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University of Kentucky
College of Agriculture
Department of Veterinary Science


## *In this issue*





## *Commentary*

Septicemia is an important cause of morbidity and mortality in neonatal foals. During 1991 and 1992 the Livestock Disease Diagnostic Center in Lexington examined 134 foals which died of septicemia and found that more than 70% of the deaths were the result of infection by Gram negative bacteria, particularly *E. coli*.

One strain of *E. coli* has recently gained national prominence as a cause of bloody diarrhea, kidney failure, and death among people who had eaten contaminated undercooked hamburger. This particular strain of *E. coli* has been isolated from the intestinal tract of cattle but to-date has not been isolated from horses. Nevertheless the human cases of *E. coli* infection emphasize the severe disease-causing potential of this organism.

Because the clinical condition of septicemic foals deteriorates rapidly, antibiotic therapy must be initiated quickly, even before the results of bacteriologic culture and antibiotic sensitivity become available. Penicillin and many of the other antibiotics used on breeding farms are generally more active against Gram positive than Gram negative bacteria. The persistent use of these antibiotics may have resulted in the selection of resistant Gram negative organisms within the foaling environment. Veterinarians presently resort to antibiotics used in other species to treat the drug-resistant bacterial infections.

To reduce the number of cases of septicemia follow these basic principles of good foaling management: provide a clean, disinfected foaling stall; ensure adequate ingestion of colostrum is confirmed by undertaking an IgG test on a blood sample taken from the foal 18 hours after birth; dip the navel several times in a 2-3% solution of iodine; and keep a very careful watch on the foal during the first week of life. Detection of decreased nursing, fever or hot, swollen joints should prompt an examination by the farm's veterinarian.

## *International*

### First Quarter 1993

The International Collating Centre, Newmarket and other agencies confirm the following disease outbreaks:

Equine-2 influenza was reported from Argentina, France, Norway, Sweden, the United States, and the United Kingdom. Thoroughbred horses at three racetracks around Buenos Aires were affected in March; and in Sweden, Standardbred horses at 19 of 26 racetracks in the south of the country were involved in a widespread outbreak of influenza that commenced in late 1992. In the United States outbreaks were confirmed in Florida and Kentucky. Clinical signs in all outbreaks were described as mild influenced by a previous history of vaccination.

Contagious equine metritis was reported from Belgium and Japan. Several countries reported cases of strangles, salmonellosis, and the respiratory form of equine herpesvirus type 4 (EHV-4). More than 10 cases of abortion caused by equine herpesvirus type 1 (EHV-1) were reported from France (35), Japan (15), and the United Kingdom (18) with the paralytic form being reported from Italy and the United Kingdom. In the United States, cases of paralysis due to EHV-1 were confirmed among saddle horses in the state of Montana.

Italy reported the results of an extensive stallion screening program to determine the prevalence of antibody to equine arteritis virus among all breeds. A high prevalence was reported among trotting stallions imported from the United States and Scandinavia. South Africa confirmed four cases of African horse sickness.

## New Health Certification For European Community

With the formation of the Single Market within the twelve countries of the European Community (EC), that is, Belgium, Denmark, France, Germany, Greece, Republic of Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, and the United Kingdom, a new Health Certificate has been drawn up which will apply to horses imported by EC countries.

Introduction of the Health Certificate is scheduled for July 1, 1993. Here are the details, which have a direct bearing on horses purchased for export to Europe:

- The 30-day pre-export isolation has been retained.
- There will be no requirement to blood test fillies or geldings for Equine Viral Arteritis; but for the 1993 summer sales, horses should be tested prior to the sales.
- **Venezuelan Equine Encephalitis** (VEE). Horses will not be allowed to enter the EC if they were vaccinated within a 6-month period prior to commencing pre-export isolation. It is considered that few horses will have been vaccinated against VEE. Horses purchased that were vaccinated within this time frame must wait until 6 months from the date of vaccination before they enter pre-export isolation.
- **Western and Eastern Equine Encephalitis** (WEE/EEE). If horses were vaccinated against these two diseases, it should have taken place within 6 months and at least 30 days of export and the dates recorded. If horses were vaccinated outside that period, if dates of vaccination are not available, or if there is no history of vaccination, then horses must be blood tested during the pre-export isolation.

Consignors should have available for prospective European purchasers details of vaccination records with respect to VEE, WEE, and EEE.

**Contact:**
Dr. David G. Powell, (606) 257-2756
Maxwell H. Gluck Equine Research Center

## Lyme Disease And Ticks

Lyme disease is now considered the most prevalent tick-borne disease among humans in the United States. Most of the reported human cases have been in the Northeast, the Upper Midwest, and California. The current incidence of human Lyme disease in 1992 by state is shown in **Figure 1**.

The number of reported human cases in Kentucky increased from 3 in 1987 to 43 in 1991 and 28 in 1992, as a result of ticks becoming attached to people's skin during travel outside of Kentucky.

Lyme disease is caused by a tick-borne bacterial spirochete *Borrelia burgdorferi* which also infects domestic animals including horses, cattle, dogs, and cats. Clinical signs tend to be non-specific but include fever, stiffness, muscle pain, and swollen joints. The diagnosis of Lyme disease in animals is currently based on a combination of history, clinical signs, response to antibiotic therapy, risk of probable exposure, and blood tests. It should be emphasized, however, that the results of blood tests do not always correlate to disease status.

*Borrelia burgdorferi* is maintained in a complex life cycle of small wild mammals and immature stages of the black legged tick, *Ixodes scapularis* (formerly referred to as *Ixodes dammini*) and *Ixodes pacificus*. Larval and nymphal stages of the tick acquire the organism when they feed on infected mice.

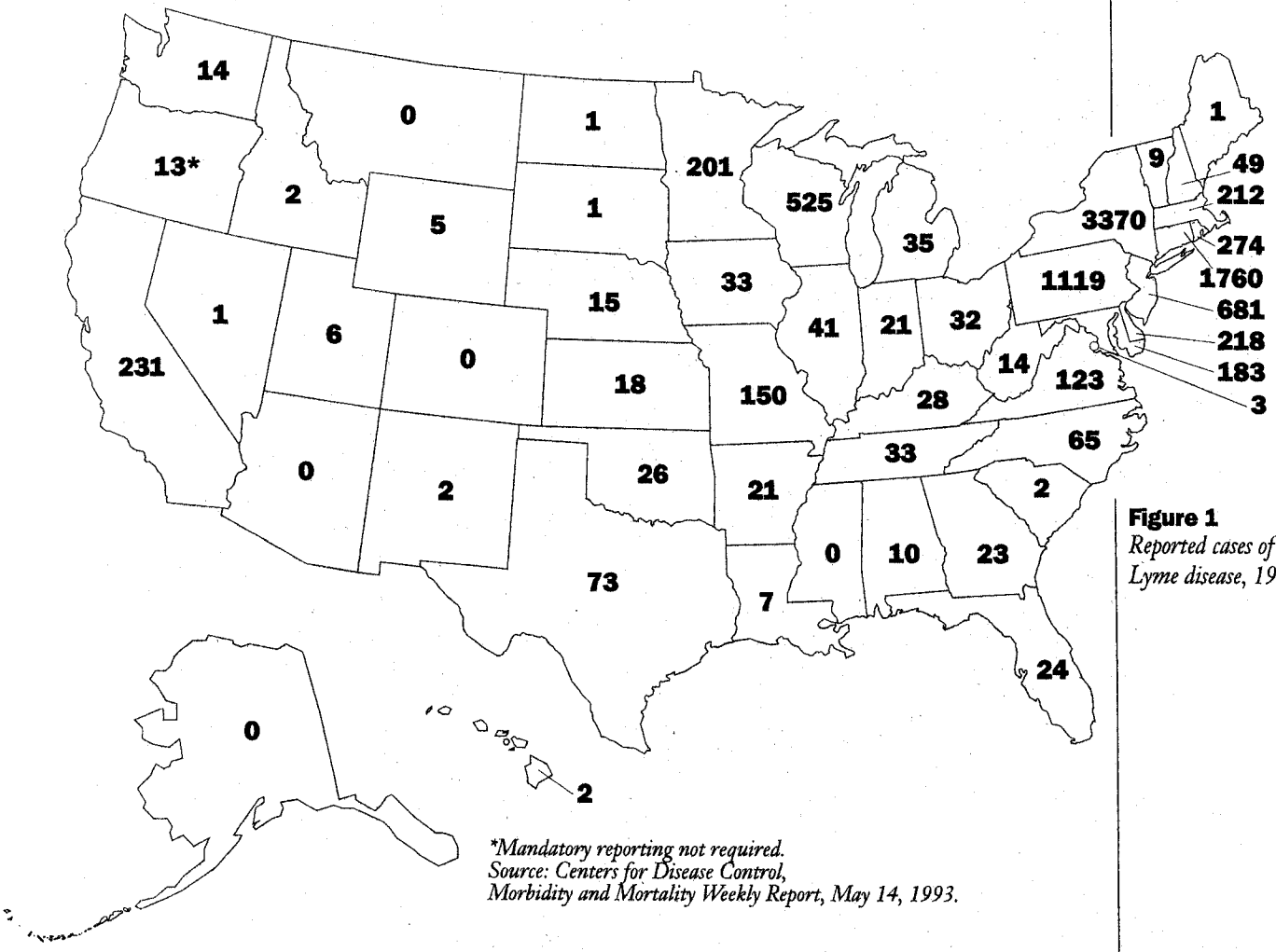
Lyme disease develops when the infected nymphs feed and transmit infection via the skin to humans and domestic animals, particularly during the summer months. Adult ticks feed and mate on deer during the fall and spring. The female ticks drop off, laying their eggs on the ground. After several weeks the eggs hatch into larvae, initiating a two-year life cycle. It is now understood that deer are not a reservoir for Lyme disease, but merely the host for the adult stages of the tick.

Not all tick species are considered capable of transmitting Lyme disease. This is an important point because Kentucky is one of several "transitional" states in the eastern United States that has reported cases of Lyme disease but does not have established populations of the tick vectors *I. scapularis* and *I. pacificus*. *I. scapularis* is present in several border states including Indiana, Illinois, Virginia, and Tennessee whereas *I. pacificus* is found primarily on the West Coast.

EQUINE DISEASE QUARTERLY



*Correspondence should be addressed to the editors,*
*Department of Veterinary Science*
*Gluck Equine Research Center*
*University of Kentucky*
*Lexington, KY 40546-0099*
*Telephone (606) 257-4757*
*Fax (606) 257-8542.*




*Mandatory reporting not required.
*Source: Centers for Disease Control, Morbidity and Mortality Weekly Report, May 14, 1993.*

**Figure 1**
*Reported cases of human Lyme disease, 1992*

Three species of ticks are found in Kentucky: the American dog tick, *Dermacentor variabilis*; the lone star tick, *Amblyomma americanum*; and *Ixodes cookei* (**Figure 2**). Adult stages of the American dog tick can be found on horses from mid-April to late July in Kentucky. The lone star tick has a wide host range including humans, and wild and domestic mammals, and is found primarily in the south and west of the state. *Ixodes cookei* has occasionally been found on horses, dogs, and humans in Kentucky. Studies so far have failed to produce conclusive evidence that ticks other than *I. scapularis* and *I. pacificus* are capable of transmitting Lyme disease.

Ticks on horses are usually found under the mane and tail during the summer months. They cause irritation, resulting in excessive rubbing, and large numbers may give rise to anemia. To ensure horses are free of ticks they should be kept away from wooded areas that harbor wild life. Ticks do not move great distances and mowed paddocks are not suitable tick habitats.

Horses should be regularly inspected for the presence of ticks. If ticks found are they should be removed by grasping the tick close to the surface of the skin with tweezers and pulling gently. Various pesticides, including pyrethrins and permethrins, are available; it is important to always follow the label directions, particularly if they are applied to pregnant mares.

**Contact:**
Dr. Gregory Burg, (606) 257-7473
Department of Entomology

**Figure 2**
*Three species of ticks (not to scale)*

Black-legged tick
*I. scapularis*

American dog
*Dermacentor va*

## Septicemic Foals

Septicemia refers to disease-causing bacteria and their toxins circulating through the bloodstream with the potential to infect various organs. When foals die from septicemia, the most commonly cultured organs which yield pathogenic bacteria are the kidney, liver, lung, lymph nodes, and intestines. Bacteria are occasionally isolated from the brain, subcutaneous abscesses, and joints.

A study of foals less than four months of age necropsied at the Livestock Disease Diagnostic Center revealed that 76 died of septicemia in 1991 and 58 in 1992. The majority of organisms isolated from necropsy specimens were Gram negative bacteria including *E. coli*, *Actinobacillus* spp., *Klebsiella*, and *Enterobacter* spp. **(Figure 3)**. The 18 Gram negative mixed infections most commonly included *E. coli*, *Actinobacillus* spp. and *Klebsiella pneumoniae*. *Streptococci* spp. were the most frequently cultured Gram positive bacteria. A mixture of Gram positive and Gram negative bacteria were detected in 26 cases.

In nine necropsies, no pathogenic bacteria were grown on culture, yet a diagnosis was made of septicemia. These cases had postmortem lesions indicative of septicemia. The inability to culture any pathogenic bacteria was attributed to antibiotic therapy which interfered with bacterial isolation.

Sixty percent of foals died within one week of birth **(Figure 4)**. The cause of death was primarily as a result of Gram negative infection. These early deaths were infected *in utero*, during parturition, or shortly after birth. The Gram negative isolates were always resistant to penicillin and erythromycin and often resistant to sulfa drugs, tetracycline, tribrissen, gentamicin, and neomycin.

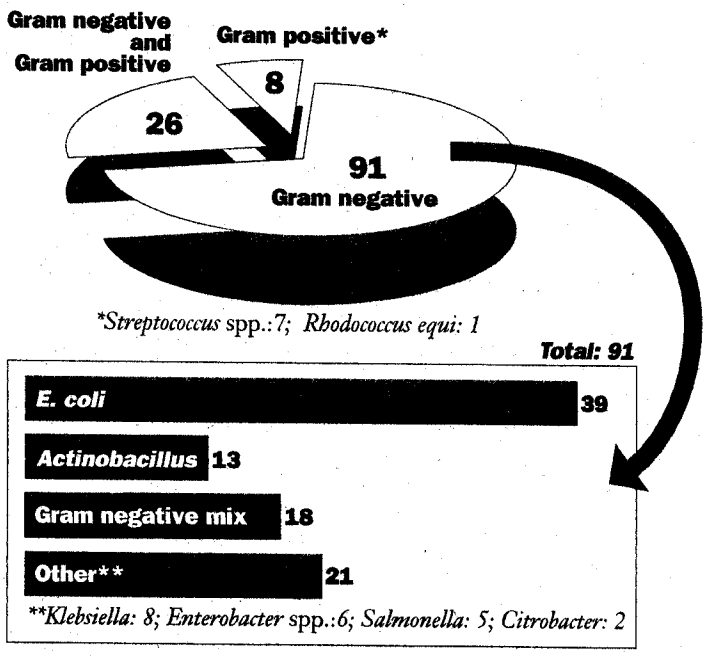
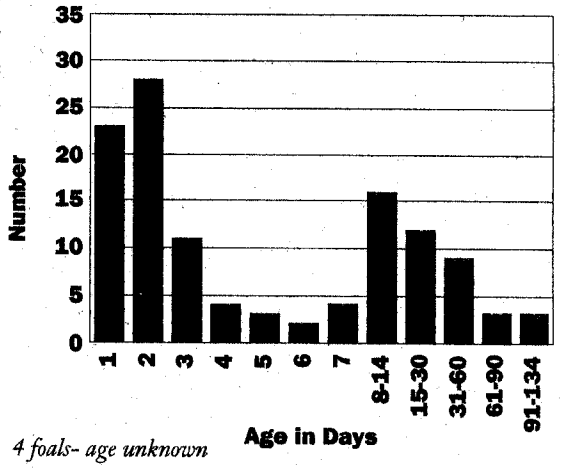



**Figure 3**
*Bacteria isolated from septicemic foals*

**Figure 4**
*Ages of septicemic foals*




*4 foals- age unknown*

**Contact:**
Dr. Roberta Dwyer, (606) 257-4285
Maxwell H. Gluck Equine Research Center
*or*
Dr. Marie Petrites-Murphy, (606) 253-0571
Livestock Disease Diagnostic Center

ick
ibilis

Lone-star tick
*Amblyomma americanum*

## Pregnancy Rates in Mares: Time of First Breeding

The release of live foaling information by The Jockey Club has made it possible to compare foaling success by Kentucky mares to the entire mare population registered with The Jockey Club (United States, Canada, and Puerto Rico). The results were compared over a two-year period during 1987-1988 and involved more than 179,000 mare years for the entire population and about 33,000 mare years for the Kentucky population.

Data were analyzed to determine the effect of the first breeding date on live foaling rates (**Figure 5**). For the entire Thoroughbred population, about 68% of mares that were first bred in February produced a foal from a cover that occurred sometime during the breeding season. In contrast only about 40% of the mares first bred in June produced a live foal.

The live foaling rate for Kentucky mares was about 78% for those first bred in February and about 45% for those first bred in June. For both the overall population and for Kentucky mares, the live foaling rate for the season decreased by an average 9% for each month that first breeding was delayed.

There are three possible explanations for the decline in live foaling rate as the season progresses: a decline in mare fertility as the breeding season progresses; groups of mares bred early in the season are more fertile than mares bred later in the season; or, mares first bred earlier in the season have more breeding opportunities (cycles) than those first bred later in the season. Results indicated that the latter factor had the largest effect on the seasonal foaling rate.

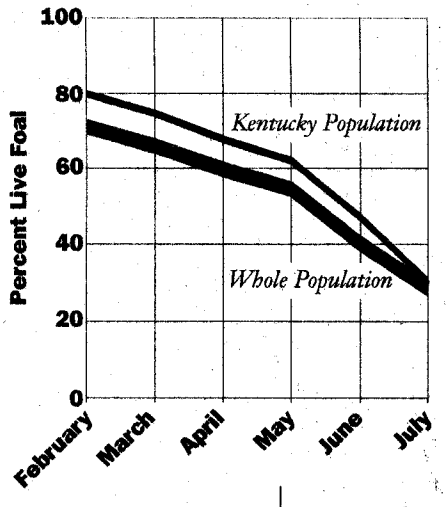



**Figure 5**
*Effect of first breeding date on live foaling percentage*

The decline in live foaling rate as first breeding was delayed occurred in mares of different reproductive statuses. The rates of decline were similar for maiden, barren, and foaling mares.

The potential number of cycles on which mares can be bred is the primary factor for reproductive success. For mares first bred in February or March, there is enough time in the breeding season for five or six cycles. However, if a mare is first bred in June, there is only enough time remaining for one or two cycles before the breeding season ends in mid July.

To increase the potential number of cycles available during the breeding season:

- Put mares under artificial lights to stimulate an early onset of ovulatory cycles.
- Breed mares as soon as possible.
- Do not skip a cycle unless it is absolutely necessary.
- Examine mares for pregnancy as soon as possible.
- Re-breed mares that are found not to be pregnant.
- Re-examine pregnant mares at periodic intervals, and, if a pregnancy is lost, re-breed during the same season.

The number of cycles available for breeding each mare can be maximized if managers, veterinarians, and owners work together to get an early start on each mare and to be patient and persistent until the breeding sheds close.

**Contact:**
Dr. Karen McDowell, (606) 257-2874
Maxwell H. Gluck Equine Research Center

## Fescue, Endophyte, and Mares

A fungal endophyte exists in the majority of Kentucky's tall fescue. It has been associated with agalactia, prolonged gestation, dystocia, and thickened or retained placenta among mares grazed on infected tall fescue during their last trimester of pregnancy.

Studies of this fungus have revealed that its presence in tall fescue adds to its drought and stress tolerance but causes significant livestock problems in ruminants and horses. The fungus, *Acremonium coenophialum*, grows only within the tall fescue plant and never naturally occurs outside the plant. It can only be detected by microscopic examination of treated stem bases of the plant or by immunosorbant assays.

Not all varieties of fescue have the endophyte, and several endophyte-free varieties are available (e.g., Kenhy, Johnstone, Forager, Phyter, and Cattle Club). Surveys of more than 200 tall fescue fields in Kentucky during 1981 found that 97% were infected to some degree with the fungus.

The severity of foaling and reproductive problems associated with tall fescue varies greatly. In South Carolina and Alabama, experimental studies where mares were foaled on infected tall fescue resulted in foal and mare mortality as a consequence of complications during foaling. However, in Kentucky

several farms with tall fescue infected pastures routinely carry mares to term without significant problems.

During the early spring of 1990 a large horse farm in Central Kentucky noted an increase in the number of cases of prolonged gestation, dystocia, and agalactia in foaling mares. Examination of their foaling pastures revealed a high percentage of infection with the fungal endophyte, and the symptoms fitted the classical fescue toxicity pattern.

But why was there a problem in 1990 when this farm had not changed its foaling management or pasture grass component in several years? Analysis of the tall fescue for alkaloids associated with the fungus (and implicated in its toxicity to horses) revealed concentrations excessively high for early April. A hypothesis was formed that the premature production of alkaloids in 1990 was related to the abnormally warm winter.

To test this theory, monthly samples were taken from fescue fields on the farm and analyzed for loline alkaloids, which are produced in tall fescue only in association with the endophyte. The data obtained show that weather, specifically temperature, does not totally explain why levels of loline alkaloids get prematurely high in some years. In general, the concentration of alkaloids does rise with increasing temperature, but there was considerable variation even among adjacent fields.

What can we conclude from the research undertaken in Kentucky and other states? Kentucky horse farms have not experienced the severity of toxicosis associated with pregnant mares grazing tall fescue in experimental studies conducted in other states. Among horses, only pregnant mares seem to be adversely affected by the endophyte in tall fescue.

Dilution of the alkaloid intake by including clover in pastures or by feeding grain does not moderate the symptoms of fescue toxicosis in horses to the extent observed in cattle. Horses foaling later in the spring (April, May) are at greater risk for developing fescue toxicosis symptoms. Removing pregnant mares 90 days prior to foaling is still the best recommendation for fescue infected with the endophyte. Even hay made from infected tall fescue should not be fed to mares during this period.

**Contact:**
Dr. Jimmy Henning, (606) 257-3144
Department of Agronomy

**Newsletter**
**Department of Veterinary Science**
**Gluck Equine Research Center**
**University of Kentucky**
**Lexington, KY 40546-0099**

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