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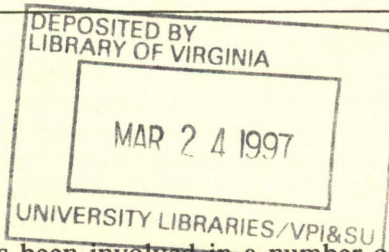
# THE FOOD ANIMAL VETERINARIAN



VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE

Fall 1996

No. 16



Dear Food Animal Practitioners:

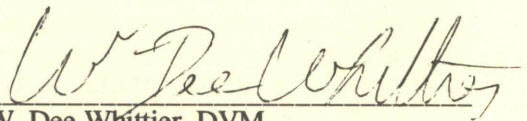
The Academy for Food Animal Practice has been involved in a number of issues. They sponsored the Foreign Animal Disease conference jointly with the USDA -APHIS Veterinary Group from Richmond on November 9, 1996. Approximately 35 veterinarians attended and were updated on foreign animal disease as well as wildlife and other infectious diseases that are of interest to large animal practitioners in Virginia.

The annual Spring meeting of the Virginia Academy of Food Animal Practice has been scheduled for May 3, 1997. The topic will be Bovine Disease Resistance and speakers are being arranged to address these subjects.

The VVMA meeting will take place in Norfolk, Virginia, on the 14th, 15th, and 16th of February. There will be a food animal education program on Saturday, the 15th. The food animal program will include the training for the Feeder Cattle Certification Program as indicated below. It will also include a presentation on dairy cattle genetics by Dr. Bennett Cassell and a presentation from Dr. Burt Mitchell from the FDA Center for Veterinary Medicine on regulatory drug issues. Also part of the VVMA program will be a program provided for government and corporate veterinarians that will be of interest to food animal practitioners.

Remember Extra-Label Drug Use issues? Congress passed and the president signed the bill so that the use is no longer just a guideline but actual law. Now all of that has shaken through the system and is about to be initiated under the name Animal Medicinal Drug Use Clarification Act (AMDUCA) of 1994. A live, satellite teleconference to address the extra-label drug use regulations will be conducted by the AVMA on February 12, 1997, 1-4 PM EST. The Academy is working to set up a down link site to view this together (probably Blue Ridge Community College in Weyers Cave), then have some other educational activity, perhaps a farm visit, and have dinner together. There will be CE credit available for this program.

I hope that many of you will be in a position to take advantage of these continuing education activities to fulfill the Virginia Board of Veterinary Practice requirement that all veterinarians in Virginia complete 15 hours of continuing education credit during the year.

  
W. Dee Whittier, DVM  
Extension Veterinarian



## EARLY EMBRYONIC MORTALITY IN CATTLE

Failure to produce a calf following single or repeated inseminations is a common problem among dairy and beef producers. A considerable portion of conceptus loss appears to be inevitable and represents a baseline for normal reproductive wastage. These losses impose a limit on expectations concerning reproductive efficiency within each herd. This concept has implications for the diagnosis of group and individual infertility problems. An awareness of the inherent level of reproductive wastage for each phase of the reproductive process will add perspective and help refine diagnostic and treatment strategies when perceived infertility problems are encountered.

### Fertilization Failure

Based on the rate of cleavage for embryos recovered 2-5 days post-insemination, fertilization occurs greater than 90% of the time. Partitioning the available data into cow vs. heifer and AI vs. natural service reveals some differences between categories. Fertilization appears to be more efficient in heifers (4% non-fertile embryos) than in cows (12% non-fertile embryos) regardless of the type of breeding program in use. Not surprisingly, natural service (4% non-fertile embryos) results in fewer non-fertile embryos than AI (15% non-fertile embryos). While natural service and a high proportion of heifers probably provides some advantage in fertilization efficiency within a herd, the average performance of cows, heifers, natural service and AI programs combined provides the most realistic estimate of reproductive wastage due to fertilization failure. On the basis of this average, 8% of breedings would be expected to fail solely due to failure of fertilization.

### Early Embryonic Mortality

First service conception rates of only 50-60% and less are commonplace in the dairy industry. Indeed, sustained first service conception rates about 60% typically reflect excellent management and may represent a seemingly unobtainable goal for many producers. The difference between the first service conception rates currently achieved in the industry and the losses attributable to ovulation/fertilization failure represent death of the developing conceptus. Early embryonic mortality is defined by the incidence of embryonic death occurring prior to 42 days of gestation. This coincides with the end of the stage of differentiation. It is during this period that the majority of reproductive wastage occurs. The bulk of this loss occurs prior to day-10 post-breeding when 20-25% of embryonic loss occurs. An additional 10-15% of embryos are lost after day-10 but prior to day-40 post-breeding. In total, 30-40% of fertilized embryos may not survive past 40 days post-conception.

It is important to consider that these losses occur in apparently normal animals and that this phenomenon is well documented in a wide variety of wild and domestic animals as well as in humans. Further, the magnitude of the loss is relatively constant in all mammals studied to date. The inference of these data is that the observed incidence of early embryonic mortality, which is a constant source of irritation for cattle producers, is a normal physiological process. From a management perspective, this problem is compounded by limitations on our ability to detect pregnancy at a very early stage. Embryos which survive beyond 13-15 days post-breeding may initiate maternal recognition of pregnancy and therefore extend the estrous cycle. These animals eventually return to estrus without overt signs of abortion, making it very difficult to determine whether pregnancy failed due to physiologic or pathologic mechanisms.

The majority of early embryonic losses are thought to arise from de novo mutation during gametogenesis and errors during fertilization and early cleavage. Of lesser importance are genetic factors inherited from the parent which may cause embryonic death. Environment has also been shown to affect early embryonic development. One mechanism through which sustained periods of excessive heat and humidity contribute to "summer infertility" is by inducing embryonic death. The embryo appears to be most susceptible to elevated temperature during the first 48 hours post-breeding. Similarly, prolonged periods of negative energy balance, such as occurs in early postpartum dairy cows, may also have a detrimental effect on oocyte quality. These poor quality oocytes may then result in unviable embryos or embryos that are predisposed to early mortality.

Minimal gains have been achieved for first service conception rates despite decades of research and extensive use of AI in the field. At present, differentiating physiologic from pathologic embryo loss is best accomplished through regular herd visits which include evaluation of on-farm records. Continuous monitoring leads to familiarity with the performance of both the herd and herdsman. Implementation of optimal nutrition and reproductive programs will help maximize conception rates; however, substantial embryonic losses will occur even under optimal conditions. --Douglas W. Shaw, DVM, PhD, Ext. Vet., Food Animal Reproduction. Ohio Veterinary Newsletter, The Ohio State University, Columbus, OH, Vol. 22, No. 2, June 1996.

## VIRGINIA FEEDER CATTLE CERTIFICATION PROGRAM

The Virginia Cattleman's Association has put together a Feeder Cattle Certification Program like the Kentucky Gold and other certification programs that exist throughout the United States. The goal put Virginia in a position to participate in strategic alliances and package high quality feeder cattle in other ways for marketing Virginia feeder cattle at a premium. The program has two components: 1) a health/vaccination component; and 2) a genetic component. The genetic portion of the program requires that calves be sired by bulls of known breeding and with EPD's meeting certain standards. The health aspect of the program involves a vaccination program but also provides for a preweaned component which would make it essentially a pre-conditioning program. There will be different ear tags provided to designate calves which have qualified for the various levels of the certification program. All calves which meet the qualifications for the tagging program need to have been certified by a veterinarian or other trained personnel. Training for veterinarians wishing to participate in this program will be included in the educational program for the Virginia Veterinary Medical Association in February in Norfolk. A second training session for veterinarians will be conducted in association with the Spring Academy meeting.

## NEOSPOROSIS-ASSOCIATED ABORTION IN A DAIRY GOAT

Hydrocephalus and cerebellar hypoplasia may be associated with neosporosis.

A 3-year-old Saanen doe in Costa Rica mated naturally to a Toggenburg buck, then aborted a single fetus at 3.5 months of gestation. The placenta was not available for examination, but the fetus appeared autolyzed (marked subcutaneous edema) and had hydrocephalus, with dilated lateral ventricles and a smaller than normal cerebellum. Histologically there was diffuse meningoencephalitis with round cell infiltrates, gliosis, hemorrhage, and perivascular cuffing. Lesions were most severe in cerebral white matter adjacent to the lateral ventricles. Mineralization of necrotic foci and numerous protozoal tissue cysts typical of *Neospora caninum* were also observed. Immunohistochemistry for *Neospora* was positive. Small foci of myocyte degeneration and necrosis, infiltration with lymphocytes and neutrophils, and one group of tachyzoites were found in skeletal muscle. Infiltrates were also present in the heart but no protozoa were observed there. The aborting doe had a titer of 1:800 to *N. caninum* by indirect fluorescent antibody test 9 months later, and 5 of 80 other adult goats in the herd also had titers. Only one of these six does had a titer to toxoplasmosis. The next year the Saanen doe produced one normal and one stillborn kid, but no necropsy was performed on the dead kid. --J.P. Dubey et al., JAVMA 208:263-265, 1996, as reported in Sheep, Utah State University, September 1996.

## EXPERIMENTAL NEOSPOROSIS IN SHEEP

*Neospora caninum* is an apicomplexan protozoan, first described in 1988, that infects a wide range of mammalian intermediate hosts and causes encephalitis and abortion. The definitive host is not known. Neosporosis is a major cause of epidemic and endemic abortions in cattle around the world. In the present study, experimentally-induced ovine neosporosis was investigated as a model of bovine neosporosis. Six groups of six ewes were inoculated intravenously with  $1.7 \times 10^5$  to  $1.7 \times 10^6$  *N. caninum* tachyzoites on day 65, 90, or 120 of gestation. All ewes inoculated on day 65 aborted, and all inoculated on day 120 gave birth to clinically normal lambs. Ewes inoculated on day 90 either aborted, gave birth to weak lambs, or bore clinically normal lambs. Multifocal, nonsuppurative encephalitis, frequently with necrosis and mineralization, was observed in 46 of 51 aborted and live-born lambs, even when clinically normal. Nonsuppurative placentitis was observed in 15 of 17 placentas. Myositis, myocarditis, and hepatitis were also commonly observed in aborted fetuses. *N. caninum* tissue cysts were discovered in brains of 11 of 29 aborted fetuses and 8 of 22 live-born lambs, using a bradyzoite-specific antiserum employed in an immunohistological procedure. Clinical signs and lesions of experimental neosporosis in sheep closely resemble those of natural and experimental neosporosis in cattle. --M. M. McAllister, A. M. McGuire, and W. R. Jolley, University of Wyoming, Laramie, WY 82070, as reported in Sheep, Utah State University, September 1996.

## **THE USE OF COMBINED XYLAZINE AND LIDOCAINE EPIDURAL INJECTION IN EWES WITH VAGINAL OR UTERINE PROLAPSE**

For a 60 kg (132 pound) ewe, 4.2 mg of xylazine (using small animal Rompun) can be mixed with 2% lidocaine to give a final volume of 2 ml and injected for a caudal epidural block of long duration.

Factors possibly predisposing to vaginal prolapse include advanced pregnancy with multiple fetuses, fibrous diet, lack of exercise, previous dystocia, and lameness leading to prolonged periods of recumbency. Effective and practical means of preventing prolapses have not been identified, and the overall incidence is usually low (0.1 to 5%). Reprolapse occurs occasionally when forceful abdominal contractions occur after replacement of a vaginal or uterine prolapse, despite the use of various retention devices and suture techniques. Lidocaine alone as an epidural injection can provide up to 4 hours of caudal analgesia, but high volumes cause pelvic limb paresis and recumbency. The author used lignocaine (a British term for lidocaine) plus xylazine in 52 ewes with vaginal prolapse and 9 ewes with uterine prolapse. The sacrococcygeal site was clipped and surgically prepared. Xylazine at 0.07 mg/kg was combined with lidocaine to give a 2 ml volume for injection into the sacrococcygeal site of the standing animal, using a S/8 inch 21 gauge needle. Lack of resistance to injection was considered the best indication of proper placement. Loss of tail tone and of perivulvar sensation was observed within 2 minutes. The prolapse was then thoroughly cleaned and replaced and a Buhner retention suture using 5-mm obstetrical tape was placed. No abdominal contractions were observed during the 24 hour period following replacement of the vaginal prolapse in 48 of 52 ewes with vaginal prolapse or in any of the ewes with uterine prolapse. None of the ewes re prolapsed. Hyperflexion of one or both fetlock joints and pelvic limb ataxia occurred in 25 ewes for up to 24 hours. Based on his previous experience with other techniques, the author concluded that this technique reduced the incidence of tenesmus and re prolapse. Vaginal prolapse often recurs during the subsequent pregnancy, so affected ewes are best culled after rearing the present season's lambs. -- P.R. Scott et al., *Theriogenology* 43:1175-1178, 1995, as reported in *Sheep*, Utah State University, September 1996.

## **OCCUPATIONAL ARM, SHOULDER! AND NECK SYNDROME AFFECTING LARGE ANIMAL PRACTITIONERS**

The repetitive nature of doing multiple rectal examinations, which involves having the examining arm extended, appears to lead to a traction type injury of roots of cervical spinal nerves 5 to 7 as they exit the cervical foramina. Traction of the cervical plexus also occurs during this procedure when the examiner's head is bent laterally towards the opposite shoulder. The occurrence of symptoms on the contralateral side suggests cervical root impingement because of the neck being bent to that side for prolonged periods of time.

The injury to the cervical plexus appears to be a specific occupational syndrome made worse by repetitive strain. Once other lesions, such as rotator cuff or cervical disc, have been ruled out, management of the condition consists of resting the nerves involved. Proper rest from doing rectal examinations, however, is not practical if the veterinarian has to continue doing them in order to earn a living.

The following management suggestions, based on modifying the examination position, should, therefore, be discussed with the patient under treatment.

- 1 - Keep the examining arm with the shoulder flexed forward 20 to 25 degrees
- 2 - Flex the neck forward rather than laterally, if possible, during the examination
- 3 - For larger animals, consider using a stool or platform. Dr Ailsby is an orthopedic surgeon, 500 Cornwall Professional Building, 2125-11th Avenue, Regina, Saskatchewan S4P 3X3.

**Source:** *The Canadian Veterinary Journal*, Volume 37, No 7, page 411, July 1996 AABP Newsletter, August 1996.

## BOVINE CORONAVIRUS CALF SCOUR SYNDROME

Bovine coronavirus (BCV) causes enteritis in dairy and beef calves from 1 day to 3 months of age, but diarrhea is most common between 1 and 2 weeks of age. Virus infection starts in the proximal small intestine and spreads throughout the small and large intestines. Virus replication occurs primarily within absorptive epithelial cells of small intestinal villi and crypts and in enterocytes covering colonic ridges and crypts. Yellow diarrhea develops 48 hours after experimental infection and continues for 3 to 6 days. Diarrhea may result in dehydration, acidosis, and hypoglycemia. Clinical signs associated with BCV enteritis are indistinguishable from those associated with rotavirus infection, but because coronaviruses can produce more widespread and severe lesions than rotaviruses, they are more likely to be associated with signs of colitis such as straining and passage of mucus, or occasionally blood, in the feces.

Epidemiology studies suggest that BCV is probably distributed worldwide. Persistently infected, but clinically normal, cows and calves act as a source of infection for susceptible calves. The rate of virus excretion from cows increases during the winter months and at parturition and calves born to carrier cows have a higher risk of diarrhea. BCV is a labile virus but outbreaks of diarrhea still occur if cows are transferred to clean ground at calving.

Diagnosis of BCV infection is confirmed by virus identification by direct examination of the feces for virus particles or by fluorescent antibody examination of gut tissue for virus antigen. Virus isolation is rarely used as a means of diagnosis because bovine coronaviruses are difficult to isolate. Best results are obtained when calves are early in the course of disease and are examined fresh (euthanasia immediately before necropsy) because autolysis and bacterial invasion of gut mucosa occur rapidly after death. Multiple infections are common and evidence exists that several agents may be required to produce severe diarrhea. Isolation of such concurrent bacteria as *E. coli* and *C. perfringens* may be of no significance unless one can identify virulent strains, as these organisms are normal inhabitants of the gut and their isolation is commonplace.

Treatment is designed to replace fluids and electrolytes, either intravenously or orally, depending on the severity and stage of infection of each case. Physical examination is required to establish the severity of mental depression by assessing the calf's sucking or drinking drive and the degree of weakness. Acidosis is by far the most common cause of depression in diarrheic neonates. The severity of dehydration can be gauged from the degree to which the eyeball is sunken and the skin tent. In some calves it may also be necessary to correct hypoglycemia and hypothermia, restrict milk intake, or administer antibiotics.

Control of BCV diarrhea is dependent on the presence of adequate levels of specific antibodies in the gut lumen acquired from the previously exposed or vaccinated dam's colostrum and milk. The level of BCV specific antibodies in the lacteal secretions is very high at parturition but then declines rapidly. Duration of passively acquired immunity in the calf is prolonged by resecretion of absorbed antibodies back into the gut lumen and by adherence of immunoglobulins to the surface of the intestinal mucosa. Following natural exposure to infection, calves develop active immunity to the virus but diarrhea will likely occur if the passively acquired immunity declines before an adequate level of active immunity has developed. The offspring of cows with low levels of antibody in their colostrum and milk are especially susceptible to infection, calves born to primiparous cows being particularly vulnerable.

Prevention of BCV diarrhea depends upon decreasing the challenge dose of virus or increasing specific immunity. The immune status of neonatal calves can be raised by parental vaccination of pregnant cows to provide passive immunity or by oral vaccination of neonatal calves to stimulate active immunity. Active immunization of calves by oral inoculation with live, attenuated BCV vaccines has protected colostrum deprived calves in experimental trials but has not proved consistently effective in field trials. This may occur because the vaccine virus is neutralized in the gut by passively acquired maternal antibodies. --Taken from M. A. Clark, *British Veterinary Journal* 149:51-70, 1993; B. Smith, *Large Animal Internal Medicine; Pathology of Domestic Animals*, 4th Ed., K. Jubb, P. Kennedy, and N. Palmer (ed.), as reported in *Vet-Med*, Volume 1, Issue 4, July 1995.

## RESEARCH IN THE CONTROL OF PARATUBERCULOSIS (JOHNE'S DISEASE)

Paratuberculosis is an economically significant wasting disease of ruminants that continues to be a serious concern to the beef and dairy industries. This problem disease is insidious in nature and difficult to control. Infection occurs in the animal during the first few months of life, and develops into a chronic problem. Unfortunately, disease progress and current diagnostic methods frequently prevent detection of early infections and/or subclinical disease. This leads to the typical "tip of the iceberg effect" associated with Johne's disease. When one or two animals in a herd are diagnosed with clinical paratuberculosis, it is very likely that a considerable number of other animals are also infected subclinically.

Improved diagnostics for detection of early infections and subclinical disease are key factors in the control of Johne's disease. The development of improved diagnostic techniques, effective vaccines, and other control measures is unlikely to occur without a detailed molecular analysis of the basis of the disease. Additionally, the physiology of the etiologic agent (*Mycobacterium paratuberculosis*) and its interaction with the ruminant host is desperately needed to control this problem.

We have recently developed genetic tools for the manipulation of *M. paratuberculosis*. Our current focus is on the application of this technology to identify and characterize microbial factors and host cell receptors involved in the pathogenesis of the disease. With this knowledge, we expect to develop an effective subunit or live-attenuated vaccine compatible with diagnostic tests. Evidently, a subunit vaccine made of a purified microbial component would offer greater prospects of compatibility with current diagnostic tests. Recent experiments with a related microorganism (*Mycobacterium tuberculosis*) by M.A. Horwitz and co-workers at the University of California have shown that a purified protein isolated from culture supernatant fluids induced substantial protective immunity. It is then possible that a similar purified component produced by the Johne's bacillus could be used as an effective vaccine. Another approach is to develop an attenuated strain that would allow differentiation between vaccinated and infected animals. The latter requires identification of at least two attenuating mutations and a mutation in a gene encoding a microbial antigen for which a differential test could be developed.

*M. paratuberculosis* may be also of further concern for human health. Certain evidence suggests that *M. paratuberculosis* may be the etiologic agent of Crohn's disease. In this regard, both paratuberculosis and Crohn's disease are characterized by an inflammation of the intestinal mucosa. Further support for this hypothesis has been provided by the isolation of Johne's bacillus from an increasing number of Crohn's disease patients. R. J. Chiodini (International Association for Paratuberculosis), and recently M.T. Collins and co-workers at the University of Wisconsin have carried out studies that demonstrate increased heat resistance of the microorganism. This has led to the concern that *M. paratuberculosis* may be more resistant to some pasteurization methods than related microorganisms. This could potentially provide a route for the pathogen to enter the food chain. Although, it is premature to make a definitive conclusion, these associations are important areas of research to be explored. --Raul G. Barletta, Ph.D., Department of Veterinary and Biomedical Sciences. Center for Biotechnology. University of Nebraska-Lincoln in Nebraska Veterinary and Biomedical Sciences Newsletter, MAR 96, as reported Herd Health Memo, June 1996.

## ERYTHROMYCIN AND STAPH. AUREUS MASTITIS

I was involved in a trial in Idaho examining the efficacy of treatment of *S. aureus* IMI with erythromycin. We used the erythro-dry and erythro-200. All treatments were made at dry-off and thereafter. The 3 treatment groups were: T1, intramammary (e-dry); T2, e-dry with intramuscular administration with e-200 at 10 mg/kg; and T3, 1x per day milking, followed each time with e-dry, for 4 days, and on day 5, a last e-dry tube and intramuscular e-200 as before. The % cures were 8.2, 8.75, and 9.2 for T1, T2, and T3. Not all that auspicious. A random sample of *S. aureus* indicated they were all sensitive to erythromycin in vitro. This trial was conducted under the auspices of each herd's veterinary practitioner. Larry Fox, Washington State Univ. 3 Dec 1996 16:35:40 -0500 on Dairy Discussion List." DAIRY-L@UMDD.UMD.EDU>

## THE IMPORTANCE OF COLOSTRAL IMMUNITY FOR BEEF CALVES

The effect of passive immune status on the subsequent health and growth of beef calves was investigated at the U.S. Meat Animal Research Center in Clay Center, Nebraska. Blood samples were collected from 263 calves at 24 hours postpartum for determination of plasma protein (PP) and serum IgG concentrations. Plasma protein concentration was classified as adequate ( $\geq 4.8$  g/dl) or inadequate ( $< 4.8$  g/dl). Serum IgG concentration was classified as adequate ( $> 1,600$  mg/dl), marginal (800 to 1,600 mg/dl), or inadequate ( $< 800$  mg/dl). The lowest concentrations of serum IgG and PP were observed among calves that experienced morbidity or mortality prior to weaning. Calves that experienced morbidity during the postweaning feeding period had lower PP values at 24 hours, but IgG concentrations similar to calves not ill during the feeding period. The risk of death prior to weaning was over five times greater for calves with inadequate IgG at 24 hours compared to adequate calves. The risk of morbidity was over six times greater for inadequate calves during the first 28 days of life. Calves with inadequate PP concentrations at 24 hours had a three times greater risk of respiratory morbidity while in the feedlot when compared to calves with adequate PP. The effects of 24-hour passive immune status on calf growth were indirect through effects on morbidity. Morbidity during the first 28 days of life was associated with a 35-lb lower expected weaning weight. Respiratory morbidity in the feedlot resulted in a .09-lb lower expected ADG during the feeding period. Thus, passive immune status was an important determinant of health before and after weaning, and was indirectly associated with calf growth during the same periods. Colostral management strategies should receive appropriate attention by producers and veterinarians attempting to improve the health and production of beef calves. --Summarized for "Passive immune status at postpartum hour 24 and long-term health and performance of calves" by T.E. Wittum and L. J. Perino, American Journal of Veterinary Research, 1995;56:1149-1154 as reported in Ohio Veterinary Newsletter, Volume 22, #1, July-December 1995.

## BLOOD SELENIUM LEVELS IN THE U.S. BEEF COW/CALF HERD

The USDA's National Animal Health Monitoring System (NAHMS) tested whole blood samples from 2,216 cows and heifers in 253 herds during the 1992 Cow/Calf Health and Productivity Audit (CHAPA). CHAPA herds were from 18 states that contained 70 percent of the adult United States beef cow inventory in January 1993. Eligible producers expected at least half of their calves in 1992 from January through June and had at least five cows or heifers. Of the whole blood samples collected from cattle during the CHAPA, 7.8 percent were classified as severely deficient for selenium, 0-.050 parts per million (ppm). Another 10.4 percent were marginally deficient (.051 -.080 ppm). Most operations (85.0 percent) had no cattle considered to be severely deficient for selenium and only on 2.0 percent of operations were all cattle tested severely deficient.

These CHAPA results showed a wide variation among regions. Percentages of severely deficient cattle ranged from 3.6 percent in the central region to 18.6 percent in the southeast. Only 62.7 percent of the operations in the southeast had no animals in the severely deficient range compared to 89.7 percent and 94.6 percent in the west and central regions respectively. The mean of all samples collected on a farm were used to classify each according to criteria used for the individual blood samples. Overall, 4.7 percent of operations were considered severely deficient and another 9.1 percent were marginally deficient. Forty-nine percent of all operations supplemented selenium for their herds. Nearly all of these (98 percent) used a mineral supplement with additional selenium. About 4 percent gave selenium injections and 4 percent added selenium to their cattle rations. Some operations used more than one method of supplementation. Supplementation was more common in the central and southeastern regions (54.7 and 61.4 percent of herds in these regions, respectively) than in the west (19.0 percent).\*

Percentages of severely deficient cattle were lower in all regions for operations that supplemented selenium. Even on operations with some selenium supplementation, over 16 percent of individual cattle blood samples from the southeast were considered severely deficient.

Centers for Epidemiology and Animal Health USDA:APHIS:VS, attn. NAHMS, <http://www.aphis.usda.gov:80/vs/ceah/cahm/chapse>

## THE RELATIONSHIP BETWEEN GIARDIA AND CRYPTOSPORIDIUM OOCYST SHEDDING IN CALVES

Infectious diarrhea is the leading cause of morbidity and mortality in calves. *Giardia* and *Cryptosporidium* are two of the most common parasites that reside in the intestinal tract. Infection with these parasites occurs by fecal-oral contamination and is initiated when a susceptible host ingests an oocyst directly from the cow or from contaminated feed, water, or housing. Clinical signs, which usually include abdominal pain, general discomfort and diarrhea, can begin as early as five days after infection.

We tested fecal samples from 84 calves, five days to ten weeks old, for the presence of *Cryptosporidium* and *Giardia*. Forty-three samples came from calves with diarrhea and 41 samples came from calves that were judged to be clinically normal. We used Enzyme Linked Immunosorbent Assays (ELISA) and Indirect Fluorescent Antibody Tests (IFA) for both *Cryptosporidium* and saturated sugar flotation was used to detect *Giardia*. ELISA was selected as the method of choice for detection of both organisms because results showed higher sensitivity and specificity.

Four of 39 (10%) diarrheic samples and seven of 34 (21%) normal samples were positive for *Giardia*. Thirteen of 30 (43%) diarrheic and nine of 32 (28%) normal samples were positive for *Cryptosporidium*. Although positive, ELISA titers were lower in normal calves than in diarrheic calves for both organisms, indicating lower numbers of organisms shed in the feces. Less experienced staff were less able to detect the organisms in normal samples using flotation or stained fecal smears because of low numbers of organisms. There were no calves, with or without diarrhea, that had both *Giardia* and *Cryptosporidium*. There are at least two species of *Cryptosporidium* that occur in cattle, *C. parvum* and *C. muris*.

*Cryptosporidium parvum* is common in calves less than three weeks old, while *C. muris* is more often found in older calves. *Cryptosporidium muris* can cause mild diarrhea in cattle of all ages. After ingestion of a *Cryptosporidium* oocyst, sporozoites within the oocyst are released by digestion and attach to the border of intestinal epithelial cells. These reproduce asexually, with two generations of merogony within the intestinal epithelium. Next, microgametes fuse with macrogametes and sexual reproduction occurs. An unsporulated oocyst results. The oocyst undergoes sporulation and is passed from the body in the feces.

*Giardia* is a flagellated protozoan that usually causes clinical signs in calves during the first seven weeks of age. Although *Giardia* has two forms, a trophozoite which is active and motile in the GI tract, and a resistant cyst. Outside the host, cysts survive cold, wet conditions but die in a dry, hot climate. The life cycle is very similar to that of *Cryptosporidium*. The cyst is ingested orally and a trophozoite is released by digestion of the cyst wall. The trophozoite associates with the microvilli of the small intestine without entering the cells. The trophozoite later encysts and matures on the way through the intestinal tract. A mature cyst with two potential trophozoites is usually the stage found in the feces of infected hosts

Elimination of *Giardia* and *Cryptosporidium* infections in calves is difficult, since no highly effective drugs are currently labeled for use in young calves. Furthermore, resistant cyst stages persist in the environment. These organisms have significance for public health. People handling calves should be careful to avoid contaminating their hands with feces because *Cryptosporidium* and *Giardia* can infect humans.

--Source: L.S. Mansfield, A.J. Murphy, D.T. Gauthier, E.M. Mazzaferro and T. Humphries-Barker, Parasitology section. As published in Veterinary Diagnostic Newsletter, Michigan State University, Vol. 12, No. 2, 1995. --Veterinary & Biomedical Sciences, November, 1995, Page 1. Animal Health Spectrum, Extension Veterinary Medicine, Vol. 6, No. 4, December 1995, as reported in Veterinary Newsletter, The University of Georgia, February 1996.



## OBSERVATION ON THE COMPLEXITY OF BOVINE RESPIRATORY DISEASE

*The article that follows is taken from an interview with John Mayer, DVM, Midlands Consulting, Omaha, NE by the Animal Health Foundation (AHF).*

**AHF:** In cases of bovine respiratory disease (BRD), how do you determine the causative agent?

**Mayer:** Our primary method is postmortem examination with virus isolation and bacterial culture. We also collect swabs of nasal secretions from groups of live cattle--both normal animals and those that are visibly sick, so we have a basis for comparison. Unfortunately, results from both of these methods are obtained after the disease process is well underway.

The real value of the results is they provide data on the organisms present in animals from various origins of various ages arriving in the feedlot at various times of the year and in various conditions. With that data we can identify trends which are subsequently helpful in controlling disease.

The poultry industry has a great advantage over the cattle industry in diagnosing causative agents. When poultry producers are faced with an outbreak, they can immediately sacrifice and necropsy a sample of the flock without incurring financial setback or alarming customers. The cattle industry, particularly custom feeders obviously can't do that. So we gather as much data as possible and apply it to future circumstances.

**AHF:** How would you use that data?

**Mayer:** We place all incoming cattle into two categories, low risk and high risk based on the factors above and others. For example, we also consider whether an animal is direct from the ranch or has been through a sale barn, whether or not a calf was weaned before shipping, whether or not the animal was vaccinated before weaning and/or shipping, the length of the haul, the degree of shrink, the degree of commingling, and so on. Actually, the list can become quite lengthy, which means it's never a black and white determination; animals can arrive with a combination of low and high risk factors.

### Risk Factors in Incoming Cattle

#### Low Risk

Direct from ranch  
Vaccinated before weaning  
Weaned before shipping  
Low commingling  
Short haul  
Low shrink  
Good weather/no climate change  
Yearlings

#### High Risk

From sale barn/order buyer  
Not vaccinated before weaning  
Not weaned before shipping  
High commingling  
Long haul  
High shrink  
Bad weather/climate change  
Calves

We use these categories to adjust our arrival processing routine. For example, we place low risk cattle in their home pens as quickly as possible while we spend more time observing and evaluating high risk cattle. In some circumstances we may selectively mass medicate.

**AHF:** Do age, origin, breed, or history have bearing on susceptibility to respiratory pathogens?

**Mayer:** Probably the greatest variable in susceptibility is the immune status of the individual animal. Under what are apparently identical circumstances, some will get sick while some won't. And some sick ones will recover while some will die.

There's no question that the healthiest, most resistant calves come from cows in good health, with a solid vaccination record, and which have provided ample colostral antibodies. Also, cattle that have had the exposure or vaccination--before shipment are much less susceptible to respiratory disease in the feedlot. --As reported in *Veterinary Newsletter, The University of Georgia, December 1995.*

## IMPACT OF PREVENTIVE HOOF TRIMMING ON HEIFERS

Our northern climate places many restrictions on how we raise heifers and these restrictions can have an important effect on hoof growth. Heifers in northern climates are raised indoors during the winter months. They are either grouped with other heifers of similar size in pens or they are placed in tie-stalls. The latter method does not permit much free movement. The tie-stall is usually constructed of concrete with straw for bedding or rubber pads. Wet concrete in the tie-stalls or moist manure pack in pens can soften the hoof wall and, coupled with reduced exercise, promote a longer toe due to less wear on the hoof wall. Most producers do not routinely trim their animals' hooves until after they have calved. When vaccinating and deworming heifers, one can often notice that they have long toes. Corrective trimming at an early age might allow a more normal claw, promoting more normal growth and wear on pasture.

Studies have shown that claw conformation has an impact on longevity and production. The problem in dairy cattle is that hoof growth always exceeds hoof wear. When the hoof becomes too long, it becomes difficult to get much hoof wear when the animal is walking. If the hoof is trimmed to a more normal shape, the animal is better able to wear the hoof down on their own. Rates of hoof growth and wear are lowest during the winter and highest during the spring and summer. Hoof growth is greatest in heifers and the least in older cows. Therefore, if one trims heifers after the season of rapid hoof growth (summer), they should maintain better hoof conformation longer than those trimmed before the warmer months.

Agriculture Canada provided funding to investigate the impact of preventive hoof care on first lactation milk production. In this study, all heifers less than 16 months of age on eight Holstein dairy farms in PEI were enrolled. Four farms used tie-stalls for their heifers and four utilized large loafing pens. 50% of the heifers had preventive hoof care by a professional hoof trimmer. Approximately half of the trimmed group were trimmed in May and the other part of the trimmed group were done in November-January, depending on when the heifers were brought into the barn.

252 heifers were enrolled with 125 trimmed and 127 non-trimmed controls. Of the 133 heifers which completed their 305 day first lactation record, 68 had been trimmed as heifers and 65 had not. After statistical analysis of the data when controlling for calving age, it showed that the trimmed heifers produced more milk (higher BCA) than the control heifers ONLY when they were trimmed in the late fall. There was no difference between the groups if they were trimmed in the spring. It is interesting that there was also a statistical difference in the spring and fall trimmed heifers with an increased milk fat and protein BCA in the fall trimmed heifers.

An important production difference was also found when comparing heifer housing. Tie-stall heifers performed higher in both milk BCA and 305 day milk, while loafing pen heifers produced higher amounts of 305 day fat and protein.

Therefore, trimming heifers before they calve does have an impact on their first lactation milk production. In these data, it appears that trimming should be done in heifers in the late fall when they return to their winter housing. One will have to decide if it is the type of housing or the management which produces a difference in the milk production. --Dr. Patty Scharko on The Animal Productivity and Health Information Network (APHIN), a computer based information network serving the dairy industry in P.E.I., Canada. <http://www.upei.ca:80/~aphin/>

### IN PASSING...

- One-seventh of your life is spent on Monday.
- By the time you can make ends meet, they move the end.

## FEED MILL LICENSING NOW A REALITY

Medicated Feed Applications (MFA's), or 1900's, are now a thing of the past. On October 9, 1996, the President signed the Animal Drug Availability Act of 1996 (ADAA), which amends Section 512(m) of the Federal Food, Drug, and Cosmetic Act to require a single facility license rather than multiple MFA's for each feed mill as previously required. FDA intends to revise its regulations to clarify that a license will be required for the manufacture of feeds using Category II, Type A medicated articles, the manufacture of free choice feeds, and the manufacture of liquid Type B feeds .

Prior to shipment of a new animal drug intended for use in the manufacture of medicated animal feed, the seller must have a written statement from the buyer that the buyer has a feed mill license and possesses current approved Type B and/or C feed labeling for the drug, unless FDA has exempted by regulation manufacturers of animal feed bearing or containing such a drug from the requirement to hold a license.

Licenses are required to establish and maintain all records and make such reports as required . They are also required by good manufacturing practice regulations to establish and maintain a program of sampling and analysis consisting of an assay of the first batch manufactured, followed thereafter by two samples at periodic intervals during the calendar year. If a medicated feed contains a combination of animal drugs, only one of the drugs need be subject to analysis each time, provided the one tested is different from the one(s) previously tested. Reports of assays shall be kept on the premises for not less than 1 year after the date of manufacture of the medicated feed. Licensees will be subject to biennial inspections and will be subject to the same regulatory procedures as MFA holders were. Licensees are also required to register every year with the FDA. **November 5, 1996, Web site for the FDA , The Center for Veterinary Medicine (CVM) , <http://www.cvm.fda.gov>**

## COLOSTRAL IMMUNITY IN BEEF CALVES

The passive transfer of immunoglobulins in colostrum is the most important source of immunologic protection available to neonatal calves. Inadequate intake and absorption of maternal antibody has been associated with an increased risk of disease and death. Recently, passive immune status was evaluated among 263 beef calves at the U.S. Meat Animal research Center in Clay Center, Nebraska. Both serum immunoglobulin and plasma protein values at 10 and 24 hours postpartum were measured. Plasma protein level, measured by refractometry, was judged to be a reasonable indicator of passive immune status suitable for field use. It was found that calves of dams diagnosed with mastitis at or following calving had significantly reduced serum antibody levels at both 10 and 24 hours postpartum.- Twin calves, which received extra care and attention following birth, had higher antibody levels at 24 hours than did single calves. Age of the dam was associated with passive immune status, with the lowest levels observed among calves of first-calf heifers and aged cows. Serum immunoglobulin levels also decreased as calves were born later in the 63 day spring calving season. Calf sex, dam body condition score at calving, dystocia, and birth weight were not related to passive antibody transfer. One dose of a commercial colostrum supplement administered to calves with inadequate passive transfer at 10 hours postpartum had no effect on plasma protein or serum immunoglobulin levels at 24 hours, or on preweaning morbidity and mortality. Thus, while biologic risk factors for reduced passive transfer of maternal antibody were identified, attempts to intervene by giving a commercial colostrum supplement were ineffective. -- from "Effects of various risk factors on plasma protein and serum immunoglobulin concentrations of calves at postpartum hours 10 and 24," by L.J. Perino, T.E. Wittum, G.S. Ross, American Journal of Veterinary Research, 1995;56: 1144- 1148, as reported in Ohio Vet. Newsletter, Volume 22, #1, July-Dec. 1995.

## IN PASSING...

- Nostalgia isn't what it used to be.

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