BEEF CATTLE PRACTICE

Management of Infectious Reproductive Diseases in Beef Cattle Herds

Reproductive diseases are the greatest disease threats to the production and profitability of beef cattle herds. Infection by reproductive-tract pathogens results in losses such as embryonic deaths, abortions, stillbirths and weak calves. Abortions are just the visible “tip of the iceberg” with reproductive-tract infections. Clinically, embryonic deaths evidence themselves in repeat breeders and in low pregnancy rates. Devastating losses occur when a naïve herd falls prey to a reproductive-tract pathogen, which often reduces pregnancy rates to 40 or 50 percent of normal. Thereafter, such pathogens can cause a cyclic pattern of losses, with great loss one year, followed by several years of minimal loss, then major loss again. Low reproductive performance robs a beef herd of profitability.

A successful program of controlling infectious reproductive diseases in beef herds will include these four steps:

1. Maintain a high level of general resistance to infectious disease.
   - Proper nutrition, including minerals (especially those needed for a strong immune system: copper, selenium and zinc).
   - Minimize stress: avoid crowding; don’t mix first calvers and adults.

2. Keep infectious agents out of the herd
   - Purchase animals from well-managed, reputable herds.
   - Prior to purchase, test animals for carrier state!
   - Quarantine purchased animals on their arrival.
   - Prohibit nose-to-nose contact for 60 days.
   - Administer vaccines, treat for parasites and give LA-200 to eliminate Leptospira hardjo-bovis carrier state.

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3. Minimize spread of infectious agents within the herd.
   - Identify and cull carrier animals.
   - Isolate sick animals; bury dead animals.
   - Don’t use the same equipment for feed and manure handling.
   - Reduce wildlife reservoirs of neosporosis.

4. Maintain a high level of specific resistance to infectious disease.
   - Maintain a proper vaccination program, especially for bovine viral diarrhea (BVD) and Leptospira borgpetersenii serovar hardjo-bovis.

All 4 parts of the program are necessary to its success!!

What follows are general principles to control infectious reproductive diseases in beef herds. However, design and implementation of successful reproductive disease control programs require attention to a myriad of details. It must be stressed at the outset that a specific herd’s reproductive disease control program should be based on that herd’s unique management practices and on knowledge of the diseases that significantly threaten it.

We will focus on seven reproductive pathogens that can inflict major disease losses in a beef cattle herd: Brucella abortus, Leptospira hardjo-bovis, Campylobacter fetus, infectious bovine rhinotracheitis (IBR) virus, bovine viral diarrhea (BVD) virus, Tritrichomonas foetus and Neospora caninum. A discussion of practical control measures for each of these diseases follows.

**Brucellosis**

**Disease:** We’ve come a long, long way in eradication of this bacterial reproductive disease since the late 1960s, when a negative herd was rare in most Texas counties! But even though we have almost eradicated this disease, we must continue our control programs well into the future.

**Control Program:** Control of brucellosis in beef herds will continue to be based on calfhood vaccination and biosecurity. Continue to vaccinate calves and to purchase only brucella-vaccinated females (preferably from Brucella Certified herds) or females tested for brucellosis before purchase. Bulls also should be required to pass a brucella test prior to purchase.

**Leptospirosis**

**Disease:** Many different leptospira organisms potentially can infect cattle, five of the most common are included in the five-way leptospirosis vaccine: Leptospira pomona, L. hardjo, L. canicola, L. icterohemorrhagica and L. grippotyphosa. Over the past 30 years, hardjo-bovis infection has emerged as the most common cause of leptospiral reproductive losses in North American cattle, and there’s lots of it in Texas! Transmission of infection is efficient: chronic carrier cows harbor the bacteria in their kidneys and shed massive numbers of organisms in urine. A recent survey of Texas beef herds found six out of 12 herds with cows shedding hardjo-bovis (50 percent prevalence).

Leptospira hardjo-bovis has become widespread in our cattle population, inflicting significant reproductive losses, because while our five-way leptospirosis vaccines have provided moderate protection against most leptospira serovars, they give minimal protection against hardjo-bovis. They do not contain that organism! Instead, they contain L. interrogans serovar hardjo (hardjoprajitno), which is present in Europe but not in North America, and which gives little cross-protection against our form of hardjo (hardjo-bovis). Fortunately, a highly effective vaccine against hardjo-bovis (Spirovac®- Pfizer Animal Health) recently has become available in the United States. At this time, only Spirovac® is both available and proven to be effective against hardjo-bovis here.

**Control Program:** Because Leptospira hardjo-bovis is widespread in Texas beef cattle herds, a control program is highly recommended. Prevention of losses due to hardjo-bovis infection in beef herds combines biosecurity, antibiotic treatment to eliminate the carrier state, and vaccination. Sampling and testing for the hardjo-bovis carrier state is time-consuming and expensive. To keep from introducing the infection into a herd, instead of testing purchased animals for carrier status, handle them as if they were confirmed hardjo-bovis carriers. Upon arrival of the new cattle, isolate them from the herd (no nose-to-nose contact); treat them with LA-200, which clears the carrier state; and give them a primary vaccination with Spirovac®. Four weeks later, such animals should receive a second vaccination with Spirovac®. Then they can be introduced to the herd at the end of their quarantine period.

Control of hardjo-bovis within the herd is accomplished by antibiotic treatment to eliminate the carrier state and by vaccination. Such a control program is designed to ensure that carrier animals are not present in the herd and that cattle in the herd have a protective degree of immunity against hardjo-bovis. The older calves are, the more likely they are to be renal hardjo-bovis carriers. Also, the more contact calves have with adult animals, the more likely they are to become hardjo-bovis carriers. Thus, young calves must be treated with LA-200 to eliminate the possible carrier state, as well as given their primer vaccinations. In 4 to 6 weeks, calves should receive a second vaccination.

In beef herds, a practical control program could include administering LA-200 and a primer vaccination to calves at weaning, then repeating the vaccination 4 to 6 weeks later. Thereafter, both calves and adults should receive an annual vaccination booster.
During the first year of a control program, all yearlings and adults in the herd could be treated with antibiotics to eliminate the carrier state and given a primer vaccination. Four to 6 weeks later, the entire herd should receive their second vaccination. Thereafter, calves should be started young with antibiotic treatment plus primer and second vaccinations, and adults should receive annual boosters. An alternative approach would limit antibiotic treatments to yearlings and calves at weaning and rely solely on vaccination for adults.

To protect the herd against the other leptospiral organisms, you must continue to administer five-way leptospira vaccine, unless you use the newly introduced Spirivac® which contains the other leptospiral organisms plus campylobacter. Heifers should be vaccinated at first working, then given boosters at weaning and again at 1 month prior to breeding.

Campylobacteriosis (Vibriosis)

Disease: Vibriosis is a bacterial venereal disease of cattle characterized by embryonic deaths, manifested clinically as repeat breeders and low pregnancy rates. Abortions occur occasionally, usually between the 4th and 7th months of gestation. Bulls become infected from breeding an infected cow, then pass the infection to naïve cows during subsequent breeding. Young bulls (under 3 to 4 years old) tend to have transient infections of hours to days, while older bulls (4 to 5 years old and older) become life-long asymptomatic carriers. Cows can mount an immune response and clear themselves of the organism. Such resistance is temporary, however, and re-infection is possible 3 or 4 months later. In herds with long breeding seasons (6 months or more), the resistance/re-infection phenomenon can result in pregnancy patterns characterized by a cluster of pregnant cows the first month or so of the breeding season, followed by 2 or 3 months with a few, scattered pregnancies, then by another cluster of pregnancies the last 2 months of the breeding season.

Control Program: Vibriosis is widespread in Texas' cattle population. Because vaccination effectively controls the disease, all breeding cattle in every herd must be vaccinated against Campylobacter fetus! An oil-based vibriosis vaccine results in the longest-lasting immune response; a single dose is effective, so there is no advantage to using two injections initially. Unfortunately, oil-adjuvanted vaccines cause swellings at the vaccination site due to fibrosis and granuloma formation. Replacement heifers should be vaccinated 1 month prior to the start of their breeding season. Cows should be given an annual booster, preferably 1 month prior to breeding; however, annual boosters given at pregnancy examinations have been found to provide adequate protection. Bulls should receive two 5 ml doses of oil-based vaccine (2-1/2 times the cow dosage) at 4-week intervals, beginning 8 weeks before breeding season starts. This procedure has been shown not only to prevent infection, but to clear infections from carrier bulls.

IBR and BVD Viruses

Diseases: These two viruses are discussed together because infection of cattle with either of them results in early embryonic deaths, abortions, stillbirths and weak calves. BVD virus infection also can result in birth defects, especially cerebellar hypoplasia. Such infections can reduce calf crops due to lower pregnancy rates, abortions and greater calf mortality. If calves are infected during nursing, their weaning weights are reduced.

Herds become infected with these viruses when chronically infected animals are purchased, spreading the viruses throughout the herd. When non-immune dams become infected with BVD virus at 42 to 125 days gestation, their calves are born persistently infected (PI). PI calves shed massive amounts of BVD virus into the environment. About 50 percent of PI calves die by the end of their first year. Others survive to become pregnant replacement heifers, and, when sold to a naïve ranch, infect new herds, resulting in serious losses from BVD infection.

Control Program: Prevention of infection from these viruses is based on biosecurity and vaccination. Biosecurity involves not buying animals persistently infected with BVD virus! All herd additions should be tested for PI status for BVD virus prior to purchase. The best test for PI status is immunohistochemistry on skin biopsies collected with pig ear-notchers. Purchased heifers must remain in quarantine until they have calved and their calves have been proven non-PI by negative immunohistochemistry skin test.

Use either modified-live (MLV) or killed IBR/BVD virus vaccines in vaccination programs. Veterinary virologists currently recommend using MLV vaccines as much as possible in herd vaccination programs as the most effective way to prevent IBR and BVD virus infections. MLV vaccines provide more complete protection against fetal infection than do killed vaccines. Be careful, though: non-immune pregnant cattle vaccinated with MLV IBR/BVD vaccines will abort their fetuses from infection with the vaccine virus.

To use MLV vaccines safely, administer them to replacement heifers at weaning, then give a MLV vaccine booster 1 month prior to the onset of breeding. Thereafter, non-pregnant adults should receive MLV vaccine 3 to 4 weeks prior to breeding. Recent developments in available MLV vaccines and their use allow boosters to be given during pregnancy examinations. Such administration should be practiced only under close veterinary supervision with strict adherence to vaccine package insert recommendations.
**Trichomoniasis**

**Disease:** Trichomoniasis, a venereal disease of cattle, is caused by a protozoan and is characterized by embryonic deaths evidenced clinically as repeat breeders and low pregnancy rates. Abortions also begin in early pregnancy and continue to calving. Trichomoniasis probably is one of the most economically devastating cattle diseases, second only to foot and mouth disease.

**Control Program:** Although trichomoniasis is common in Texas beef cattle herds, it is not as widespread as vibriosis. Expensive vaccines are only partly effective against trichomoniasis. In most herds, biosecurity should be used as the main control measure for this disease. Don’t buy trichomoniasis into the herd! All purchased non-virgin bulls must be cultured or tested by PCR for T. foetus. In addition, don’t expose cows to bulls from other herds:

1. Don’t borrow or lease bulls.
2. Don’t graze common lands with other herds.
3. Keep your fences in good repair to keep neighbors’ cattle out.

Defend against establishing trichomoniasis in a herd by keeping your bull battery as young as possible. Younger bulls (less than 5 years old) have shallower epithelial crypts in the mucosa of the prepuce than do older bulls. T. foetus organisms require deep epithelial crypts to establish chronic infections.

**Vaccination** of cows and bulls against T. foetus is recommended under certain circumstances:

1. High-risk herds (e.g., neighbor’s herd is infected, communal grazing);
2. In herds where trichomoniasis is suspected;
3. As part of the control program in trichomonas-infected herds.

**Neosporosis**

**Disease:** Infection of cattle with the protozoan Neospora caninum mainly causes abortions, which may occur at any stage of gestation, but are most common between 5 and 6 months. Stillbirths also occur. Widespread in Texas beef herds, this disease is probably one of the most common causes of abortion in our beef cattle. A survey in 2000 found that 59 percent of the herds sending calves to the Texas Ranch to Rail Program were infected with N. caninum.

A “new disease” of cattle, neosporosis was reported first in 1989, when it caused an abortion outbreak at a New Mexico dairy. Researchers later uncovered genetic evidence indicating that this organism has been on earth as long as cattle have been here! However, although we have had the requisite technology for years, we previously did not recognize N. caninum because the organism is present mainly in the brains of aborted fetuses and until recently, veterinarians autopsying aborted fetuses usually did not remove their brains.

This protozoan’s life cycle involves dogs (coyotes, dingoes?) and foxes as definitive hosts and cattle as intermediate hosts. In Australia, the ranchers call neosporosis “wild dog disease.” Infected dogs have been shown to shed N. caninum oocysts in their feces. Cows then can become infected by ingesting these oocysts. Once a cow becomes infected, she is a life-long carrier of the N. caninum. She also will almost always (85 to 95 percent of pregnancies) pass the organism to her calf and cause in-utero infection. Most calves infected in-utero are normal, healthy carrier calves but have much greater chances than do non-infected calves of aborting their first and second pregnancies. Thus, there are two possible ways that cattle can become infected with this protozoan:

1. Ingestion of oocysts (a) by eating feed or drinking water contaminated by feces of dogs or foxes that have neosporosis or (b) ingestion of zoites or tissue cysts by eating or licking placenta or fluids of aborted fetuses (termed post-natal or horizontal transmission).
2. In-utero transfer of zoites to a fetus whose dam is a life-long carrier (termed congenital or vertical transmission).

In infected beef herds, both transmission routes probably are ongoing to some extent. Evidence from dairies, however, suggests in-utero transmission to be the most common method of transmission.

Replacement heifers or cows that are carriers of N. caninum are more likely to abort their fetuses than are those not infected. In an investigation of abortions in a Texas purebred herd, the author found that carriers of N. caninum were 10 times more likely to lose their calves than were non-carrier cows.

**Control Program:** At such an early state of understanding of this new disease, control strategies have not been well-proven. Research is ongoing, and successful control strategies will evolve as new information becomes available. Various combinations of biosecurity, testing and culling of carrier cows, and vaccination are being tested. Dr. Barling, Texas A&M University College of Veterinary Medicine, has identified some management factors associated with higher likelihood of neosporosis infection in Texas beef herds. Such factors include spring calving season or split calving season, higher stocking density, use of round bale hay feeders and weaning supplement access by wildlife. Dr. Barling also found that Texas beef herds with cattle dogs were less likely to have neosporosis. Our cattle dogs must be keeping wild canids away from cattle feed sources! Only one vaccine (Neoguard™ - Intervet Inc) is commercially available against N. caninum, and, unfortunately, we do not know if it is effective since no peer-reviewed independent studies on its efficacy have been published.

Carrier cows can be accurately identified by detecting antibodies in their serum. But because vaccinated cattle also may remain seropositive for long periods of time, use of vaccine may make a herd test-and-cull program impossible. The role of vaccination in control of neosporosis will not be known until properly conducted field trials are performed to determine its ability to protect against abortion due to this disease.
Given our current knowledge of neosporosis, biosecurity appears to be the soundest approach to its control:

1) Purchase only seronegative females.

2) Lower the number of neospora carrier cows in the herd, because carriers create more neospora-positive females, which are more likely to abort than are neospora-negative cows. Two approaches: (a) Test the entire herd of breeding females and do not keep replacement heifers from the offspring of infected cows. It’s highly likely they also are infected! (This approach is the most economical for a commercial beef cow/calf herd.)

Or

(b) Test the entire herd of breeding females, cull all positive cows and replace them with cows that have tested negative. (This option is probably best for a purebred herd, where embryos are placed into recipient cows, because the fetus is too valuable to risk its loss. There is no need to cull donor cows; their embryos are safe to use.)

3) Protect feed and water sources from fecal contamination by wild canids.

4) Promptly dispose of aborted fetuses and their placentas.

For 3 years after program initiation, the author found testing and culling cows to be effective in controlling abortions due to N. caninum in a central Texas purebred beef herd using embryo transfer. Simulation models have recently concluded, however, that the most economically effective approach to controlling neosporosis in commercial beef herds is to test all females and keep infected cows in the herd, but not use their daughters as replacements. A test-and-cull program must be accompanied by an effort to reduce the number of potential wildlife carriers on the ranch. When a proven neosporosis vaccine becomes available, vaccination will become an important part of control programs.

Conclusions
Reproductive tract pathogens threaten production and profitability of beef cow/calf operations. Such pathogens usually enter a herd through purchase of a chronically infected carrier heifer, cow or bull and cause the most damage in the first year such animals are introduced into a naïve herd. Because of increased susceptibility to infectious disease, replacement heifers and first-calf heifers experience the greatest losses from reproductive tract infections. Thus, it’s wise to make special efforts to implement an effective reproductive-diseases control program in a herd’s young breeding stock. Control programs for infectious reproductive diseases generally combine biosecurity and vaccination.

From Steven E. Wikse, DVM, DACVP, Associate Professor and Extension Veterinarian, Food Animal Section, Department of Large Animal Clinical Sciences, Texas Cooperative Extension, College of Veterinary Medicine & Biomedical Sciences, The Texas A&M University System, College Station, Texas.

Consider Important Cattle Health Issues When Performing Herd Work This Fall

Whether you’re sorting calves for sale, moving the herd to fresh pasture, or deciding which cows to keep, working cattle in cooler weather makes sense. Fall also is a good time to address important herd health issues that can affect Texas’ ability to trade and move cattle freely.

“The U.S. Department of Agriculture (USDA) has extended funding for the cattle tuberculosis (TB) testing program until the end of 2004, so ranchers still can take advantage of a free TB test for their seed stock or purebred cattle,” commented Dr. Bob Hillman, Texas’ state veterinarian and head of the Texas Animal Health Commission (TAHC). “Increased TB surveillance must be accomplished in order for Texas’ TB-free status, downgraded two years ago, to be reinstated. TB-free status will enhance the marketability of Texas cattle, because breeding animals could move across state lines without TB testing requirements or restrictions.”

Texas, New Mexico, California and Michigan are the only states not certified cattle-TB-free, and each of these states is following a specially tailored plan to regain TB-free status.

“Texas must not be the only state that doesn’t fulfill its disease surveillance obligation,” Dr. Hillman said.

Dr. Hillman urges Texas producers to arrange for a TB herd test by contacting either the TAHC at 1-800-550-8242 or their private veterinary practitioner. More than 550 Texas private veterinarians are certified to conduct TB herd tests; they are reimbursed by the TAHC through cooperative agreement funds from the USDA.

“More than 750 of the state’s 807 dairies have been tested for TB since last fall, and only one – in Hamilton County – has been found to be infected. This herd is being depopulated, with an indemnity paid by the USDA,” Dr. Hillman commented. “The Texas cattle industry’s plan also called for testing of 2,400 purebred or beef breeding herds. As of early September, however, only about 300 herds have been tested, far short of the goal. Time and money are running short; please support the Texas cattle industry and get your herd tested while the costs can be offset with federal funds.”

“Producers also may be able to arrange for a free herd test for cattle brucellosis, if their cattle had potential exposure or if the herd exhibits signs of the disease, such as abortions, weak calves or lowered milk production. Many times brucellosis infection is ‘silent,’ with few obvious signs of disease, so proactive measures are crucial to find infection,” Dr. Hillman said.

“In late August, a brucellosis-infected beef herd was detected in Leon County, the first in the state since late 2003. Was this Texas’ final...
infected herd? Only time and continued disease surveillance at livestock markets, tests prior to private sale, slaughter surveillance and selective herd tests will give us that answer.”

States may be classified “free” of brucellosis after 12 months without an infected herd and after a USDA-mandated review. Texas and Wyoming are the only states without the free status.

“When you handle your cattle, inspect them carefully for unusual ticks or for blistering around the animal’s mouth, nose, teats or hooves. Watch for cattle that stagger or fall,” Dr. Hillman urged.

“Seven ranches outside the permanent fever-tick zone in Kinney and Zapata Counties have been found infested with the dangerous fever ticks, capable of transmitting ‘Texas Fever,’ which can be deadly to cattle,” Dr. Hillman said. “The TAHC and USDA Tick Force are tracing, inspecting, dipping or spraying cattle that were moved from pastures prior to detection of the ticks. All cattle inspected to date have been free of the fever tick.”

Tick and maggot submission kits should be a “staple” in every private veterinary practice dealing with large animals and should be on every producer’s shelf, noted Dr. Hillman. The kits may be obtained from TAHC area offices or TAHC headquarters at 1-800-550-8242. Unusual ticks or maggots should be submitted for identification to the State-Federal Laboratory. There is no charge for this service.

This summer’s vesicular stomatitis (VS) outbreak is now officially over in Texas as of mid-October. However, if your clients’ livestock exhibit lesions, blisters or sloughing skin in or around the mouth, nose, teats or hooves, don’t just think about VS. Call the TAHC, so laboratory tests can be run on a blood sample and snippet of skin from the affected animal. The blisters and lesions could be due to VS, the result of ingesting a toxic plant, or, what we dread most, an introduction of foot-and-mouth disease.

Finally, Dr. Hillman urges reporting of “downer cattle” to TAHC, so that brain tissue samples may be collected and tested for bovine spongiform encephalopathy (BSE).

“Downer, or non-ambulatory, cattle are no longer accepted at livestock markets or slaughter plants, as they are considered at ‘high-risk’ for the brain-wasting disease,” he pointed out. “Call us, and we can assist with tissue collection from the animal. The USDA in June launched an intensive national BSE testing program, aiming to collect and test samples from more than 200,000 head of cattle by late December 2005 to determine if BSE is present in the U.S. and, if so, at what level. As of early September, all of the 48,000 samples tested so far were negative. Of those, more than 2,600 have been from Texas-origin cattle.”

“It can be frightening to look for disease,” Dr. Hillman admitted.

“But if we don’t, disease can gain a foothold in Texas; eradication will be extremely costly, and the industry’s market share and reputation could be damaged. If you see something unusual, or something unusual is reported to you by one of your clients, call the TAHC. Don’t wait till it’s too late.”

Adapted from September 3, 2004, news release, “Working Your Herd This Fall? Consider Important Cattle Health Issues!” Texas Animal Health Commission, Box 12966, Austin, Texas 78711, (800) 550-8242, FAX (512) 719-0719; Bob Hillman, DVM, Executive Director. For more information, contact Carla Everett, information officer, at 1-800-550-8242, ext. 710, or ceverett@tahc.state.tx.us; or go to the TAHC web site at http://www.tahc.state.tx.us.

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**EXCEDE™ Sterile Suspension for Beef and Non-Lactating Dairy Cattle is Available**

**EXCEDE™ Sterile Suspension** (ceftiofur [CE] crystalline free acid, 200 mg/ml, 100 ml container) recently has been approved for treatment of bovine respiratory disease (BRD — shipping fever, pneumonia) associated with Mannheimia haemolytica, Pasteurella multocida, and Haemophilus somnus. EXCEDE™ Sterile Suspension also is indicated for the control of respiratory disease in cattle at high risk of developing BRD associated with these three organisms. A single SC injection, given in the middle third of the posterior aspect of the ear of beef and non-lactating dairy cattle, at 3.0 mg CE/lb (6.6 mg CE/kg) body weight (BW) or 1.5 ml EXCEDE™ Sterile Suspension per 100 lb BW (1.5 ml/45.5 kg BW), delivers not less than 150 hours (6.25 days) of therapeutic plasma levels above the MIC90 for these three bacteria (usually delivers 7 days of therapeutic blood levels). Cattle responding to treatment are expected to improve clinically within 3 to 5 days after injection. If no improvement is observed, diagnosis should be reevaluated.

Label instructions for injection site, dosage and treatment frequency, residue avoidance and withdrawal period and shelf-life after opening are:

- **Administer only by SC injection into the middle third of the posterior aspect of the ear of beef and non-lactating dairy cattle.**
- **Clip and/or clean the back of the ear to better visualize injection site, if necessary.**
- **Shake the suspension well before using.**
- **Use a 16 gauge X 1 inch, 45 degree bevel needle to better avoid intravascular penetration (most needles are 21 to 28 degree bevel).**
- **Do not administer into an artery or vein — arterial injection will likely result in death! Venous injection may result in adverse reactions such as tachycardia.**
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- **Adjust the needle insertion point to avoid any previous implants, ear tags or ear holes (arteries or veins may have rerouted around these holes).**
structures - do not administer into blood vessels!).

- Inject the full contents of the syringe (one single dose) at 3.0 mg CE/lb (6.6 mg/kg) BW, which is equivalent to 1.5 ml/100 lbs (1.5 ml/45.5 kg) BW.
- After injection, apply pressure at the needle insertion point when withdrawing the needle, and massage the base of the ear.
- Because ears are inedible tissue and are removed and discarded at slaughter (9 CFR301.2), there is no pre-slaughter withdrawal period following the label treatment with EXCEDE™ Sterile Suspension.
- However, use of dosages in excess of 3 mg CE/lb (6.6 mg CE/Kg) BW or administration by an unapproved route (i.e., SC in neck or IM injection) may lead to violative residues.
- Do not use in female dairy cattle 20 months of age or older; use in this class of cattle may cause violative milk residues. A withdrawal period has not been established for this product in pre-ruminating calves.
- Do not use in calves to be processed for veal.

Contents should be used within 30 days after the first dose is removed.

Other precautions include:
Following SC injection into the middle third of the posterior aspect of the ear, thickening and swelling (characterized by aseptic cellular infiltrate) of the ear may occur; as with other parenteral injections, localized post-injection bacterial infections may result in abscess formation, but attention to hygenic procedure can minimize their occurrence.

Adverse reaction studies: One tissue-tolerance study indicated that SC administration of EXCEDE™ Sterile Suspension (SS) into the middle third of the posterior aspect of the ear of cattle was well tolerated but was characterized by a biphasic thickening of the ear. Initial increase in ear-tissue thickness is attributed to the space required for the volume of the injected material. Additional increases in thickness were observed through day 14 after injection. Post-injection ear thickness decreased in all animals after day 14. One animal carried an injected ear in a drooping position for 7 days post-injection. SC areas of discoloration and some foci of hemorrhage have been observed at necropsy in ears of injected cattle. Discoloration was reduced markedly in size by the end of the study. No signs of irritation were observed on edible portions of the carcass around the base of the ear.

Local tissue tolerance of cattle’s ears to single SC EXCEDE™ SS injection also was evaluated in a large multi-location field-efficacy study. None of the 1927 treated animals was removed from this trial due to ear irritation, although swelling was noted at some injection sites. Immediately after administration, leak-back and/or bleeding from the injection site was observed in a small fraction of treated animals. It was concluded that administration of EXCEDE™ SS into the posterior aspect of the ear was well tolerated and was acceptable under feedlot conditions.

A study evaluated the 56-day performance of 207 Angus and Angus cross-bred steers administered one of the following: EXCEDE™ SS alone, EXCEDE™ SS with a growth-promoting implant, growth-promoting implant alone, or neither product. The administration of EXCEDE™ SS into the posterior aspect of the ear with or without growth-promoting implants was well tolerated by cattle and did not adversely affect feedlot cattle performance. Based upon results of this study, the location of implants administered after EXCEDE™ SS may need to be adjusted slightly in some animals within the boundaries of the middle third of the ear.

Note that topical exposure to EXCEDE™ SS in individuals allergic to penicillin or cephalosporin may cause an allergic reaction. Avoid skin sensitization by wearing latex gloves. Carefully read all label instructions before using this drug.

From EXCEDE™ Sterile Suspension technical bulletin (January 2004), Pharmacia & Upjohn Company, Division of Pfizer Inc., New York, New York, 10017. For more information go to www.excede.com or call 1-866-387-2287.

SWINE PRACTICE

Long Acting Ceftiofur Suspension (EXCEDE™ FOR SWINE) Available for Treatment of Swine Bacterial Respiratory Disease

EXCEDE™ FOR SWINE (ceftiofur crystalline free acid, 100 mg/ml sterile suspension, 100 ml container) recently has been approved for the treatment of swine respiratory disease associated with Actinobacillus pleuropneumoniae, Pasteurella multocida, Haemophilus parasuis and Streptococcus suis. A single IM dose delivers at least 7 days of therapeutic plasma levels. Swine responding to treatment are expected to improve clinically by 3 to 5 days after injection. If no improvement is observed, diagnosis should be reevaluated.

The label instructions for injection site, dosage, treatment frequency, residue avoidance and withdrawal period and shelf-life after opening are:

- Administer only by IM injection in the neck muscle behind the ear (post-auricular region of the neck of swine).
- Shake the suspension well before using.
- Use only a single dose of 2.27 mg/lb (5.0 mg/kg), which is equivalent to 1 ml/44 lb BW (1ml/20 kg BW).
- Inject no more than 2 ml in a single injection site! (Pigs heavier than 88 lbs [40 kg] will require more than one injection!)

Veterinary Quarterly
• Inject a maximum of 2 ml at each injection site (injection volumes in excess of 2 ml may result in violative residues).

• Following label use as a single treatment, a 14-day pre-slaughter withdrawal period is required.

• Using dosages in excess of 2.27 mg/lb (5.0 mg/kg) or administrating by an unapproved route may result in illegal residues in edible tissues.

• Use contents within 12 weeks after the first dose is removed.

Other precautions state:
Administration of EXCEDE™ FOR SWINE according to the label may induce transient reaction at the injection site and in underlying tissue, possibly resulting in trim loss of edible tissue at slaughter. The safety of ceftiofur has not been demonstrated in pregnant swine or in swine intended for breeding.

Adverse reaction studies: An injection site tolerance study using EXCEDE™ FOR SWINE demonstrated that at both 3 and 7 days post-injection, half the injection sites were scored “negative” for irritation and the other half were scored as “slight irritation.” All gross observations and measurements of injection sites qualified the sites as “negative” for irritation at 10 days post-injection. No adverse effects were observed in multi-location field-efﬁcacy studies involving more than 1,000 pigs.

Note that topical exposure to EXCEDE™ FOR SWINE may cause reactions in individuals allergic to cephalosporins or to penicillins. Avoid skin sensitization by wearing latex gloves. Carefully read all label instructions before using this drug.

From EXCEDE™ FOR SWINE technical bulletin (May 2004), Pfizer & Upjohn Company, Division of Pfizer Inc., New York, New York, 10017. For more information go to www.PFIZERPORK.com or call 1-866-387-2287.

### AQUACULTURE PRACTICE

#### Ornamental Fish Health Problems

With the expanding popularity of privately-owned garden ponds, there has also grown an increasing need for veterinary intervention when disease problems occur in ornamental fish populations. Fish health problems can have infectious or non-infectious causes. Secondary opportunistic infections often develop when fish become immunocompromised due to stress. Two contributing factors commonly associated with fish disease are suboptimal environmental conditions and/or the introduction of new fish into an established fish population without prior quarantine.

Environmental diseases in fish can have various causes, with dissolved-oxygen levels (DO) one of the more commonly affected water-quality parameters. Low DO levels can play an indirect role, as a predisposing factor, or a direct role in the development of fish disease outbreaks. DO levels in aquatic systems normally show diurnal fluctuation, with levels highest during the day and lowest at night. Establishing a good algal bloom is important to maintaining optimal DO levels in a pond ecosystem, since photosynthesis is a major source of oxygen production. Such algal blooms can present problems for pond owners who want clear-water ponds. But either insufficient or excessive algal blooms can predispose water systems to hypoxic conditions, unless enough oxygen is produced during the day to sustain all aquatic organisms in the pond throughout the night. Oxygen depletions develop most commonly during hot summer months, since high water temperatures decrease pond-water oxygen-carrying capacity. Overstocking and prolonged periods of hot, overcast weather also can predispose ponds to oxygen depletion. Monitoring early-morning DO levels and observing fish behavior are good indicators of an impending low-DO problem. Larger fish will be the first to exhibit signs of respiratory distress, by locating near the water surface and/or water inlets, developing lethargic behavior and showing increased opercular movements (“piping”). Supplemental aeration, especially at night, is recommended as a primary preventive measure along with decreased handling and feeding of fish during periods of stress.

The occurrence of bacterial disease in fish populations can take many forms, involving the skin, fins and/or gills. It is another common health problem seen in ornamental fish ponds and its occurrence is usually stress-related and/or opportunistic in nature. Gross lesions will vary, depending on whether infection is superficial or systemic. When bacterial infections become prevalent in a fish population, the fish and their environment should also be evaluated for other possible underlying contributing factors (e.g., parasites, suboptimal water quality, etc.). Increased mucus accumulation and epithelial hyperplasia associated with superficial infections initially appear as opacities on the skin surface or along fin margins, progressing into ulcers or fin erosions with epithelial necrosis. With systemic infections, fish generally develop superficial petchelation/hemorrhages, ascites and/or exophthalmia. Mortality rates will vary, depending on body surface area affected, virulence of the bacteria and development of septicemia. The presence of gill disease in a fish population can mimic oxygen depletion, since respiratory impairment of affected fish predisposes them to develop anoxia in the presence of only moderately reduced DO levels. In ornamental cyprinid species, such as koi, an atypical strain of Aeromonas salmonicida is commonly associated with a deep superficial ulcerative condition, known as Ulcer Disease. Because affected fish may develop osmoregulatory problems if their lesions become enlarged, early diagnosis...
Spring Viremia of Carp virus (SVCV) and Koi Herpesvirus (KHV) have recently become major fish-health concerns for both koi enthusiasts and producers in the United States. Clinical disease is stress-related and temperature-dependent, with SVCV outbreaks occurring within a lower water temperature range (40 to 64°F) as compared to KHV (68 to 80°F). Clinical signs for both viral infections are nonspecific, with variable mortality rates reported. Concurrent secondary bacterial and parasitic infections can interfere with detection of these viruses.

SVCV is an exotic OIE-notifiable fish pathogen first identified in the United States in spring 2002; later, SVCV was reported in Wisconsin (2002), Washington (2004) and Missouri (2004). SVCV is a highly contagious rhabdovirus infection primarily affecting common carp; it can be transmitted horizontally in the water and by blood-sucking vectors. Clinical disease occurs most commonly in spring at cooler water temperatures, subsiding as water temperatures warm and fish immune systems become more active. Affected fish become sluggish and lie near the bottom; they develop ascites, hemorrhages, anemia and exophthalmos. Pinpoint hemorrhages in the swim bladder and mucus in the intestine are considered important gross lesions for SVCV.

Once a preliminary SVCV diagnosis has been made, notify the state Area-Veterinarian-in-Charge (AVIC) and USDA/APHIS Veterinary Services officials. Diagnosis must be confirmed by the National Veterinary Services Laboratory (NVSL). Since depopulation and decontamination are the approved procedures to contain and control the spread of SVCV, APHIS has initiated an indemnity program for U.S. farm-raised carp populations affected by SVCV, along with a national surveillance testing program to attempt to eradicate this disease.

KHV also has been identified recently in U.S. common carp and koi populations, as well as in fish in Israel, Europe and Asia. Presently, KHV is not reportable in the United States, but it has become economically important for the U.S. koi industry. KHV is highly contagious and causes severe gill disease and has been associated with acute, high mortalities in all ages of both common carp and koi. At present, goldfish do not appear to be affected, but they may act as asymptomatic carriers.

Testing for both SVCV and KHV should be conducted when a koi population experiences acute mortalities. Presumptive diagnosis for either virus is based on diagnostic laboratory findings (e.g., histology, virus isolation and PCR testing). Presently, there are no diagnostic tests to detect asymptomatic carriers. Since survivors are considered carriers, avoidance (virus-free water source) and quarantine are the best preventive health measures, with depopulation and disinfection (200 ppm bleach) recommended if an outbreak occurs. Quarantine periods of 3 months to 1 year also have been recommended, during which time fish should be exposed to a range of temperatures to induce clinical expression of latent infections.

Early recognition of fish disease problems by fish owners is important to their successful control, but increased interest and involvement by veterinary practitioners also is needed to provide both diagnostic and clinical assistance to local fish owners and producers. As first steps toward entering this non-traditional and challenging area of veterinary medicine, practitioners should participate in aquatic-based continuing education workshops and contact diagnostic labs offering aquatic diagnostic testing.

From Patricia Varner, DVM, PhD, AFS/FHS-Certified Fish Pathologist; Aquatic Disease Specialist, The Texas Veterinary Diagnostic Laboratory System, P.O. Drawer 3040, College Station, Texas 77841, (979) 845-3414, PVARNER@tvmdl.tamu.edu.

WILDLIFE AND EXOTIC PRACTICE

Cardiomyopathy and Heartworm Disease in Ferrets

Causes and Historical and Physical Exam Findings

Dilated or congestive cardiomyopathy is the most common cardiac disease reported in ferrets. Usually seen in middle-aged to older ferrets, its cause is unknown. Clinical presentation typically includes lethargy, weight loss, anorexia, coughing and respiratory distress. Physical exam findings include hypothermia, tachycardia, systolic murmur, moist rales, muffled heart and lung sounds, ascites and rear leg weakness.

In ferrets, the canine heartworm (Dirofilaria immitis) causes natural and experimental infections that produce disease resembling that caused by heartworms in dogs. However, just one worm in a ferret's heart can be lethal because ferrets are so small. Ferrets living in outside housing in heartworm-endemic areas are especially vulnerable. Usually, a client reports that an affected ferret is lethargic, has lost weight and has coughing episodes, difficulty breathing and an enlarged abdomen. Physical exam findings include lethargy, coughing, dyspnea, congestion and ascites, with melena reported in a few ferrets.

Diagnostic Tests

Diagnostic evaluation of ferrets with suspected cardiomyopathy should include CBC, serum chemistry panel, radiography, echocardiogram and ECG. Radiographic changes that may be seen are enlarged cardiac silhouettes, pleural effusion, increased pulmonary density, ascites, hepatomegaly and splenomegaly. Echocardiogram results usually include increased left ventricular, end-diastolic and end-diastolic dimensions; depressed indios of systolic function (fractional shortening); left atrial enlarge-
mment; and right ventricular dilation. Many ECG changes may be recorded.

Ferrets with heartworm disease show reverse pleural effusion and cardiac enlargement. Although no echocardiogram changes have been reported, enlargement of the right atrium and ventricle and of the pulmonary artery is expected. Circulating microfilaria are rare in ferrets; therefore, testing for Dirofilaria immitis antigen by using the ELISA (Snap Heartworm Antigen Test kit, Idexx Labs, Westbrook, ME) has proven diagnostic.

Differential Diagnosis

Differential diagnosis for these two cardiovascular diseases includes hypertrophic cardiomyopathy, valvular heart disease, myocarditis, mediastinal mass and lymphoma.

Treatment

Cardiomyopathy is managed with drugs to control heart rate, rhythm, preload, after-load and contractility. Place animals with acute heart failure in an oxygen cage and give them furosemide (Lasix® 2-4 mg/kg SC or IM q 8-12 h). For those animals stable enough to be handled, drain pleural effusion by thoracentesis. Nitro-glycerin ointment (2 percent, 1/8 inch applied to skin q 12-24 h) reduces preload and helps to alleviate pulmonary edema during initial heart failure management (watch for hypotension as a side effect).

Digoxin (0.01 mg/kg PO q 24 h) provides positive inotropic therapy, stimulating the failing myocardium and depressing AV nodal conduction during supraventricular tachyarrhythmia. Continue furosemide to reduce edema and effusion. Enalapril (0.5 mg/kg PO q 48 h), an angiotension-converting enzyme inhibitor or vasodilator, reduces arteriolar and venous tone, improving cardiac output and reducing edema. Reduce enalapril dosage to every third day if the ferret becomes hypotensive.

Therapy can be successful if heartworm disease is caught early. Current recommendations include giving thiacetorsemide (Caparsolate 2.2 mg/kg IV q 12 h for 2 days) via a cephalic-vein catheter. Begin heparin therapy (100 units SC q 24 h for ferrets weighing 0.45-1.35 kg) for 21 days. Antithrombotic therapy is essential and has improved treatment dramatically. If heart failure also is present, treatment previously described for cardiomyopathy is indicated. Cage rest with no exercise should be strictly enforced during all 21 days of heparin therapy. After 3 weeks of heparin therapy, switch to aspirin (1/4 of 81 mg children’s aspirin, [20mg] PO q 24 h) and continue for 3 months.

Follow-Up

Cardiomyopathy should be monitored with periodic ECGs, radiography or echocardiography, and serum digoxin assay. Evaluate these serum chemistry values: BUN, creatinine and potassium. In ferrets, catching cardiomyopathy in its early stage offers a fair-to-good prognosis for months of good-quality life (a better prognosis than for dogs with similar disease presentation).

Follow up the ELISA test for heartworm antigen at 3 months after adulticide therapy, then monthly until the test is negative. Most ferrets will become negative at 4 months post adulticide therapy. Begin heartworm preventative once a month after adulticide treatment, using 1/4 to 1/2 of the smallest feline ivermectin tablet per month (14 to 17 microgram Heartgard-Feline)

References


From James H. Johnson, DVM, MS, DACZM, Zoological Medicine Service, Department of Large Animal Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, The Texas A&M University System, College Station, Texas. (979) 845-4300, jjohnson@cvm.tamu.edu.

FELINE PRACTICE

Highly Virulent Feline Calicivirus Disease Becoming More Common

More-virulent forms of Feline Calicivirus (FCV) disease are emerging in U.S. cat populations. Six outbreaks of severe FCV disease, including those in this paper, have been reported since 1998.

The reported outbreaks shared several important factors:

• In five out of six outbreaks, the suspected index case was a shelter or rescued cat.
• In six out of six outbreaks, otherwise healthy, calicivirus-vaccinated adult cats mainly were affected.
• In all six outbreaks, FCV spread rapidly (including fomite spread) to cats owned by clients or employees of veterinary clinics; FCV disease spread was limited to affected veterinary practices or shelters with no evidence of spread to the larger community; and outbreaks seemed to be self-limiting, resolving within about 2 months.

Why are properly vaccinated, healthy cats susceptible to FCV infection? FCV is a RNA virus in the family Caliciviridae. Like other viruses in this family, FCV has high mutation rates, with minimal repair. So, documentation of FCV strains with wide virulence range is not surprising. Vaccine ineffectiveness in recently reported outbreaks apparently resulted from incomplete or nonexistent protection from current-vaccine calicivirus strains.

Rabbit hemorrhagic disease (RHD) is an example of a calicivirus that probably mutated, causing horrific epidemic disease. Unknown
before 1984, RHD has since emerged to kill tens of millions of rabbits worldwide.

RHD calicivirus shares some characteristics with emerging FCV strains: RHD virus spreads rapidly; it is associated with high mortality rates; it results in more serious disease in adults than in juveniles; and it causes lesions suggesting vascular damage as their cause. Although virulent FCV may rarely be associated with disseminated intravascular coagulation (DIC), secondary infection actually may cause DIC seen with FCV disease. Thus, emerging FCV strains fall short of commonly causing hemorrhagic viral fever as does RHD. Therefore, the name "virulent systemic FCV disease" has been suggested for disease resulting from these emerging FCV strains.

Clinically important facts about virulent systemic FCV disease include:

- Facial and limb edema and multiple organ involvement, in addition to upper respiratory symptoms;
- 33 to 50 percent mortality, with adults more likely than kittens to have severe disease;
- About 20 percent of exposed cats with mild or no clinical signs;
- Many affected cats previously properly vaccinated;
- Viral shedding documented to occur at least 16 weeks after recovery;
- Chronic viral shedding possible (but maybe not clinically important);
- Need to handle all cats showing suspicious signs (including upper respiratory infection) with good sanitary practices;
- Sodium hypochlorite solution to be used for disinfection; and
- Isolation recommended for all exposed cats until negative viral status confirmed.


EQUINE PRACTICE

Horse Breeding Workshops to be Held at Texas A&M
This December/January

Texas A&M University's department of animal science will offer three workshops for horse breeders.

"The workshops are designed for mare and stallion owners and for managers who want to learn more about efficient methods for enhancing the success of their breeding programs, just in time for the 2005 breeding season," said Dr. Vogelsang, workshop coordinator and assistant professor of animal science.

Drs. Vogelsang, Pete Gibbs and Nikki Ferverda and equine reproduction graduate students will instruct the three-day workshops here at College Station on December 9-11, 2004; January 6-8, 2005; and January 13-15, 2005.

The workshops are designed to teach efficient methods for breeding programs. Sessions on anatomy and physiology, control and manipulation of the estrous cycle, gestation, and foaling and feeding will be included.

Hands-on laboratory sessions will include semen collection and evaluation, estrous detection, artificial insemination, body-condition scoring and foaling management.

Lectures will be held in the Kleberg Animal and Food Sciences Center on the Texas A&M campus with parking at the West Campus Parking Garage. Laboratory sessions will be held at the Texas A&M Horse Center.

These workshops cost $500 per person. Enrollment is limited, so participants are encouraged to sign up early. For more information or to enroll, contact Martha Vogelsang at (979) 845-7731 or email her at m-vogelsang@tamu.edu.

Adapted from October 1, 2004 news release by Megan Knight, (979)862-1556, workn1@tamu.edu, "Horse Breeding Workshops Come to Texas A&M," newssteam@agne.tamu.edu. This and other news stories, streaming audio and video, and digital photos for your use are available at http://agne.tamu.edu. For more information contact: Martha Vogelsang, (979) 845-7731, m-vogelsang@tamu.edu.

RESEARCH

Fire Ant Killing Protozoa Found in 120 Texas Counties

Texas A&M University System entomologists recently completed a survey that detected the protozoan Thelohania solenopsae in fire ant colonies in approximately 120 of 157 Texas counties.

Once a colony is infected, the protozoa cause disease that debilitates the queen, workers and larvae. The life span of all infected ants is decreased, with mortality rates increased in infected sexual females.

This protozoan probably will never eradicate fire ants, but it has the potential to change them from highly aggressive pests into ones much less competitive with native ants.

The next step is to try to grow these protozoa on culture mediums. If successful, this research might yield a product to introduce the protozoa into fire ant mounds in bait form. Alternatively, infected fire ants might be introduced into areas without the protozoa. However, many questions and problems first must be addressed, including the question of where this protozoan originated.

Although there are several native species of fire ant, their stings are not nearly so bad as those of their more aggressive cousin, the red imported fire ant, which was introduced accidentally into the United States in the 1930s. Without natural predators, the red imported fire ant spread to cover all or portions of Florida, Georgia, South Carolina, Tennessee, Alabama, Mississippi, Arkansas, Texas and Oklahoma. The species has become abundant, displacing many native ant species.

Scientists long have known that one of the red imported fire ant's natural enemies in South America is the protozoan Thelohania solenopsae, which is related to the amoeba. South America is infected with this protozoan at a rate of about 25 percent, but its degree of importance as a natural pathogen there is hard to assess. The scientific community
has been extremely cautious about introducing this protozoan into the United States, since they don’t know what effect it might have on native ant species such as harvester, carpenter and leaf-cutting ants.

Because of these fears, studies of South American prototype were carried out in labs under controlled conditions. Then, in 1998 near Thorndale, a U.S. Department of Agriculture entomologist found a fire ant colony infected with protozoa having DNA different from that of the South American strain.

The Texas A&M survey shows that this protozoan has occurred naturally, without human intervention. Of course, scientists still must answer other questions before they will be comfortable with helping the protozoa propagate in Texas. Could it be that these protozoa have been in North America all along, just waiting for the fire ant to be introduced as a host? Or was the protozoan itself an immigrant, hitching a ride into this country with South American fire ants? If so, did the protozoan change so that its DNA now looks different from that of the South American strain?

If the protozoan is native to North America, then further introduction likely will not harm native ant populations, which already should be adapted to it. If it is not native, helping it spread might not be wise.

These questions are crucial because ants play critical roles in ecological balance. Predatory ants kill and eat many other insects, both harmful and beneficial. Though individually small, ants collectively can make a huge impact. A reasonable estimate is that, worldwide, ants comprise up to 15 percent of all terrestrial animal biomass.

“No one really knows for sure what percentage ants constitute of the animal biomass. But one thing is certain. If you really want to disrupt the ecosystem, disrupt the ants,” said Dr. Forest Mitchell, entomologist with the Texas Agricultural Experiment Station at Stephenville.

Adapted from March 22, 2004 news release by Robert Burns (903) 834-6191, rd-burns@tamu.edu. "Fire Ant Killing Protozoa found in 120 Texas Counties," at newsstream@cvm.tamu.edu or web site http://agne.tamu.edu. For more information contact Dr. Forest Mitchell, (254) 968-4144, f-mitchell@tamu.edu.

VETERINARY CONTINUING EDUCATION SEMINARS,
TEXAS A&M UNIVERSITY  2004- 2005

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<td>October 29-31, 2004</td>
<td>Annual Equine Conference  (Dr. Keith Chaffin)</td>
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<td>November 19-20, 2004</td>
<td>Emergency Medicine for Small Animals  (Dr. Maureen McMichael)</td>
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<td>Annual Equine Reproduction Symposium for Veterinarians  (Drs. Terry Blanchard and Dickson Varner)</td>
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*Confirmed
Calendar is subject to revision
For more information on these programs of self-study and about other personalized continuing education opportunities, please call (979)845-9102; fax (979)862-2832; or e-mail: ceoffice@cvm.tamu.edu. Visit our Web site at http://www.cvm.tamu.edu/vtce.

From the Office of Veterinary Continuing Education, Texas Veterinary Medical Center, College Station, Texas.