

Brought to you by the UK Equine Initiative and Gluck Equine Research Center

## UK Hosts First All-Equine Field Day

Nearly 125 attended the University of Kentucky's first all-equine field day on June 27. Participants, who hailed from 29 Kentucky counties and seven states, chose three of nine available workshops highlighting ongoing equine research at UK and visited nearly 40 sponsors and College of Agriculture-affiliated exhibits.

Topics and Speakers for the 2009 Equine Field Day were:

■ **Managing Problem Weeds On Horse Farms**, Bill Witt, PhD.

Participants viewed approximately 75 weed species growing at the site. Control options (mowing, tillage, herbicides) were discussed with emphasis on control in cool season grass pastures.

■ **Degenerative Joint Disease**, Jamie Mac-Leod, VMD, PhD.

The breakdown of tissues in a synovial joint that contribute to osteoarthritis in horses were described. Clinical signs, diagnostic methods, and treatment/management issues were presented along with a description of research initiatives in



**Dr. MacLeod conducted a workshop on joint disease.**

these areas that are being conducted at UK.

■ **Evaluating Your Feeding Program**, Laurie Lawrence, PhD, and Bryan Cassill, MS, Jennifer Ringler, MS, Mieke Brummer, MS, Grey Parks, BS, Shawna McCown, BS.

New information was presented on selecting the best feeds for broodmares, growing horses, and performance horses. The workshop included an explanation of the benefits of different types of hays and some of the non-traditional feed ingredients that are now

used in horse feeding. Participants had the opportunity to test their skills at evaluating the best hay for a horse.

■ **Vaccination and Infectious Disease Control**, David Horohov, PhD.

This workshop focused on some of the methods available to prevent the occurrence and spread of infectious diseases. Emphasis was placed on the vaccination recommendations from the American Association of Equine Practitioners. The development and use of an infectious disease

control program was also discussed. Faculty and students from the Gluck Center were presented to answer questions about vaccination and infectious disease control programs.

■ **Is Your Deworming Program Working?** Mary Rossano, PhD, and Jim Smith, DVM.

### ARTICLES OF INTEREST

#### UK Field Day Topics

Poisoning in Horses

Weed of the Month

CEM Study: Antibiotic-Treated Semen Bermudagrass for Horse Pastures

Economic Impact of Ky. Horse Shows

Book written by Carter Signed

Kentucky LDDC Expansion Underway

Old Horse Immune Function

Developing Natural Springs as Water Sources

Tobin Receives Award

Outreach From Gluck, LDDC Faculty

Upcoming Events

# BLUEGRASS EQUINE DIGEST

## (EQUINE FIELD DAY ...)

Rossano and Smith presented an update on trends in drug resistance in equine parasites in Kentucky. Topics included detecting drug resistance, strategic deworming, and alternatives to chemical parasite control.

■ **Rotational Grazing**, Bob Coleman, PhD, Glen Aiken, PhD, and Charles Dougherty, PhD. They discussed the use of rotational graz-



**Bill Witt, PhD, of UK's Plant and Soil Sciences Department, conducted a weed identification and management workshop at UK's first all-equine field day held June 27.**

ing for horses, including the topics of stocking rates, pasture management, and horse management to maximize the use of the forage produced while maintaining the horses in appropriate condition.

■ **Normal Development of the Equine Pregnancy**, Mats Troedsson, DVM, PhD. Dipl. ACT, ECAR, and Claudia Klein, DVM.

This session addressed normal development of pregnancy and pregnancy-related problems during early and late gestation

■ **Mud, Horses, and Clean Water**, Steve Higgins, PhD.

This session discussed stream crossings, gulley erosion, and riparian areas (zones of vegetation on the bank of a natural body of water) as they relate to water quality.

■ **Economic Considerations: Does Your Farm Need A "Bale-Out?"** Kenny Burdine, MS.

This session focused on cost management for equine operations and specifically examined grazing versus hay feeding.

## Thanks to Our Sponsors

Sponsors included Darley, Keeneland, Intervet/Schering-Plough Animal Health, Dow AgroSciences, Fort Dodge, Neogen, American Saddlebred Horse Association, Boehringer Ingelheim Vetmedica, Central Equipment, Hagyard Equine Medical Institute, John Wiley Books, KBC Horse Supplies, Kentucky Equine Education Project, Kentucky Equine Research, Kentucky Thoroughbred Farm Managers Club, Kentucky Thoroughbred Association/Kentucky Thoroughbred Owners and Breeders, Rood and Riddle Equine Hospital, The Pond Lady, Fayette County Farm Bureau, Horse Cents, Kentucky Horse Council, and Woodford Feed. **UK**

To see photos from the event or to download informational handouts given by each of the speakers, visit [www.ag.uky.edu/equine/?p=198](http://www.ag.uky.edu/equine/?p=198)



**Mary Rossano, PhD, of UK's Animal Science Department, discussed effective deworming.**



**From left to right, Tracey Sturgill, PhD; Amanda Adams, PhD; David Horohov, PhD, William Robert Mills, PhD, Chair in Equine Immunology; and Roberta Dwyer, DVM, PhD, Dipl. ACVPM, from UK's Gluck Equine Research Center gathered before their session on vaccination and infectious disease control.**

## POISONING IN HORSES

Poisoning in horses is not a common occurrence, but when poisoning occurs, effects can be disastrous and far-reaching. Listing all toxic substances is impossible, as virtually everything on the planet can be toxic at sufficiently high dosages. What dose is safe and what dose is toxic varies with each toxin, each animal, and each situation. Factors that influence risk from a toxic substance include animal age, concurrent diseases, exposure to concurrent toxins or drugs, reproductive status, and route of exposure. This article will briefly summarize some of the more common toxic substances that can pose risks to horses in North America.

**Herbal Supplements** The use of herbal supplements for horses has become common in recent years. Many people believe that if something is “natural,” it must be safe and non-toxic. However, some of the most toxic substances on earth are completely natural (such as botulinum toxin, taxine in yew plants, and nicotine). Many herbal and natural supplements are inherently toxic, and many herbal products contain impurities and unknown amounts of “natural” ingredients. Herbal supplements are not well-regulated, and studies investigating risks associated with use of these products in horses are lacking.

**Plants, Feeds, and Feed Additives** Pastures can contain toxic plants and grasses that can pose risks at certain times during the year or under certain circumstances. Too many toxic plants

exist to list here, and importance varies greatly with geographic location. However, all weeds should be viewed with suspicion and identified if possible. Additionally, grains can be contami-

nated with seeds from poisonous plants. Many shrubs, trees, and ornamental plants can be toxic to horses.

Hay and feed pellets can pose a toxic risk when

## WEED OF THE MONTH

**Common name:** Poison Hemlock

**Other names:** Nodding thistle

**Scientific name:** *Conium maculatum* L.

**Life Cycle:** Biennial

**Origin:** Eurasia

**Poisonous:** Yes, extremely

Poison hemlock is distributed widely across the United States and grows most frequently along fence borders in shady and moist areas. Seed germination occurs in the fall or early spring, and flowering occurs from May through July, depending on location. This robust growing plant might reach heights up to 10 feet. The leaves are alternate or basal and three to four pinnately compound and sometimes are confused with wild carrot (Queen Anne’s lace). Stems are erect, smooth, and hollow, and they have purple mottling. This purple mottling is one method of distinguishing poison hemlock from wild carrot.

This plant is extremely poisonous to horses and humans, and all plant parts contain the poisonous alkaloids; however, the fruits contain the greatest concentration of the alkaloids. Poison hemlock gives off a rank odor when crushed, and horses rarely eat this plant because of its low palatability. Poison hemlock plants harvested with hay maintain the toxic properties, so care should be taken to avoid feeding hay containing this plant.

Control of poison hemlock is relatively easy with herbicides. Mowing and hand weeding should occur well before flower production to prevent seed production. Consult your local Cooperative Extension Service personnel for herbicidal control in your area. **UK**

*Bill Witt, PhD, a researcher in Plant and Soil Sciences, provided this information.*



**Poison Hemlock**

## (POISONING ...)

unintended substances are incorporated into the feed. These substances include toxic weeds, toxic insects such as blister beetles, and dead animals that can serve as the origin of botulinum toxin production. Rotting, decomposing feeds, or improperly stored hay, can also contain botulinum toxin. Pelleted or supplemental feeds can contain contaminants such as ionophores (for example, monensin) or antibiotics due to mixing errors or contamination from transport vehicles. By-products from grain distillation can be present in supplemental feeds and can contain mycotoxins and antibiotic residues.

**Mycotoxins** Grains might contain fungal toxins. Grain screenings or broken grain pieces carry a higher risk of containing significant concentrations of aflatoxins and fumonisins, both important mycotoxins. Some grass forages can contain mycotoxins such as slaframine and lolitrems. Endophyte-infected tall fescue grass can contain ergovaline and other mycotoxins that can cause reproductive problems in horses.

**Metals and Minerals** Mineral and salt supplements potentially can contain incorrect concentrations of minerals due to mixing errors or accidental mislabeling. Direct exposure to toxic metals such as arsenic and lead can occur through contaminated soils; dump sites; ashes of burned, treated lumber; some pesticides; and paint from older buildings or bridges.

**Pesticides** These include products designed to kill rodents, fungi, insects, snails and slugs, weeds, birds, and coyotes or other predators.

Many horse owners have rodenticide products in their barns, not realizing that anything that will kill a rodent will also kill a horse if the dosage is high enough. Many pesticides contain flavorings or grain bases that are very attractive to horses. Risks from insecticides, fungicides, and herbicides are generally highest with concentrated products

### Useful References For Poisonous Plants

- Knight, A.P., and Walter, R.G. *A Guide to Plant Poisoning of Animals in North America*. Teton New Media, Jackson, Wyoming. 2001;
- Burrows, G.E., and Tyrl, R.J. *Toxic Plants of North America*. Iowa State University Press. Ames, Iowa. 2001; and
- Burrows, G.E., and Tyrl, R. *Handbook of Toxic Plants of North America*. Blackwell Publishing, Ames, Iowa. 2006.

or treated seeds.

**Industrial Toxins** Contamination of pasture, water, and air can occur from industrial chemicals and petroleum products that are emitted upwind or upstream. Industrial toxins are not a common cause of poisoning in horses, but veterinarians and owners should be aware of nearby industrial and mining activities.

**Venomous Animals** Bites from venomous snakes—most importantly rattlesnakes, copperheads, and water moccasins—are common occurrences in horses in the southern and western

parts of North America. Bees, wasps, black widow spiders, fire ants, and brown recluse spiders can also pose risks to horses.

Horse owners, farm managers, and veterinarians should be aware of the myriad of potentially toxic substances that can pose risks to horses, and they should take steps to minimize the chance that poisoning will occur. **UK**

*Cynthia Gaskill, DVM, PhD, is an associate professor and veterinary clinical toxicologist at the Livestock Disease Diagnostic Center. Reprinted from Equine Disease Quarterly, University of Kentucky, College of Agriculture, Department of Veterinary Science.*

## CEM STUDY: ANTIBIOTIC-TREATED SEMEN REDUCES DISEASE SPREAD

Researchers at the University of Kentucky's Gluck Equine Research Center will publish a study this fall (2009) that shows antibiotic-treated semen used in artificial insemination can reduce the risk of spreading of contagious equine metritis (CEM), a sexually transmitted disease in horses.

The UK study set out to investigate if antibiotics in semen extender, which is used for artificial insemination, inhibit the growth of *Taylorella equigenitalis*. Preliminary results show the antibiotics eliminate the spread of CEM from an infected stallion to a mare when antibiotic-treated semen is used in artificial insemination.

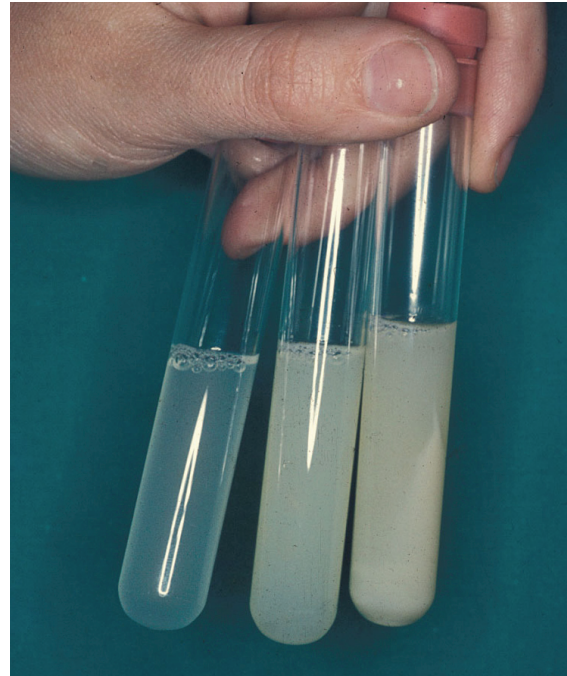
The study began shortly after several Quarter Horse stallions in Kentucky tested positive in December 2008 for *Taylorella equigenitalis*. All the stallions were actively used in breeding via artificial insemination.

To date, 21 stallions nationwide have tested positive for CEM, and a total of 715 mares have been exposed. Of the 715 mares exposed to CEM, only four showed clinical signs.

Stallions are asymptomatic carriers (they don't show any clinical signs of disease) when they harbor the bacterium that causes CEM, *Taylorella equigenitalis*. About a week after breeding, most infected mares will begin to show distinct clinical signs, including a noticeable vaginal discharge. (Note: not all mares will develop a discharge

when infected with *T. equigenitalis*.)

There are two phases of infection in mares: acute and chronic (carrier). The acute phase of disease frequently results in a thick, mucoid/milky white discharge from the vulva that is obvi-



**The test tubes show color differentiation in discharge collected from mares infected with contagious equine metritis.**

ous within 10 to 14 days post-breeding. Carrier mares are those with an established bacterial infection in the clitoral area (sinus and fossa) or the uterus, with or without clinical signs of disease. These mares are highly infectious until the bacteria are cleared.

CEM can cause a serious economic impact to

the equine industry. When a mare is infected with *T. equigenitalis*, she generally cannot become pregnant until the bacteria are cleared. Treatment isn't difficult, but it is labor-intensive. Once the bacteria are cleared, the mare can become pregnant.

### Historically Speaking

The first outbreak of CEM occurred in Ireland and England in 1978 through natural breeding in the Thoroughbred industry. In 1979, the first CEM outbreak occurred in Lexington, Ky., when two stallions were imported from Europe. This triggered a response from the United States to regulate imported stallions.

Today, CEM is a reportable disease at the Federal level, and imported stallions and mares are routinely tested for CEM. The current procedure is based on bacterial culture of *T. equigenitalis*. However, this organism is difficult to grow in the lab, and repeated samples are required to confirm a negative status of the horse. For that reason part of the research performed at the Gluck Center has focused on developing and validating a PCR test to aid in the diagnosis of CEM. Results are promising. **UK**

*Claudia Klein, DVM, is a staff veterinarian and graduate student in reproduction at the Gluck Center. Jenny Blandford is the Gluck Equine Research Foundation Assistant at the Gluck Center.*

## BERMUDAGRASS FOR HORSE PASTURES

Kentucky horse owners might find Bermudagrass to be a good summer pasture species for mares, foals, and yearlings, and it might also serve as an on-farm source of hay or bedding. These observations are based on a continuing four-year study at UK.

Cold-hardy bermudagrass cultivars, developed by plant breeder Charles Taliaferro at Oklahoma State University and marketed by Johnston Seed Company, can be established from seed, eliminating the costs and problems of establishment by sprigging (putting out small plants). "Wrangler" bermudagrass was marketed primarily as forage for cattle. "Reata," which is a blend of "Wrangler" and "Riveria" (a seeded turf-type bermudagrass), has been sold specifically for equine grazing.

Bermudagrass seed is very small (there are more than 2 million seeds per pound) and is coated with materials to facilitate seeding and germination. About one half of the coated seed weight is made up of these materials. Wrangler and Reata are sown at 6 pounds of coated seeds per acre. Coated seed costs about \$300 per 50-pound bag.

An experimental bermudagrass pasture was developed at UK's Spindletop Farm in the spring of 2003. Coated seed was broadcast on a prepared seedbed and consolidated with a

cultipacker.

Low temperatures in early summer 2003 resulted in sparse bermudagrass stands, so we broadcast more bermudagrass seed in 2004. In 2005, the field was managed for establishment and mowed frequently because of severe infestations of spiny and red root pigweed. Cool-season grasses and winter annual weeds were controlled by glyphosate (Roundup) in the spring every year when the bermudagrass is dormant. Broadleaf weeds were controlled with 2, 4-D dicamba in April or May each year.

Bermudagrass grows when air temperatures are above 65°F, and it grows exceptionally well up to 100°F, given timely spring and summer rains. Bermudagrass grows best when cool-season grasses are stifled by high temperatures in July and August. Growth slows in October as nights cool, stops growing at 50°F, then loses its green color as leaf cells die ("brown off") after the first frosts in mid-October. There has been no "winter kill" in Spindletop's Wrangler bermudagrass pasture the last six winters, indicating that these plants are really cold-hardy in Kentucky.



**Bermudagrass**

The field was grazed by mature horses in the summers of 2006 through 2008 and again starting in June 2009. Grazing of bermudagrass at Spindletop usually starts about the first of June, depending on growth during the spring weather. In the three years of grazing this pasture with mature horses, horses feeding on the bermudagrass have not been supplemented with hay or other feeds, nor has the pasture been irrigated. The horses maintained body weight and body condition scores without supplements and irrigation, even in occasional droughts. Surplus herbage was clipped in June, July, and August.

Stockpiled herbage (surplus herbage) provided some reservoir of energy when grass growth was

## (BERMUDAGRASS ...)

limited by rainfall in September and October or by low temperatures.

### Extending Your Grass

With Kentucky bermudagrass you can expect 120 to 140 days of grazing each season. The season can be extended by grazing of the senescent (browned off) herbage. Research in Arkansas indicates that standing browned off herbage retains its nutrients longer. The grazing season can also be extended by over-seeding the stand of bermudagrass with annual ryegrass or other cool-season forages, although UK researchers have not looked at that option.

In Kentucky, bermudagrass might yield up to 8 tons of dry matter per acre each 140-day growing season. This means that bermudagrass growth rates could average 150 pounds per acre per day for 120 days, which could support six mares per acre consuming 25 pounds per day. To support these high pasture growth rates, UK researchers applied 50 pounds of nitrogen (as urea) every four weeks or up to 200 pounds of nitrogen per acre over the growing season. The pastures also received broadcast potassium, as chloride, at 200 pounds per acre based on soil testing.

A simple rotational grazing system was used from 2006-2009. The field perimeter was secured with four plank fences and electrified high-tensile fences. Four, five, or six temporary paddocks were created with three strands of polytape on insulated steel T-posts. The first three years portable waterers drawing from city water were

moved around in the temporary paddocks. In 2009 paddocks were arranged around a single insulated Mirafont waterer to facilitate watering.

The 4.8-acre field in 2006 was divided into six 0.8-acre paddocks. That year the field was stocked with 11 adult Thoroughbred and Quarter Horse mares (body weight averaged 1,112

### Kentucky Bermudagrass Forage Ideas

- Extend the grazing season by grazing the browned off herbage into the late fall and by overseeding annual ryegrass in October.
- Make bermudagrass hay from surplus herbage for pasture control and to use if there are shortfalls in pasture supply.
- Replace nitrogen fertilizer by overseeding white clover in spring.

pounds) at 2.3 mares per acre overall. When confined to a 0.8 acre paddocks, the stocking density was 13.75 mares per acre.

Horses were moved from paddock to paddock every five to seven days according to the forage supply and herbage quality. After the horses were removed, grazed pastures were mowed to 4 inches and fecal material was broken up and spread with a spring tine harrow. Pastures were grazed again after 21-28 days of growth in the absence of horses.

Horses grazed bermudagrass according to foraging theory: they grazed patches of bermuda-

grass where they could ingest herbage fastest with the least effort. Mares first grazed the hummocks that formed over old urine patches where the herbage was tallest, least mature, leafiest, greenest, and had the highest nutritive value.

Bermudagrass herbage has few macro- or micronutrient limitations for adult mares and geldings, and these classes of horses might not need supplements when on bermudagrass pastures. The soluble carbohydrates and protein of bermudagrass herbage are low and unlikely to cause nutritional problems in horses. There are no alkaloids or other harmful mycotoxins normally present in bermudagrass in Kentucky. **UK**

*Prepared by Bob Coleman, PhD, PAS, UK Department of Animal and Food Sciences, Glen Aiken, PhD, USDA Agricultural Research Service, and Charles Dougherty, PhD, UK Department of Plant and Soil Sciences, for the 2009 UK Equine Field Day, June 27, 2009.*

## Kentucky Horse Shows and Competitions, Understanding the Impacts

While most link Thoroughbred racing to Kentucky's horse industry, few understand the incredible scope of the non-racing industry and the numerous industries that surround and support it. The objective of this study was to help readers gain an understanding of Kentucky's non-racing horse industry, specifically horse shows and competitions.

In November 2008, a survey was mailed to managers of Kentucky horse shows held between 2005 and 2008, with assistance from the Kentucky Equine Education Project (KEEP). This survey provided useful insight into this piece of the state's horse industry and allowed university researchers to develop an understanding of the potential impacts from horse shows on the state's economy.

According to KEEP records, at least one horse show was held in 80 of Kentucky's 120 counties from 2005-2008. To give some feel for the size and geographic scope of the study, a total of 351 surveys were mailed to those 80 counties. Responses were received from show managers in 40 of those 80 counties, and the overall response rate was 32%.

Breed associations represented in the survey included Appaloosa, Arabian, Half-Arabian, Miniature Horse, Morab, Morgan, Mule, Paint, Paso Fino, Quarter Horse, Racking Horse, Rocky Mountain Horse, Saddlebred, Tennessee Walking Horse, and Thoroughbred. Disciplines represented in the survey included barrel racing, dressage, driving, endurance, eventing, gaited, horse pull, hunter/jumper,

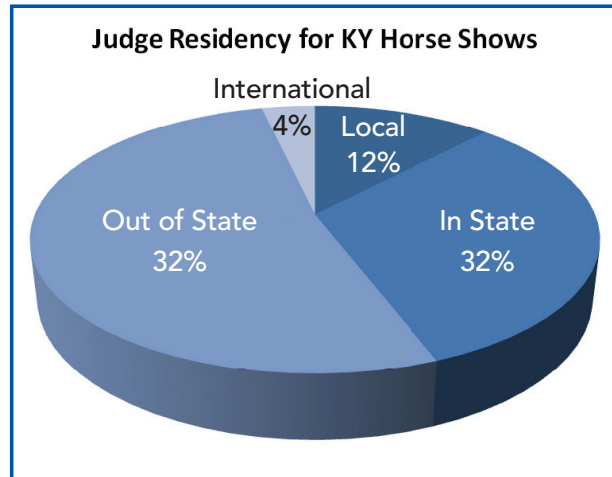


Figure 1

reining, rodeo, steeplechase, and walking/racking.

Information pertaining to the size of the show, the quality of the show, whether prize money was distributed, whether it was a benefit or charity show, what sort of paid staff were used, what services were purchased or rented, and whether vendors were available on site all provide indications of the impact that a horse show has on a community. The results are summarized below.

### Size, Quality, and Length of Shows

There are many ways to describe the size of a show. Two of the most common are by the numbers of competitors and horses involved. More than 81% of the responding shows involved more than 50 competitors, and almost half involved more than 100. Similarly, about 75% of the responding shows involved more than 50 horses and nearly half

involved more than 100. These figures are important because they indicate the number of people who will be relying on local services for themselves and their horses during the show.

Another way to describe shows is to determine whether they are recognized or not. While it depends on the breed, color, or discipline association, in general, a recognized show must use judges who have been certified by the appropriate governing body, and in some cases, only registered horses can be shown. Recognized shows are perceived to be of higher quality, which means

that there is a greater likelihood that competi-

tors will travel farther for the show. Consequently, communities can expect a greater economic benefit from these shows.

In the sample, 57% of the shows were rated, 43% were restricted-breed, and 59% were open (some organizations offer both breed and open classes in the same show). Moreover, 62% of the shows in the sample were targeted to youth competitors (18 and under).

The residency of judges for horse shows is another indicator of the quality of a show. Show managers attempt to get out-of-state judges, and some disciplines even require this. In rare events, international judges are hired. This is important because the residency of the judge can be one indicator of the prestige of a show. Figure 1 shows that over half of the shows surveyed used out-of-state judges. Local judges were used in only 12% of shows.



## (HORSE SHOWS ...)

Finally, the length of a show is an important factor when considering its likely impact because it indicates the duration that competitors might rely on the local community for peripheral services. Longer shows require longer stays, which increases the amount of money spent in the local community on meals, lodging, transportation, and other services. About 42% of the shows in the survey lasted more than one day.

### Paid Staff and Vendors

In addition to the money spent by participants, there are also significant costs in putting on a show. A horse show requires a large crew, and most crews are volunteers. However, many shows also hire staff, which creates additional economic impact. Approximately 67% of the shows in the sample paid an announcer. Additionally, show managers, farriers, medics, and musicians were also commonly hired. Businesses in the local community might play a role in the horse show. In fact, shows often purchase or rent services from local vendors. In the sample, food service was the most common service that was paid for (48%), followed by advertising (38%), hotel services (35%), and show equipment (32%). Figures 2 and 3 show common staff and services utilized by horse show managers.

The need for services creates an opportunity for vendors to showcase their products and/or services to show participants and visitors. This represents another opportunity for local businesses to benefit from the horse show in their

communities, and many of the horse show managers indicated that they used local services where they were available.

According to the survey, 68% of the shows in the sample had an area where vendors could set up displays. Of those shows with vendors, 20% used only local vendors, 21% had more than half local vendors, 13% used less than half local vendors, and 46% of the shows used no local vendors at all (Figure 4; page 10).

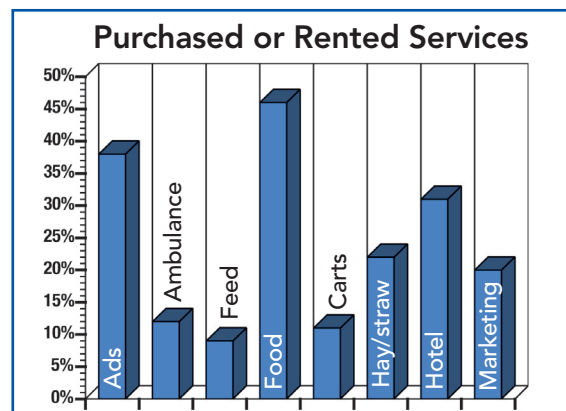


Figure 2

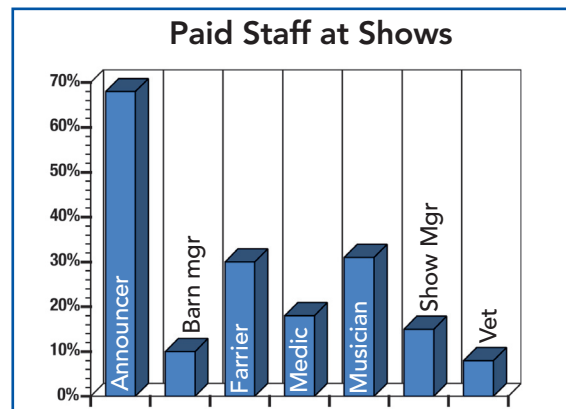


Figure 3

### Fees, Prize Money, and Charity

There are impacts and incentives that result from entry fees and prize money for participants. Nearly all of the shows charged entry fees. These fees consisted of gate fees, per class or per horse fees, or some combination thereof. Furthermore, 81% of the shows in the sample distributed prize money; these monies were funded by sponsors (85%), entry fees (72%), and other sources (36%). For those surveys listing a total amount of prize monies distributed, the average was \$10,398.68, with a median of \$3,987.50. Also, note that this does not include ribbons, trophies, buckles, or saddles, which are often given as prizes.

Thirty-four percent of the shows in the survey donated some amount to a charity or some other cause, such as a school athletic team. On average, these shows donated just over \$7,000 to charity, with a median of just over \$1,600 and a maximum of \$42,000. This is a positive impact that is often overlooked by many outsiders.

### Summary

The non-racing horse industry in Kentucky is often overlooked when considering economic impacts of the equine industry. In reality, this is a significant segment of the industry that provides a wide range of economic benefits to the state through breeding, nutrition, boarding, training, and health services. The state also benefits through peripheral services such as meals, lodging, and transportation.

This study outlined impacts coming from horse

(HORSE SHOWS ...)

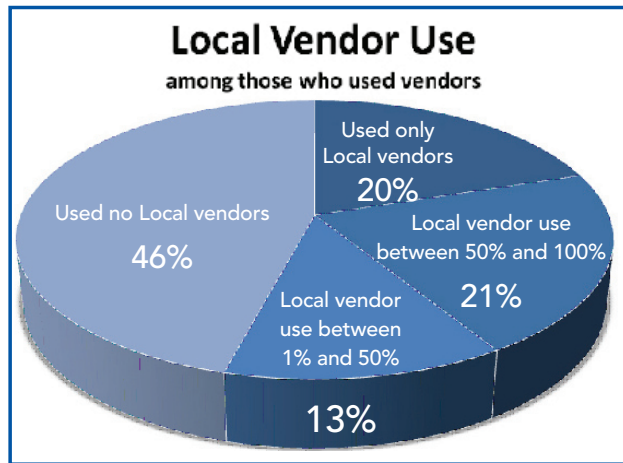


Figure 4

shows and competitions, many of which accrue directly to the local communities hosting the events through a variety of avenues. While putting a dollar amount on this impact requires further examination and research, which is currently in progress, it is clear that the impact is quite significant, and explains why many communities have worked to create inviting venues to attract these types of shows and competitions. [UK](#)

## Acknowledgments

The authors would like to thank Rich Wilcke and Tim Capps from the University of Louisville for their assistance with this project.

*C. Jill Stowe, PhD, Assistant Professor, Agricultural Economics; and Kenny Burdine, extension specialist, Agricultural Economics.*

## BOOK WRITTEN BY CARTER SIGNED BY SUBJECT AT AVMA MEETING

James H. Steele founded the veterinary division of the Centers for Disease Control and Prevention (CDC) in 1947. The 96-year-old veterinarian is called “The Father of Veterinary Public Health” by his colleagues.

A book written by Craig Carter, DVM, PhD, Dipl. ACVPM, director of the University of Kentucky’s Livestock Disease Diagnostic Center, was signed by Steele, DVM, at the American Veterinary Medical Association meeting July 11-13 in Seattle. The book signing was hosted by the American College of Veterinary Preventive Medicine (ACVPM).

*One Man, One Medicine, One Health—the James H. Steele Story*, by Carter and editorial assistant Cynthia Hoobler, DVM, MPH, Dipl. ACVPM, highlights the career of Steele. He introduced the principles of veterinary public health to the U.S. and countries around the globe, saving untold animal and human lives along the way. His achievements have helped the world achieve higher standards of living through a better understanding of the epidemiology of diseases shared by animals and man (zoonoses).

As a U.S. Public Health Service officer, Steele became the first Assistant Surgeon General

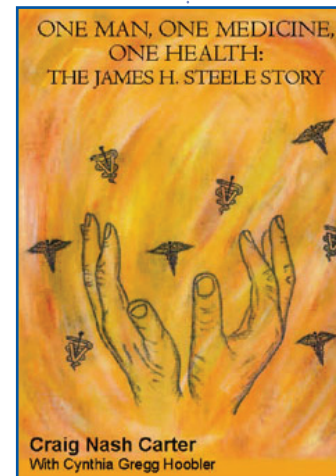
for Veterinary Affairs and later was appointed Deputy Assistant Secretary for Health and Human Services at the rank of Admiral. He has received numerous awards through his career, including the Surgeon General’s Medallion in 2006, presented by SG Richard H. Carmona. Steele is the only veterinarian to receive that prestigious award.

The biography begins with Steele’s birth and scrappy childhood in Chicago and takes the reader through his formal education, early work experiences, and on through to his retirement from the CDC in 1971. Family and personal experiences are weaved into the story to include real-life adventure, success, tragedy, and humor.

After leaving the CDC, Steele began a prominent second career as a Professor of Environmental Health at the University of Texas School of Public Health. There he compiled and edited the world’s first comprehensive series of books on zoonotic diseases, the CRC Handbook Series on Zoonoses. At age 96, he continues to lecture, consult, mentor, advise, write, and inspire.

All proceeds from the book sales will benefit the Steele Endowed Lecture Series and the James H. Steele Professorship of Epidemiology at the University of Texas School of Public Health, Houston. [UK](#)

To purchase the book, visit [Amazon.com](http://Amazon.com).



## KENTUCKY LIVESTOCK DISEASE DIAGNOSTIC CENTER EXPANSION UNDERWAY

A state funded \$28.5 million renovation and expansion project at UK's Livestock Disease Diagnostic Center (LDDC) in Lexington began in April 2009 with a targeted completion date of early 2011.

The renovation project will more than double the current facility, with the resultant structure taking in 65,531 square feet. Currently the LDDC, which opened its doors in 1970, is only 37,667 square feet. The bulk of the renovation will begin in November 2009.

Because of the Bluegrass state's signature horse industry, the LDDC currently has the largest equine necropsy caseload in the world, and it has the smallest necropsy room in the United States, making daily operations difficult.

Part of the renovation project includes increas-

ing the necropsy lab from 1,080 square feet to 2,725 square feet. The renovation for the lab began in April and will be complete in February 2010.

The vision for the LDDC renovation states for the facility to be "one of the premiere veterinary diagnostic laboratories in the United States providing the very best testing services in support of the practicing veterinary profession, Kentucky animal agriculture, the signature equine industries, companion animals, and public health."

Construction of a new administrative and education wing will begin soon. Faculty and staff will move into this new wing sometime in April 2010.

Other areas scheduled to expand are the serology and histology laboratories. The serology lab will be expanded from 1,041 square feet

to 2,075 square feet, and the histology lab will expand from 1,128 square feet to 1,700 square feet. The clinical/pathology area and molecular biology area also will be renovated.

The expansion and renovation will help laboratory faculty and staff to better manage an ever-increasing caseload and also to regain accreditation by the American Association of Veterinary Laboratory Diagnosticians. The LDDC underwent an accreditation visit in May 2009. Full accreditation will allow the LDDC to pursue becoming a member of the USDA National Animal Health Laboratory Network (NAHLN). [UK](#)



The University of Kentucky's Livestock Disease Diagnostic Center expansion project in Lexington began in April 2009 with a targeted completion date of early 2011.

## OLD HORSE IMMUNE FUNCTION: IS GENE LENGTH THE KEY?

Is it possible that genes becoming shorter as horses age could be the key to how well that animal's immune system works?

The availability of horses 20 years old and older on UK's Maine Chance Farm and on farms in the Lexington area was one of the things that interested David Horohov, PhD, William Robert Mills Chair in Equine Immunology, when he joined the faculty at the Gluck Equine Research Center in 2003.

His interest in older horses was a continuation of work that he began 19 years ago while at Louisiana State University (LSU). That early interest grew from a collaborative research project involving researchers at Rutgers, The State University of New Jersey, led by Karyn Malinowski, PhD. That study focused on the effect of exercise on young and old Standardbreds. While Horohov's interest was on the effect of exercise on immune function, it was the differences between young and aged horses that caught his attention.

"What we noted was even before they were exercised, there were significant differences between the young horses and older horses in the ability of their immune systems to respond to stimulation," Horohov said. "So, that piqued my interest. We went on to publish a paper describing these differences. Prior to that paper,

relatively little was known regarding immunosenescence (age-related changes in immune function) in horses."

In 1999, Horohov traveled to the Animal Health Trust in Newmarket, England, and expanded this earlier work. While in Newmarket, Horohov and his collaborators, Julie Kydd, MS, PhD, and Duncan Hanant, MS, PhD, vaccinated young and old horses and showed that the old horses did not respond as well to the vaccine as the young horses. This study provided evidence that age-related changes in older horses could affect their ability to respond to routine vaccination.

"One of the characteristics of immunosenescence in the elderly is their failure to respond to most vaccines; here we showed a similar defect in aged horses," Horohov explained.

When Horohov came to the University of Kentucky, he decided to revisit these earlier studies and to try and answer the question of why the immune system of aged horses is less responsive. Since recent research in human geriatric medicine had suggested that aging-related shortening of chromosomes might have a negative impact on immune function, his group turned their attention to this phenomenon in the horse.

One of Horohov's students at the time, Madhu Katapalli, worked with the Gluck Center's Teri Lear, PhD, to develop a method for evaluating the length of chromosomes in horses. Using this method, they were able to show that horses' chromosomes also shorten with age such that the oldest horse they used (28 years) had signifi-

cantly shorter chromosomes than those of the yearlings included in the study.

"One reason for doing that was to develop a means for determining the physiological age of a horse," Horohov explained. "While we are familiar with the concept of chronological age (age in years), not all individuals exhibit the same physiological changes over time. Some of us exhibit signs of aging sooner than others. What we were looking for was a molecular marker for physiological aging, something you could use that would be easy to determine and would give us a consistent standard for comparing different horses."

When evaluating immune function in aged horses, Horohov's group noted that some of them had significant changes in their immune function, while a minority of the horses showed the responsiveness of a much younger horse.

"Again, why the difference?" Horohov said. "So, that's why we wanted to see if chromosome length was a better indicator of physiologic age and a better predictor of immunosenescence.

"What Madhu showed was that as horses aged, their chromosomes appeared to shorten," he said.

Chromosome length also correlated with immune function over the horse's lifespan, such that younger horses with longer chromosomes had better immune function than older horses with shorter chromosomes. However, chromosome length was not the final answer.

"Even though chromosome length was a good

## (IMMUNE FUNCTION...)

marker for the aging process overall, it wasn't the explanation as to why the changes in immune function were occurring," Horohov said. "Some of the aged horses with very short chromosomes still had signs of good immune function, and other old horses with relatively long chromosomes were clearly immunosenescent."

Horohov's lab continues to try and understand the basic mechanism for age-related changes in immune function.

"Not only does this relate to horses, but to anything that ages, including humans," Horohov said. "Age-associated changes in immune function are known to be associated with increased risk of infections and cancers. Anything we can do to increase the performance of the immune system in older individuals would have a direct effect on long term health and survival." UK

*Jenny Blandford is the Gluck Equine Research Foundation Assistant at the Gluck Center. David Horohov, PhD, is the William Robert Mills Chair in Equine Immunology at the Gluck Center.*

## DEVELOPING NATURAL SPRINGS AS EQUINE WATER SOURCES

One of the key components to horse husbandry is a good water supply. Horse owners have several options to provide water for their animals; one of them is to take advantage of a natural spring on your property.

A spring is a discharge of water that has infiltrated the soil profile by precipitation. The discharge is created by water that flows along an impermeable layer of rock. In Kentucky there are two basic spring types: "wet weather" and "perennial." Wet weather springs are normally active during periods of wet weather, which means they are normally dry during the hot, summer months. Perennial springs, on the other hand, are active year round and are prime candidates for development as a livestock water source.

There are several benefits to developing a spring. Development of a spring might remove excess water from a saturated area, thereby allowing the area to be safely grazed, while at the same time providing drinking water. A properly developed spring might require the use of a pump, but under ideal situations gravity is all that is needed to provide drinking water to a tank(s).

After the initial development, there is no cost to operate a gravity-fed spring. Since the water source is ground water, it is discharged at a constant temperature (about 55° F). The differ-



**After the initial development, there is no cost to operate a gravity-fed spring**

ence between ambient temperature and water temperature provides the sensation that the water is cooled in the summer and heated in the winter. This means no electricity is needed to keep the water from freezing. Spring development also can improve the ability to implement rotational grazing, which can increase pasture productivity.

The Natural Resources Conservation Service technical staff in your county is the best place to start for guidance regarding the development of a spring. They might be able to provide cost-share assistance to partially fund the development of a spring for livestock.

There are several environmental and engineering issues that must be met to create a good development of a spring, including drinkability, flow rate, location, and protection.

(NATURAL SPRINGS ...)

## Drinkability

The water must be suitable for horses to drink. Typically, the water quality will be acceptable to horses if it has been adequately filtered by the soil and has not been contaminated by nearby septic systems or karst features that collect pollution.

An assessment of the watershed (Kentucky Geological Survey maps, visual inspection of the topography and elevations, etc.) can aid in determining possible contaminants. A water sample can also be collected and submitted for analysis.

The extension publication titled "Drinking Water Quality Guidelines for Cattle" that can be found at [www.ca.uky.edu/agc/pubs/id/id170/id170.pdf](http://www.ca.uky.edu/agc/pubs/id/id170/id170.pdf) can provide further reading for horse owners on the subject of water testing and drinkability.

A list of certified labs can be found at the Kentucky Division of Water Web site ([www.water.ky.gov/dw/profi/certlabs](http://www.water.ky.gov/dw/profi/certlabs)).

## Flow Rate

Producers should make sure the spring will provide adequate flow when the pasture is being used. Determining the flow rate is fairly simple, but it should be undertaken during the driest times of the year. Flows during a severe drought should ensure the flow will be available during wetter times.

Measuring flow is accomplished by creating a makeshift dam below the spring outlet. A makeshift dam can be as simple as rocks and dirt clods formed across the flow with a small

**Table 1. Amount of water needed by horses.**

ANIMAL AGE	WATER REQUIREMENT (GAL/HEAD/DAY)
Mature	8-12
Broodmare	8-12
Foal to 2 year	6-8
Stallion	8-12
Pony	6-8

Table taken from UK cooperative Extension Service ID-57 ([www.ca.uky.edu/agc/pubs/id/id57/id57.htm](http://www.ca.uky.edu/agc/pubs/id/id57/id57.htm))

opening in the center.

The flow across the opening can be used to calculate a rough estimate of the flow rate. Flow rates can also be determined by measuring the amount of time required to fill a known volume. An adequate spring flow would be the maximum amount of water needed per animal times the number of animals in the pasture at any one time with relation to the size of the storage tank.

The table below provides estimates on the amount of water needed by animals based on growth stage.

## Location

There needs to be enough change in the elevation of the spring to a watering tank to provide gravity flow. If there is not, pumps will need to be used to transfer the water. There are solar-powered pumps that might be able to move the water effectively.

## Protection

The spring must be protected by surface water to insure that the water remains unpolluted. This usually requires the formation of structures such as a fence or diversion ditch to keep pollutants, such as livestock waste, from contaminating the spring collection point.

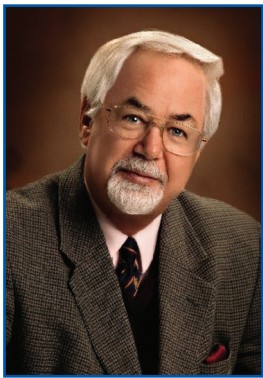
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## TOBIN RECIEVES AWARD

University of Kentucky Gluck Equine Research Center's Thomas Tobin, MRCVS, PhD, Dipl. ABT, was named co-recipient of the National Horsemen's Benevolent and Protective Association (HBPA) 2008 Industry Service Award at its annual meeting July 3, 2009, in Shepherdstown, W.Va.



Tobin

Tobin and Kent Stirling, Executive Director of the Florida HBPA, were co-honored for their long-time guidance on medication and testing issues in the industry.

For several years Tobin has served as a veterinary advisor to the National HBPA. Stirling is chairman of the National HBPA Medication Committee.

Tobin and Stirling co-authored a 108-page document for the National HBPA titled "Proposed National Policy for Drug Testing and Therapeutic Medication Regulation." The document was the third iteration on the subject. The 2002 version was published in a supplementary issue of the *Journal of Equine Veterinary Science*.

The National HBPA summer convention began June 30 at the Clarion Hotel and Conference Center in Shepherdstown. Tobin was also a speaker at the convention on July 1.

The title of his presentation was "Thresholds: How We Got To Where We Are, and Where We Are Heading." **UK**

## Industry Outreach From Gluck, LDDC Faculty

Faculty at the University of Kentucky's Gluck Equine Research Center and Livestock Diagnostic Disease Center (LDDC) are frequent travelers. They are guest speakers at veterinary conferences and meetings locally, nationally, and internationally in their respective fields throughout the year.

At the end of May, several faculty and graduate students from the College of Agriculture traveled to Keystone, Colo., for the Equine Science Society meeting, where the Gluck Center's Ed Squires, MS, PhD, Hon. Dipl. ACT, gave the keynote address, "Changes in how we breed mares. Has it been good or bad for the industry?"

Gluck faculty who attended the meeting and their involvement were Ernie Bailey, PhD, who was a section chair and co-author with students on two presentations on lordosis (swayback) and dwarfism; Teri L. Lear, PhD, gave the presentation "Assessing chromosome abnormalities in horses with infertility or congenital abnormalities;" and Karen McDowell, MS, PhD, presented "The use of Doppler ultrasonography to detect vasoconstriction associated with equine fescue toxicosis." Graduate students from UK also attended the meeting.

College of Agriculture faculty and staff who attended the ESS meeting included: Kristen Harvey, MS, Laurie Lawrence, PhD, Mary Rossano,

PhD, Bob Coleman, PhD, Kristine Urschel, PhD, Elizabeth LaBonty, MS, Animal and Food Sciences; and Ashley Griffin, MS, Craig Wood, PhD, eXtension, and numerous graduate students.

About 16 abstracts from the University of Kentucky were published in the *Journal of Equine Veterinary Science* for the Equine Science Society meeting. To read the abstracts visit [http://www.j-evs.com/issues/contents?issue\\_key=S0737-0806\(09\)X0005-5](http://www.j-evs.com/issues/contents?issue_key=S0737-0806(09)X0005-5).

### Inaugural Vet Meeting

On June 22- 23, the Gluck Center co-sponsored the first Central Kentucky Equine Veterinary meeting at Fasig-Tipton in Lexington. The two-day event was attended by veterinarians from Kentucky and other states. Squires co-organized the event with local veterinarian David Nash, DVM.

Speakers from the Gluck Center included Peter Timoney, MVB, PhD, FRCVS, on "The risk of spread of equine diseases inherent in international trade in horses and equine germplasm;" Horohov on "Art and Science of Vaccination Strategies;" and Bailey on "Status of the Equine Genome Project, and how will these discoveries benefit veterinary medicine." Squires also spoke.

The Livestock Disease Diagnostic Center's Alan Loynachan, DVM, PhD, Dipl. ACVP, and

## (INDUSTRY OUTREACH ...)

Uneda Bryant, DVM, PhD, co-presented "Lawsonia intracellularis prevalence in Kentucky" at the meeting.

### More Travels and Talks

Here is a glimpse of where some of Gluck and LDDC faculty has traveled in June and July and some destinations for August.

Bailey served as an External Examiner for a dissertation on "Genetics of Thoroughbred Performance," University of Dublin, June 10, 2009. He also attended the Havemeyer Meeting on Horse Genomics, Newmarket, UK, July 23-25, 2009, where he chaired a session and presented "Adventures with PLINK" (a specific data program).

Craig N. Carter, DVM, PhD, Dipl. ACVPM, presented "Laboratory-Based Animal Health Event Cluster Detection Systems: Improving the Outcome of Disease Outbreaks," at the XIV International Symposium of the World Association of Veterinary Laboratory Diagnosticians, Madrid, Spain, June 16-20, 2009.

Horohov spoke on "Assessment of immune function in the horse lung" at the Havemeyer Meeting on Equine Recurrent Obstruction, Montreal, Canada, May 31-June 2, 2009. He also presented "Immunosenescence and Inflamm-aging" at the 2009 American College of Veterinary Internal Medicine Forum and Canadian Veterinary Medical Association Convention, Palais Des Congres, Montreal, Quebec, June 3-6, 2009, and will present the lecture "The immunological basis of equine airway disease" at the World Equine

Airway Symposium, Berne, Switzerland, Aug. 6, 2009.

Loynachan and Nathan Slovis, DVM, Dipl. ACVIM, presented "Leptospirosis: Fundamental Principles of Disease 2009" at the American College of Veterinary Internal Medicine Forum and Canadian Veterinary Medical Association Convention.

James N. MacLeod, VMD, PhD, gave the talk "Analyses of the equine mRNA transcriptome using RNA-seq data" at the 8th International Equine Genome Workshop in Newmarket, England, July 22-25, 2009.

Squires, presented at the Breeders Short Course at Goulburn Valley Equine, Sheparaton, Victoria, Australia, on June 27-28, 2009, and he spoke at the Veterinary Practitioners Meeting at Goulburn Valley Equine, June 29-30. While in Australia, Squires lectured on "The Problem Mare" at the Australian College of Veterinary Scientist, Gold Coast, New South Wales, July 3-5, 2009.

Peter J. Timoney, MVB, PhD, FRCVS, presented "The impact of globalization of trade and other factors on the spread of equine diseases" at the Eastern Division Veterinary Ireland, Noas, Co. Kildare, Ireland, June 2, 2009. He also was conference co-organizer, presenter, and workshop chair for the meeting in Padua, Italy, June 10-12, 2009, where he presented the talk "Protecting against equine diseases in a changing international environment and equine viral arteritis."

Horohov presented "Introduction to equine vaccination" at the International Veterinary Vac-

cines and Diagnostics Conference, Madison, Wis., July 21, 2009.

Daniel K. Howe, PhD, served as the presiding officer for the meeting of the Annual Midwestern Conference of Parasitologists, Delaware, Ohio, June 4-6, 2009, and gave the lecture "Improvement of enzyme-linked immunosorbent assays based on Sarcocystis neurona surface antigens (SnSAGs) for equine antibody detection" (with abstract co-author Michelle Yeargan).

Gene Lyons, PhD, presented "Hookworms (Uncinaria spp.) in Pinnipeds with notes on Biology of Northern Fur Seals" at the Annual Midwestern Conference of Parasitologists (AMCOP), Ohio Wesleyan University, Delaware, Ohio, June 4-6, 2009.

Karen McDowell, PhD, spoke on "The Role of Caterpillars in Mare Reproductive Loss Syndrome--A Model for Environmental Causes of Abortion" at the 29th Annual Meeting of the American Society for Reproductive Immunology (ASRI), Orlando, Fla., June 5-9, 2009. She also was scheduled to present at the Preger Workshop on Preimplantation Embryo Molecular Biology in Philadelphia, Penn., July 26-Aug. 7, 2009.

John Timoney, BSc, MVB, MRCVS, MS, PhD, DSc, spoke on "Genomes of Streptococcus equi and S. zooepidemicus: Rosetta stones for strangles vaccine improvement?" at the 5th International Veterinary Vaccines and Diagnostics Conference, Madison, Wisc., July 19-23, 2009.

Thomas Tobin, MRCVS, PhD, Dipl. ABT, dis-



## (INDUSTRY OUTREACH ...)

cussed "Thresholds: How We Got To Where We Are, and Where We Are Heading" at the National HBPA Summer Convention, Shepherdstown, W. Va., July 1, 2009.

Horohov discussed "The effect of weaning on the immune function in foals" at the Hagyard Equine Medical Institute workshop on Lawsonia intracellularis, Lexington, Ky., June 24, 2009.

Loynachan spoke on "Equine proliferative enteropathy in central Kentucky: A diagnostic perspective" at the Hagyard Equine Medical Institute workshop on Lawsonia intracellularis. **UK**

## CALENDAR OF EVENTS

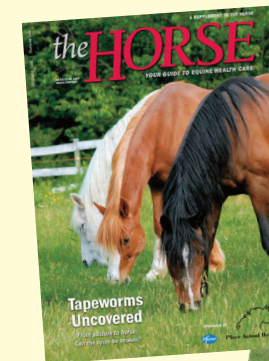
**July 30, 4 p.m.** *Botulism in the Horse* by Robert H. Whitlock, DVM, PhD, of University of Pennsylvania School of Veterinary Medicine, New Bolton Center. This is a part of the Department of Veterinary Science Equine Diagnostic and Research Seminar series, Location: LDDC conference room

**Aug. 15,** Hats Off Day, Kentucky Horse Park

**Aug. 26,** start of fall 2009 semester at the University of Kentucky

**Aug. 27, 4 p.m.,** *Equine Herpesvirus Update* by Lara Maxwell of Oklahoma State University. This is a part of the Department of Veterinary Science Equine Diagnostic and Research Seminar series, Location: LDDC conference room

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\* Bousquet E, Ribot X, Besson B, Sanquer A, Demonceau T. Ease of administration and underdosing endectocide oral paste in horses, Virbac, Carros, France - Service de Sante des Armees, Paris, France - Vignoles, France.

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