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IN THIS ISSUE

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LLOYD'S
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COMMENTARY

The article on rabies incidence in the state of Kentucky during 1996 emphasizes the need to vaccinate horses on a regular annual basis. This not only protects the horse population but reduces the public health hazard for those who are exposed to rabid horses.

The role of wildlife, which includes bats, raises the question of what impact they are having on disease incidence in the equine population. There is evidence to implicate wildlife including birds and opossums in the spread of equine protozoal myeloencephalitis (EPM); and raccoons, skunks, bats and coyotes are involved in the spread of rabies to domestic animals including horses and humans. Wildlife may also be implicated in the spread of leptospira causing abortion in mares.

Information provided by the Kentucky Department of Fish and Wildlife clearly demonstrates the changing dynamics of the wildlife population in the state during recent years. Since 1989 there has been a dramatic reduction in furs purchased from licensed trappers and hunters, as a result of the fall in value of fur pelts. The campaign waged over the last 10 years to discourage the wearing of clothing apparel made from fur-bearing animals has influenced this trend.

Failure to control the wildlife population through trapping and hunting has resulted in a population expansion. This is confirmed by examination of highway mortality figures for selected species which has shown a continuing increase for raccoons and coyotes since 1985.

Horse farms provide a favorable ecological niche for a variety of wildlife, providing easy access to food. As a consequence pastures and feed stores in barns become contaminated with urine and feces increasing the risk of inter-species cross infection.

Ecological surveillance to identify changes occurring in wildlife populations and their possible impact on host parasite relationships provide important data that could relate to "emerging diseases" in the equine population. By identifying these changes the options for practical and effective control measures become more clearly defined.

INTERNATIONAL

Fourth Quarter 1996

The International Collating Center, Newmarket, confirmed the following disease outbreaks.

Equine-2 influenza was diagnosed among horses in France, Sweden and the United States. Respiratory disease attributable to equine herpesvirus was recorded among horses in France and the United Kingdom. Sporadic cases of abortion caused by EHV-1 were reported from Germany, Ireland, Italy, Switzerland and the United Kingdom.

South Africa reported eight cases of African Horse Sickness, seven occurring on one premise. Multiple cases of rotavirus infection were recorded on five premises in Australia.

Reports of strangles were numerous with cases confirmed in Australia, Hong Kong, Ireland, Italy, New Zealand, Sweden, Switzerland and the United Kingdom. An update on CEM from our last issue: a refresher article on the disease by S.W. Ricketts was published recently in *Equine Veterinary Education* 1996, 8(3)166-170.

A New Equine Influenza Vaccine in Japan

A new inactivated vaccine against equine influenza became available during the fall of 1996 in Japan. The trivalent vaccine containing Newmarket/77 (H7N7), Kentucky/81 and La Plata/93 (H3N8), isolated in Argentina, shows a relatively broad antigenicity against several strains of 1990s epizootics. It is expected the vaccine will be effective against the current equine influenza viruses (H3N8), which are widely distributed among horses around the world.

In Japan there was a major epizootic of equine influenza in 1971 following the importation of horses; approximately 7,000 racing and riding horses around Tokyo were involved. Horse racing organized by the Japan Racing Association (JRA) and National Racing Association (NRA) was stopped for two months during the epidemic. Since the 1971 epidemic no evidence of influenza infection has been demonstrated by enforcement of intensive vaccination.

An improved new vaccine was developed by the Liaison Committee for Equine Infectious Disease Control. This committee was organized by National Institute of Animal Health, National Assay Laboratory for Animal Health, Animal Quarantine Service, Epizootic Research Station, Japan Racing Association and Ministry of Agriculture, Forestry and Fisheries of Japan. The Committee, which puts research findings to practical use in the field, is unique and might not exist in other countries.

Since the committee was established in 1989, several strategies for control procedures on equine infectious diseases, such as equine arteritis, equine influenza, contagious equine metritis and equine piroplasmosis, have been discussed and formalized. The equine influenza vaccine is one of the important objectives completed by the committee bearing in mind the progress of international horse movement.

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Serology of *Streptococcus equi* Infection: Uses and Limitations

The M protein of *Streptococcus equi* is highly immunogenic for the horse and stimulates antibodies between two and three weeks after a susceptible horse is exposed to infection. Antibody levels peak four to six weeks post infection and remain high over the following six months, after which there is a gradual decline to low levels two years after infection.

IgGb is the predominant M protein specific antibody of both acute and convalescent phase sera. IgGa and IgG(T) isotype responses are also strong during and shortly after the acute disease phase but decline to near baseline levels six months after infection.

Vaccination with commercial strangles vaccines also elicits rapid serum M protein specific antibody responses equivalent to or higher than those seen during convalescence. These responses peak at about two weeks in adult horses and involve the same IgG subisotypes as observed in convalescence except that IgGa responses are lower. Parenteral vaccination does not elicit M protein specific nasopharyngeal mucosal IgA.

Advances in the purification of M protein have facilitated development of an ELISA for measuring levels of specific antibody in equine sera. The test provides information useful in diagnosis of purpura hemorrhagica and abdominal abscesses (see **Table 1**, page 3). It is also helpful in diagnosing recent *S. equi* infection, and determination of the need for booster accination.

M protein antibody levels are very high in horses with purpura hemorrhagica. Clinical evidence of vasculitis with a very high level of M protein specific antibody strongly implicates immune complexes of M protein and antibody.

Abscessation of lymph nodes in the abdomen or thorax is often difficult to confirm by physical and laboratory investigations. Horses with abscesses caused by *S. equi* in these locations may not show clinical signs such as weight loss, intermittent fever and neutrophilia, mild anemia, elevated plasma fibrinogen until many months following recovery from strangles or exposure to *S. equi*. These cases usually have very high serum levels of M protein specific antibody.

Equine Disease Quarterly

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The atypical or catarrhal form of strangles is a common manifestation of the disease in older horses with waning protective immunity and the presence of *S. equi* may not be recognized until the infection is transmitted to younger, more susceptible horses. ELISA is helpful in identifying horses with atypical strangles because these animals quickly make strong antibody responses to M protein. This information is useful in retrospective analysis of outbreaks and in pinpointing sources of infection. Serology, however, is no substitute for bacteriologic culture of suspect horses and cannot be used to identify ***infected*** animals.

High levels of serum antibody suggest that vaccination is unnecessary and possibly contraindicated because of the risk of local Arthus reactions or systemic immune complex mediated vasculitis.

Serum antibodies stimulated by vaccination cannot be distinguished from those produced during infection. Information about the vaccine history of the horse is therefore essential in interpretation of test results. Another limitation is the variability in magnitude of responses following infection. Some horses recovering from strangles make only weak antibody responses and so a low level of serum antibody does not always exclude the possibility of recent infection.

Interpretation of test results may also be complicated by the sera of many horses containing antibody to *S. zooepidemicus*. Removal of these cross-reacting antibodies is achieved by absorption with a suspension of heat killed *S. zooepidemicus*. Reductions in ELISA values of 50% or greater following absorption suggest that *S. zooepidemicus* infection could have been the original source of antibody stimulation. This conclusion should be supported by ELISA results on three or more animals in the group.

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Estrus Cycle-Related Performance Problems in Mares

A relatively common problem behavior of mares reported by trainers and riders is variable performance or trainability related to the estrus cycle. In addition to undesirable estrus behavior in performance situations (frequent urination; resistance to move forward), complaints often concern deterioration of performance or temperament associated with a particular stage of the ovarian cycle.

Some mares are hyperexcitable and difficult to handle at certain stages of the cycle. Others appear particularly sensitive to weight or manipulation that might affect the back area over the ovaries during the periovulatory period. Lameness may emerge or is exacerbated during estrus. In some cases, the problem is associated with the diestrus phase, but in most it is associated with estrus or ovulation. In many such cases, riders and trainers believe the mare experiences abnormally frequent and/or long estrus.

Horse athletic performance or training problems involve complex human-animal interactions that are difficult to objectively evaluate. Like many behavioral problems, the historical details and various corrective measures attempted are often difficult to establish.

In 11 high-level performance mares we have systematically evaluated sexual behavior, athletic performance behavior, general handling behavior, ovarian activity, and steroid hormones over two or more cycles. During the period of study, the persons evaluating each aspect remained "blind" to each other's results.

Significant changes in such characteristics as temperament, trainability, and tractability can be documented to occur in association with certain periods of apparently normal ovarian cycles and estrus. In most instances changes in temperament and tractability, which resulted in degraded performance, were associated with estrus and the periovulatory period. However, the problem behavior can also be associated with the diestrus phase of the estrous cycle.

The underlying reasons for cycle-related performance problems are far from fully understood at this time. Accordingly, therapeutic recommendations are limited. After careful observation of the problem behavior, as well as endocrine and physical examina-

Table 1

ELISA Values for M Pr
Specific Antibody in E

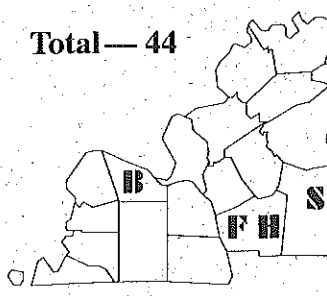
Clinical Category
Normal
Convalescent *(4 to 6 w*
Purpura hemorrhagi
Abdominal abscess

** Serum diluted 1:80*

Figure 1.

Geographic Distribu

5 Bats— B
1 Cow— C
4 Dogs— D
1 Feline— F
5 Horses— H
1 Human
27 Skunks— S
Total— 44



tion to rule out any pathological condition requiring attention, one might consider hormonal manipulation of ovarian activity and behavior.

For those mares whose problem behavior is associated with estrus, progesterone therapy can be tried to subdue ovarian activity or quiet undesirable behavior. Either progesterone in oil or any of several synthetic progestin preparations may be tried. There seems to be considerable individual mare variation in the behavioral response to different products and doses. Recent studies at Colorado State and the University of Pennsylvania have been evaluating efficacy of other progesterone preparations and delivery systems for use in mares.

For mares whose problem behavior is associated with diestrus, repeated short-cycling with human chorionic gonadotropin (hCG) or prostaglandin may be useful. Long-acting tranquilization regimens have also proven useful in a number of cases.

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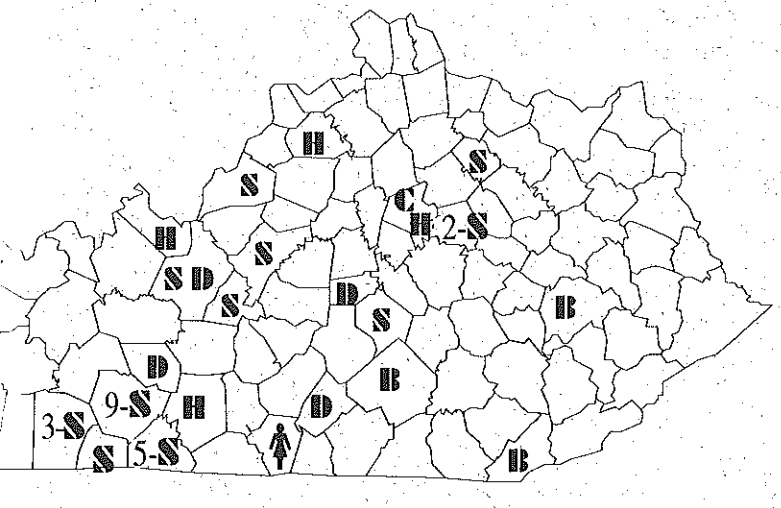
tein
quine Sera

Median & Range of ELISA Values *
0.5 (0.2-0.9)
eks) 1.2 (0.3-2.1)
2.3 (1.7-2.7)
2.0 (1.7-2.3)

ion of Rabies



K E N T U C K Y

Rabies — 1996

The Kentucky Department for Public Health, Division of Epidemiology, confirmed 43 cases of animal rabies and one case of human rabies in Kentucky for 1996. This was the first human fatality from rabies in Kentucky since 1979. The victim was a 42-year-old woman from the south-central part of the state. The source of the infection was identified by the Centers for Disease Control and Prevention (CDC) to be a bat. The total number of cases, 44, was the highest reported number of rabies cases in the state since 1992.

Overall, in Kentucky there were 27 skunks, 5 bats, 5 horses, 4 dogs, 1 cat, 1 cow and 1 human confirmed to have rabies. **Figure 1** shows the geographic distribution of rabies cases in 1996. One should carefully interpret this information; just because a region had no confirmed cases does not necessarily mean that rabid animals are not present, only that no rabid animals were submitted for laboratory testing.

As usual, the predominant species found to be infected was the skunk. However, there were four rabid horses in the state this year plus an additional rabid horse from Tennessee referred to a Kentucky equine hospital. Rabies in our native wildlife increases and declines in regular 6-8 year cycles. The number of domestic animal rabies cases, including horses, usually reflects these natural cycles. For the ten year period 1986-1995, horses accounted for only 2.1% (15/727) of the confirmed cases in the state, but in 1996, horses were 11.6% (5/43) of diagnosed animal rabies cases. Continuous monitoring of rabid animals by the Department of Public Health will determine if this is a trend for rabies in horses or if 1996 was an exceptional year for equine rabies.

Almost all domestic animal rabies cases in Kentucky are derived from skunks. Interestingly, all the domestic animals that died of rabies are species for which effective rabies vaccinations are available. None of the rabid animals had been vaccinated. State law requires all dogs to be vaccinated for rabies and certain localities require rabies vaccination of cats. Horses are generally not considered high risk animals for rabies, but given the relatively high number of rabies cases in horses for 1996 it would be prudent to routinely vaccinate horses against this disease.

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Respiratory Disease

Diseases affecting the lower respiratory system of horses are commonly encountered. Out of a total of 4,255 horses (excluding fetuses) which were necropsied from January 1993 through December 1996 at the Livestock Disease Diagnostic Center, 448 cases (10.5%) of lower respiratory system disease were diagnosed.

The most common diagnosis was bacterial pneumonia which included cases of pneumonia, bronchopneumonia, and suppurative pneumonia. Of 255 cases 41% were in foals less than one month of age, 39% in foals 1-12 months of age, and only 20% in horses greater than one year of age. Although postmortem decomposition and prior antibiotic therapy adversely affect the ability to isolate bacteria, cultures from the lung of 67% of cases yielded bacteria.

The next most commonly diagnosed respiratory condition was interstitial pneumonia with 56 cases. These differed from the bacterial pneumonia cases in pathogenesis, lesion distribution, and microscopic appearance. Two thirds of the cases were in foals 1-12 months of age.

There were 22 cases classified as aspiration pneumonia. Aspiration pneumonia results from inhalation of material, usually foodstuffs or gastrointestinal fluid. The majority of these cases were foals less than one month of age.

Mycotic or fungal pneumonia was relatively uncommon with only eight cases. In seven the causative fungus was cultured and determined to be *Aspergillus spp.* or resembled Aspergillus microscopically. One case was the result of *Histoplasma capsulatum* infection. Five cases were diagnosed in horses over one year of age.

Seven cases were classified as necrotizing pneumonia based on the nature of the pathology. They were distributed among all ages of horses caused primarily by bacterial infection. There were 42 cases of pleuritis and pleuropneumonia with inflammation of the membrane covering the lung and also involving lung tissue. Two thirds of these cases were in horses over one year of age.

Eleven cases of strangles caused by *Streptococcus equi* were diagnosed. Although strangles is primarily a disease affecting the peripheral lymph nodes, seven of the cases also had lung involvement. Eight of the 11 cases were in horses greater than one year of age.

While viral abortion is a fairly common diagnosis in fetuses, viral pneumonia caused by equine herpesvirus was diagnosed in nine foals less than one month of age. In eight, equine herpesvirus type 1 (EHV-1) was isolated and in the remaining case EHV-4 was the isolate.

An assortment of conditions complete the respiratory diagnoses. Neoplasia is an uncommon finding in the lung of horses. Five cases were seen over this 4-year period and all were in adult horses. There were three carcinomas, one granular cell tumor, and one metastatic mesothelioma. Other diagnoses included four cases of hyaline membrane disease, three cases of chronic obstructive pulmonary disease, two cases of emphysema, two cases of pneumothorax, and one case of *Pneumocystis carinii* infection.

Although a variety of different respiratory conditions were diagnosed at the LDDC, pneumonia and pleuritis due to bacterial infection were by far the most important causes of death due to respiratory disease in horses.

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Bibliographies

The Morris Library at the Gluck Equine Research Center has available bibliographies on topics related to diseases and other problems in the horse. Bibliographies on the following topics are available (free of charge) from the Library:

- Hyperkalemic periodic paralysis
- Fractures
- Alternative therapies
- Colic
- Poisonous plants

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EIA Surveillance

During 1996 a total of 75,912 samples were tested for EIA in Kentucky. Private tests amounting to 61,008 samples were submitted to comply with state regulations, three of which were positive. Tests undertaken on horses going through markets and stockyards amounted to 14,904 of which six were positive.

The number of positive EIA animals identified on an annual basis since 1987 is depicted in **Figure 2**, indicating an encouraging reduction in the prevalence of positive animals.

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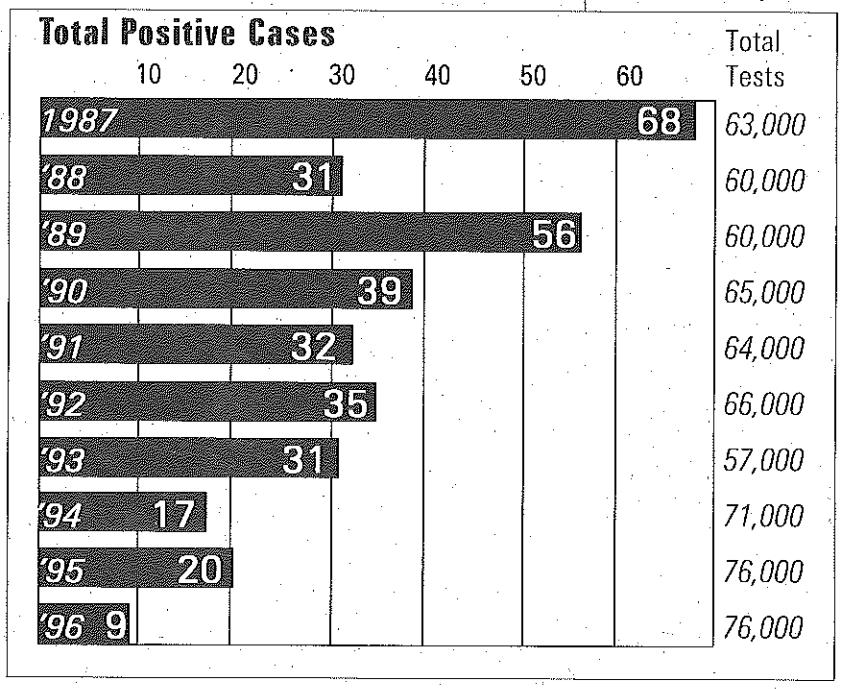
Figure 2.

EIA Surveillance Testing



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