be readily appreciated in a clinical practice setting. The presence or absence of clinical signs directly affects the ability of the practitioner to recognize overt disease. In the case of animals that are asymptomatic or latent carriers, the lack of clinical signs will delay notification of regulatory animal health officials and the initiation of control measures. Generally, this parameter is estimated by contact tracing and is heavily dependent on animal identification and verification of movements.

By obtaining estimates of these parameters from mathematical models, it is possible to evaluate the effectiveness of specific control strategies for different pathogens as well as for different types and sizes of populations. In general, control strategies for animal disease outbreaks have not changed substantially in recent years; they can easily be understood in the broader context of biosecurity. Specific measures that have been utilized in the past include: reducing contact rates in the population by imposing restrictions on equines on affected premises; reducing the communicability of individual animals, through treatment or isolation; reducing susceptibility of uninfected animals by vaccination or antiviral prophylaxis; and tracing and quarantining of in-contacts [3].

Though not directly accounted for in these mathematical models, the rapid dissemination of information to all interested stakeholders is fundamental to any control program. The successful resolution of the outbreak relies on the voluntary compliance of the industry most heavily impacted by the disease event as well as the actual control strategy employed.

While the focus of any control strategy should be to decrease the threshold level of disease transmissibility, regulatory interventions should be implemented at some optimum level to stop disease spread with the least burden to the impacted stakeholder. This requires a willingness of all parties to accept some level of uncertainty (risk) concerning disease transmission.

There are financial costs associated with any regulatory intervention regardless of the method of control employed. Ultimately, it is important that regulatory authorities resist the urge to simply adopt, as a matter of convenience, a control strategy represented by one of two extremes: do nothing and suffer consequences attributable to the disease as well as the regulatory impact imposed by other states, or completely stop all activities on the affected premises without forethought of the economical consequences to the industry.

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