VIRGINIA COOPERATIVE EXTENSION SERVICE
EXTENSION DIVISION – VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY – BLACKSBURG, VIRGINIA 24061

THE FOOD ANIMAL VETERINARIAN

VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE

Spring 2004 No. 30

Dear Food Animal Practitioner,

The Virginia Johne's Disease Control and Prevention Program (VJDCPP) continues to make significant strides in the state. Many food animal veterinarians are now certified and are enrolling herds in the voluntary program. To enroll a herd, a risk assessment must be carried out by 2 individuals, a certified veterinarian and either a second certified veterinarian or a certified implementer. Certified implementers to date include most veterinarians who work for the state of Virginia in livestock related positions and Virginia Cooperative Extension agents with a specialty in animal science.

The risk assessment approach acknowledges that this disease will never be conquered with the test-and-slaughter approach used for Brucellosis, hog cholera, etc. A significant portion of the Johne's program, therefore, involves decreasing the risk of new infections of young animals from older animals that are potentially shedding bacteria in the herd. Once this is in place, some testing may be done. The Lynchburg Vet. Diagnostic Laboratory is now up and running with Johne's ELISA testing and a liquid media fecal culture.

It is believed that most dairy operations will benefit from participation in the program. The current emphasis in beef cattle operations is for producers who sell seed stock either as purebred bulls or bred commercial heifers. This is a great opportunity to increase the level of your participation in many cattle operations with an added pay incentive. More information can be found on the Johne's Disease website at http://www.vdacs.state.va.us/animals/johnes.html

As we announced last fall, there have been some changes to the Veterinary Extension program. There are currently three Veterinary Extension positions at Virginia Tech: Beef Cattle Veterinary Extension, Dairy Cattle Veterinary Extension and Equine Veterinary Extension. I fill the Beef Cattle Veterinary Extension position. Dr. Hovingh did the Dairy Cattle Veterinary Extension, but accepted a position at Penn State and left in December. We are currently interviewing four candidates for that position and hope to have someone in it before the end of the year. Dr. Scott Pleasant, currently a surgeon at VMRCVM, has accepted the Equine Extension Veterinarian position and will begin in that role in the next few months. We look forward to working with you in meeting any educational needs that you might have.

The cattle industry in Virginia is undergoing significant changes. A recent Hoard's Dairyman article (Jan 25,'04) asked, "Which Farms Will Produce the nation's milk in 2020?" The authors report that 92.4% of the dairy farms had less than 200 cows in the year 2000 and produced 46.2% of the milk. However, they project that by 2020 farms with less than 200 cows will represent only 61% of the farms and will produce only 6.7% of the milk. They further project that mega dairies with 500 or more cows will go from producing 35.8% of the milk in 2000 to producing 84.6% of the milk in 2020. Since Virginia has not been conducive to developing many larger dairies this suggests that the dairy industry in Virginia will decline significantly. Food animal practices in Virginia need to plan to deal with this approaching reality.

My best,
Dr. Dee Whittier
Extension Veterinarian, Beef Cattle

Virginia Tech 1872

This newsletter is published quarterly in support of the outreach program of the Veterinary Teaching Hospital VMRCVM, Blacksburg, VA and is prepared for and distributed to veterinarians in the Mid Atlantic Region.

VIRGINIA STATE UNIVERSITY SINCE 1882

Udder Scores, Leg Hygiene Scores, and Subclinical Mastitis

Exposure to mastitis pathogens and the efficiency of the bovine defense mechanisms are two key factors that determine the risk of intramammary infection (IMI). Moisture, mud, and manure present in the environment of the cow are the primary sources of exposure for environmental mastitis pathogens. Cleanliness of the udder is thought to influence the quantity and type of bacteria present on teat surfaces, and dirty teats and udders are considered to be a source of environmental bacteria in milk. In one study, the incidence of IMI was correlated with the number of mastitis pathogens present on the teat end. The quality of premilking udder preparation is an important determinant of milk quality. Premilking udder preparation must be efficiently performed because thorough preparation has been reported to increase the amount of time spent in the milking parlor.

The objective of this study was to determine the relationship between udder and leg hygiene scores of lactating dairy cattle and measures of subclinical mastitis. Study animals (n=1,250) consisted of lactating dairy cows from eight commercial dairy farms. Herds were enrolled during December 2000 and January 2001 and were visited bimonthly for a total of five visits per herd. Udder and lower legs of study animals were compared to model animals depicted in photos on the scoring sheet and given a score based on the following categories: 1) Completely free of or has very little dirt, 2) slightly dirty, 3) mostly covered in dirt, or 4) completely covered, caked-on dirt.

Overall, 22% of udder hygiene scores (UHS) and 30% of leg hygiene scores (LHS) were categorized as dirty. A small proportion of animals received the lowest LHS (one indicating very clean), but 20% of UHS received this classification. Mean hygiene scores were 2.09 and 2.33 for udders and legs, respectively. Udder hygiene scores were significantly associated with LHS and varied among farms. Linear somatic cell scores increased as udder hygiene score increased. Significant differences in somatic cell scores were observed for all contrasts of udder hygiene score, except between scores of 1 and 2 and of 3 and 4. Linear somatic cell scores were associated with leg hygiene scores, but the only significant contrast was between leg hygiene scores of 2 and 4. There was a significant association between the prevalence of intramammary contagious pathogens and udder hygiene score. The prevalence of intramammary environmental pathogens was significantly associated with udder hygiene score and was 7.7, 10.0, 10.6, and 13.5% for UHS of 1, 2, 3, and 4, respectively. More than one-third of IMI .caused by major pathogens that occurred in the dirty cows could be attributed to UHS. The prevalence of environmental pathogens was not associated with LHS. Cows with udder hygiene scores of 3 and 4 were 1.5 times more likely to have major pathogens isolated from milk samples compared with cows with hygiene scores of 1 and 2.

The prevalence of isolation of both contagious and environmental mastitis pathogens from composite milk samples was significantly associated with UHS. Fecal consistency, bedding management, and stage of lactation have been previously suggested as contributing to herd differences in hygiene scores. The type of surface of the free-stall bed and the type of bedding used on that surface are likely to have a large influence on UHS but probably have less influence on LHS. Manure management systems, frequency of cleaning of barn alleys, and the ease of movement of the cattle are likely factors that have a larger influence on LHS than on UHS.

Taken from: Schreiner, D. A., and P. L. Ruegg J Dairy Sci 86:3460-3465, 2003, as reported in VetMed, Vol. 10, Issue 10, May 2004, Iowa State University, Ames, IA

Impact of Lameness on Behavior and Productivity of Lactating Holstein Cows

The impact of lameness on behavior and milk production of multiparity Holstein cows was examined on two commercial dairy farms. Pens of cows were selected based on distance from the milking parlor. Cows within each pen were locomotion scored to quantify lameness severity. Based on their locomotion score (i.e. 1-4), where an increasing number indicates an increased severity of lameness, cows were color marked and observed to quantify behaviors. Data recorded by cow was the return-time from the milking parlor (i.e. time after the first cow returned; in minutes) after the morning milking and then, at hourly intervals until cows left for the afternoon milking, whether marked cows were lying or standing and their distance from the pen entrance. Milk production and composition was determined. In Experiment 1, the percentage of cows lying increased at an increasing rate (linear (L): P=0.02; quadratic (Q): P=0.07), distance from the pen entrance was highest in intermediate locomotion score groups (Q: P=0.02), return time tended to increase linearly (P=0.07), and milk (P=0.02) and protein production (P<0.01) decreased linearly as the locomotion score groups increased. In Experiment 2, the percentage of cows lying increased linearly (P<0.01), distance from the pen entrance decreased at an increasing rate (L: P<0.01; Q: P<0.01), and return time increased at an increasing rate (L: P=0.07; Q: P=0.05) as locomotion score groups increased. Percentage of cows lying was highest in the farthest pen (P<0.01), distance from the pen entrance decreased at an increasing rate (L: P<0.01 and Q:P<0.01), and cows return time increased linearly (P<0.01) as pen distance from the milking parlor increased. Increased locomotion score and pen distance were judged to have negatively impacted cow behavior and productivity. However, lack of interactions between locomotion score and pen distance do not support a recommendation to place lame cows in pens closer to the milking parlor to increase welfare and/or productivity.

Applied Animal Behaviour Science, 2003; 83:1:1-14, S. T. Juarez, P. H. Robinson, E. J. DePeters and E. O. Price, as reported in Animal Health Spectrum, Vol. 15, No. 1, Spring 2004,Mississippi State University, Mississippi State, MS

Efficacy of Disinfectants for Sanitizing Boots Under Dairy Farm Conditions

Ampicillin-resistant Escherichia coli (AR-E. coli), suspended in a manure slurry, was placed on rubber and plastic boot material surfaces to determine survival time. In addition, rubber boots were immersed in the bacteria manure slurry, placed in water, and then several disinfectants were applied to the boots to determine the bacterial kil1 time. In the second phase of the study, boots were contaminated with the bacteria-manure slurry, and plastic and concrete surfaces were walked on to determine how far the bacteria could be tracked.

AR-E. coli was isolated from the surfaces of both rubber and plastic strips for up to one day after the strips were inoculated within the AR-E. coli slurry, with the exception of rubber strips at the highest temperature tested, Alcohol and Roccal-D Plus appeared to be the most effective disinfectants used on rubber, followed by bleach. Betadine Solution, Nolvasan Solution and water showed similar efficacy. AR-E. coli could be isolated from boot tracks on plastic for nearly 400 ft (121.9 m) and from a concrete surface for up to 150 ft (47.7 m).

Results of this study emphasize the importance of time and temperature on the ability of disinfectants to eliminate bacterial contamination in manure and support the use of biosecurity Good Management Practices (GMPs) to control the movement of potentially pathogenic bacteria on dairies.

J.Kirk, C.Boggs, J. Jeffrey, and C. Cardona The Bovine Practitioner February 2003, Vol. 37, No. 1, p. 51, as reported in Dairy Newsletter, September 2003, Utah State University, Logan, UT

E coli Vaccine for Cattle Found; Research Hailed in War Against Killer. New Tool to Fight Tainted Meat

Canadian researchers have, according to this story, devised a way to significantly reduce deadly E. coli bacteria carried by cattle, giving humans an indirect defence against the potentially fatal effects of contaminated meat or water.

The story says that the bovine vaccine, which could be mass produced as early as next year reduces the ability of the bacterium to stick to the gut wall of cattle, reducing chances for the bug to replicate there. Kelly Daynard, spokesperson for the Ontario Cattlemen's Association, was quoted as saying, "There's so much done to reduce exposure at the processing and producer level, but certainly a vaccine would be wonderful news."

Microbiologist Brett Finlay of the University of British Columbia and his team were working on developing an antibody that would act as a Teflon coating - giving the wall of the gut a slick lining that would gum up the bacteria's stick-and-stay process - when they decided to turn their attention to cattle. If they could produce the same non-stick reaction in cattle, which carry the 0157 H7 version of the bacteria - lethal to humans - the E. coli would slide right through. Fewer bacteria, less chance of contaminated meat or water supplies.

The story adds that by examining fecal samples of 500 inoculated cattle in Nebraska, researchers found the amount of bacteria the animals were carrying was reduced by 60 to 70 percent.

From FSIVet-L December 15, 2003. The Toronto Star, as reported in Veterinary News, January 2004, Penn State University, University Park, PA

Feed Intake, Milk Yield, and Metabolic Parameters Prior to Left Displaced Abomasum in Dairy Cows

As left-displaced abomasum (LDA) often occurs in cows with high contents of fat in the liver (fatty liver), a postpartum fatty liver-inducing regimen was applied to 16 cows. The main interest of the study was whether there were productive or metabolic changes in cows prior to LDA. Therefore, feed intake and milk production were monitored and blood samples were collected from the cows. The LDA occurred in 4 out of 16 dairy cows that were included in the feeding regimen. Compared to cows not developing LDA, LDA-cows had a significantly lower feed intake, 6.5 kg/d les, and milk production, 8 kg/d less, prior to clinical diagnosis of LDA. In the 10-d period preceding clinical diagnosis of LDA, blood concentrations of calcium, glucose, and insulin were significantly lower, whereas blood concentrations of nonesterified fatty acids and beta-hydroxybutyrate, as well as aspartate aminotransferase activities were significantly elevated compared to cows not developing LDA. These preclinical changes may play an important role in the pathogenesis of LDA. It is not certain, however, whether there is a causal association between these parameters and LDA.

Journal of Dairy Science, 2003; 86:4: 146S-1471, S. C. L. Van Winden, R. Jorritsma, K. E. Muller and J. P. T. M. Noordhuizen, as reported in Animal Health Spectrum, Vol. 15, No. 1, Spring 2004,Mississippi State University, Mississippi State, MS

Nutrient Boost for Alfalfa Silage

As a forage crop, alfalfa has many benefits. It fixes nitrogen in the soil— meaning there's no need to add nitrogen fertilizer—and it's a good scavenger of excess soil nitrate left by overfertilized row crops. And because it's high in protein, it's great for livestock, such as dairy cattle. Unfortunately, when alfalfa is processed into silage, up to 85 percent of its protein breaks down into nonprotein nitrogen (NPN) through a process known as proteolysis. Cows use NPN much less efficiently than protein.

Now, researchers at ARS's U.S. Dairy Forage Research Center in Madison, Wisconsin, and ARS's Plant Science Research Unit in St. Paul, Minnesota, have found an environmentally friendly way to reduce protein degradation in ensiled crops such as alfalfa. ARS has filed a patent application on the discovery, which could save farmers more than $100 million per year.

"Right now, no practical techniques are available to farmers who want to reduce protein breakdown in alfalfa silage," says plant physiologist Ronald D. Hatfield, of the Madison center. Research has shown that applying formic acid or using heat treatments can reduce protein degradation by 12 to 28 percent, but these methods are either too caustic or too expensive for farmers to use profitably. Formic acid, for example, must be handled with care and can be hard on some equipment.

But Hatfield and two other scientists at the center—agricultural engineer Richard E. Muck and molecular biologist Michael L. Sullivan—along with Deborah A. Samac, a plant pathologist in the St. Paul unit, have discovered a way to reduce protein loss by using ingredients extracted from potato skins and red clover. Research leading up to their invention began more than 10 years ago.

The researchers wanted to know why red clover, which outwardly seems so similar to alfalfa, made such excellent silage. "We looked to see whether there were different types of proteins in the two plants or differences in their protease activity," says Muck. (Proteases are the enzymes responsible for breaking down proteins.)'They didn't find anything at first.

But later, a clue emerged. Alfalfa clippings would remain green for a while after being cut, but red clover clippings would turn brown right away. Further studies revealed that red clover contains large amounts of polyphenol oxidase (PPO), the same enzyme that turns cut surfaces brown in apples, bananas, potatoes, and many other fruits and vegetables. Alfalfa has insignificant amounts of PPO:

Since making these discoveries, Sullivan has been able to extract the PPO gene from red clover, and Samac has inserted it into an alfalfa plant. They recently conducted an experiment in which they chopped some transgenic alfalfa plants into 2-centimeter pieces, treated them with a bacterial inoculant, applied caffeic acid to about half of them, and let them sit for 2 weeks. Bacterial inoculants are the principal silage additives in the United States; they ensure fast and efficient fermentation in the silo.

The alfalfa plants treated with caffeic acid had 15 percent less protein degradation than untreated plants. The scientists believe they can preserve even more alfalfa protein if they improve their processing technique and grind the plant into smaller pieces.

This work is part of Food Animal Production (#101) and Rangeland, Pasture, and Forages (#205), two ARS National Programs described on the World Wide Web at www.nps.ars.usda.gov, as reported in Agricultural Research Magazine, December 2003, U.S. Department of Agriculture, Beltsville, MD

Length of Docked Tail and Rectal Prolapse in Lambs

Manure accumulated on long, wooly tails of sheep provides an attractive environment for flies to lay their eggs. Resulting fly larvae irritate, injure, and kill successive layers of skin on sheep, and infected animals that are not treated may die from shock, intoxication, or infection. Lambs with docked (shortened) tails have a lower incidence of fly strike than lambs with undocked tails. Also, most buyers of lambs pay less for lambs with an undocked tail because the tail is inedible and may have considerable weight. Therefore, tails on lambs are usually docked at a young age. Several US national agricultural and animal health organizations have passed resolutions recommending that lambs not be docked ultrashort, and some have specifically recommended that lambs not be docked shorter than at the attachment of the caudal folds to the tail.

A multistate cooperative study was conducted to study tail length in docked lambs and its relationship to incidence of rectal prolapse. Participants in this study included Iowa State University, Ohio State University, Oregon State University, Texas A & M University, and the University of Wisconsin-Madison. A total of 1,227 lambs at six locations were randomly allocated to two or three tail dock treatments: 1) short - tail was removed as close to the body as possible, 2) medium - tail was removed at a location midway between the attachment of the tail to the body and the attachment of the caudal folds to the tail, and 3) long - tail was removed at the attachment of the caudal folds to the tail. Short-docked lambs had a greater incidence of rectal prolapse (7.8%) than lambs with a medium (4.0%) or a long (1.8%) dock. Female lambs had a higher incidence of rectal prolapse than male lambs. At two stations, lambs were finished either in a feedlot on a high-concentrate diet or on pasture with no grain supplementation. At one station, with a very low incidence of rectal prolapse, there was no difference in incidence between lambs finished in the feedlot or on pasture; however, at the station with a relatively high incidence of rectal prolapse, lambs in the feedlot had a higher incidence than lambs on pasture. The half-sib estimate of heritability for the incidence of rectal prolapse was low (0.14).

Ultra short docking of lambs at the base of the tail, so that virtually no tail remains, results in a significant increase in the incidence of rectal prolapse. Docking lambs at the site where the caudal folds on the underside of the tail attach to the tail significantly decreases the incidence of rectal prolapse to negligible levels. Ultrashort docking is a cosmetic fad promoted in the show ring that compromises the health and well-being of sheep. The practice should be abandoned.
Taken from: Thomas, D. L., et al J Anim Sci 81:2725-2732, 2003, as reported in VetMed, Vol. 10, Issue 2, January 2004, Iowa State University, Ames, IA

Bee Benefits

A Cornell University study determined that the value of honey bee pollination to US agriculture is more than $14 billion annually. Crops from nuts to vegetables and fruits all require pollinating by honey bees. The extent of pollination has much to do with the yield.
Farmers who depend on bee pollination contract with migratory bee keepers who move millions of hives to fields each year just as crops flower.
In addition, more than $130 million worth of raw honey was produced in the U.S. in 2002. Not bad if you remember that honey bees aren't even native to the New World, but were brought here by early colonists from Europe.

Agricultural Research March 2004
USDA ARS

Maternal Immunity in Beef Calves and Effects on Vaccination

Serum antibodies for newborn calves are transferred from the dam to calf by ingestion and absorption of antibodies from the dam's colostrum. The duration of this passively derived immunity is dependent on the amount of antibodies ingested and absorbed. While passive immunity provides protection against disease, passive immunity could block the development of serum antibodies when immunogens are given to calves with maternally derived antibodies.

The passive immunity transferred to calves from their dams was investigated in a beef herd to determine half-life of antibody, estimated time to seronegative status and effect on immunization. One hundred two beef calves in a commercial ranch under standard management conditions were utilized. Samples were collected at branding (day 0, approximately 2 months postcalving) and days 95 (weaning) and 116 (delivery to a feedyard). The calves were divided into two groups: vaccinates (51) and -nonvaccinates (51). The calves were vaccinated with a commercial inactivated viral vaccine containing bovine viral diarrhea virus (BVDV) la, BVDV2, bovine herpesvirus-1 (BHV-1), parainfluenza-3 virus (PI-3V), and bovine respiratory syncytial virus (BRSV) on days 0 and 95.

The mean half-life of viral antibodies in nonvaccinated calves to each virus was: BVDVla, 23.1 days; BVDVlb,22.8 days; BVDV2,22.9 days; BHV-1, 21.2 days; PI-3V,30.3 days; and BRSV,35.9 days. The calculated mean time to seronegative status for nonvaccinates based on titers at day 0 was: BVDVla,192.2days;BVDVlb,179.1 days; BVDV2,157.8 days; BHV-1,122.9 days; PI-3V, 190.6 days; and BRSV, 186.7 days. The predicted time of seronegative status for a group of calves for vaccination programs may not be appropriate as there may be a range of titers for all calves at day 0. In this study the range for BVDVla was 16-15,384; BVDVlb,8-8192, BVDV2,0-8192; BHV-1,0-935; PI-3V,8-2084; and BRSV,8-4096. Using the halflife of 23 days for BVDV 1 a, the time thereafter for seronegative status would be 46 and 299 days compared to the calculated date of 192.2 days using the mean of estimated time to seronegative status for all the calves

The substantial and variable maternally derived antibody titers in this calf crop led to variable and unreliable responses to calf vaccination. In this situation, reliable calf immunity will be possible only with repeated vaccination. Commonly, viral vaccinations begin at branding (at 60 to 90 days of age) with a second dose near weaning. However, a third dose of inactivated vaccine may need to be given 2 to 4 weeks post-weaning. Beef calves in a retained ownership program held for the feedyard and breeding animals should thus receive another viral vaccine dose after weaning. However, viral vaccination at the earliest possible time should be considered as many calves (40% or more in some operations) may have poor passive transfer of maternal antibodies. Such calves could respond to vaccination. Thus a balance must occur with vaccination of calves at multiple times, especially postweaning. Inactivated vaccines are usually the vaccine of choice in cow-calf operations as licensing issues prevent most MLV BHV-1 and BVDV vaccines in the US from being used on calves nursing pregnant cows.

Taken from: Fulton, R. W., et al Vaccine 643-649, 2004, as reported in VetMed, Vol. 10, Issue 10, May 2004, Iowa State University, Ames, IA

Would You Believe?

U.S. Medical Schools got 45% of the federal funds allotted to institutions of higher learning for research & development in 2002.

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