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Dear Colleagues,

If you haven't heard the word "biosecurity" a bunch lately, you haven't been paying attention. Veterinarians as guardians of animal health and human health, as it relates to animal health, have always been champions of biosecurity. Now we're getting a lot more attention for this important concept. It's apparent that preventing their exposure to disease causing organisms can do a big part of the job of keeping animals healthy.

In the face of diseases such as BSE and Foot and Mouth disease, the importance of preventing the introduction of foreign animal diseases to the US and the farms of our clients is huge. Britain has depopulated 10% of its livestock as it marches toward regaining its status of Foot and Mouth disease free. Spain has had just 113 cases of "Mad Cow Disease" but is now enforcing a policy of incinerating any bovine over 30 months of age at the time of culling form the herd. What huge costs for a breach of biosecurity!

Biosecurity, like any other herd-health recommendation, must be carried out in a priority-driven fashion. It might be nice to have cattle on the farms that we service vaccinated against the 63 disease-causing agents for which vaccines are approved in the US, but rarely can such a luxury be afforded. Likewise, all of the possible biosecurity tools cannot be practically applied in every livestock production setting.

Recently, at extension meetings in which I have been involved, I've asked producers to rate, on a scale of 1-10, the likelihood of having a disease outbreak on their farms caused by the following:
»Wildlife introduction of organisms
»The neighbor's cattle shedding organisms across a fence line
»Wind or water-borne introductions
»Visitors to the farm carrying in organisms
»Carriers already present in the herd
»Environmental organisms present on every farm
»Purchased animals

Interestingly, cattle producers have difficulty distinguishing amongst these in terms of their relative risk. My experience says that the last three on the list are much more likely to be the source of an outbreak than first four. Maybe its tempting to blame the first four whicht are a lot more outside the control of the producer than to take responsibility for the last three. My assertion is, that while it is prudent to take reasonable steps to control the first four, extensive efforts to deal with these shouldn't be the priority until programs are well instituted for the last three. Every farm will not justify nor be capable of the same biosecurity program. Compare a purebred operation that has used exclusive AI and been closed for years with a stocker operation acquiring cattle from dozens of outside farms each year.

The current popular interest in biosecurity may be the opportunity for food animal practitioners to educate all involved with the livestock industry, not only about the need for biosecurity but also about setting priorities as we carry out programs.

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UNIVERSITY OF MARYLAND 1807-1856-1920

Factors That Affect Embryonic Survival in the Cow: Application of Technology to Improve Calf Crop

Embryonic mortality is a significant limiting factor to the success of establishment and maintenance of pregnancy in cattle, particularly in dairy cattle. However critical times a which losses may occur have been identified in beef cattle. These times include the period immediately before estrus, days 4 through 8 after estrus, the period of maternal recognition of pregnancy during days 14 through 17 after estrus and the late embryonic/early fetal period, between days 28 and 42 to 50. Some hormonal patterns or imbalances, with which embryonic mortality is associated have been identified. Producers and researchers alike must be aware that the management required to maximize fertility in the cow is not simple. Treatments for synchronizing estrus must provide high progesterone, keep LH and estradiol low during treatment, and lead to development of a highly functional corpus luteum after mating. Such treatments must reduce luteolytic influences such as excesses of PGF2a or estradiol, early after mating, during maternal recognition of pregnancy, and during the late embryonic period.

Luteal progesterone is essential for the preparation of the uterus and oocyte before breeding as well as for maintenance of uterine quiescence and the embryo/fetus, during most of gestation in the cow. Prior to and immediately after estrus, progesterone regulates the mechanisms necessary for maternal recognition of pregnancy. Cows in which short estrous cycles (short luteal phases) were produced by early weaning (day 30 postpartum) or normal estrous cycles were produced by pretreatment with progestogen before early weaning have been used to elucidate specific points at which fertility is compromised in the early postpartum beef cow.

In mated cows with short luteal phases, daily supplementation with progestogen, beginning on day 3, failed to maintain pregnancy, despite the fact that fertilization, early embryonic development to day 3 and transport of the embryo into the uterus appeared normal. When normal embryos were transferred on day 7 after estrus into cows with short luteal phases that received daily supplementation with progestogen, or embryos from cows with short luteal phases were transferred on day 6 after mating into cows with normal cycles, pregnancy rates in each case were about half those achieved using progestogen-pretreated cows with normal luteal phases. In cows with short luteal phases supplemented with progestogen, pregnancy rates were improved dramatically when the regressing corpus luteum was removed on day 4 or 5 after mating. Thus the early regressing corpus luteum produces an embryotoxic effect in addition to depriving the uterus and embryo of progesterone.

In cows with normal estrous cycles, fertility has been lower if concentrations of estradiol were elevated for more than 3 days before ovulation. Persistent follicles that produce more estradiol have developed when progesterone was low and frequency of tonic pulses of LH was high. In cows with such follicles, oocytes appeared to resume maturation well before the surge of LH and embryos died in the oviduct before the 1 6-cell stage. In both early postpartum cows with transferred embryos and cows with normal cycles, excessive follicular development and high estradiol-17b during the luteal phase, specifically on days 14 through 17 after insemination, were detrimental to embryo survival.

Finally, losses occur during the late embryonic period, between days 30 and 40 of pregnancy. A local relationship between uterine and luteal function remains important during this time. In preliminary studies using cows with replacement corpora lutea induced on days 28 to 31, continuation of the pregnancy was associated with higher but not excessive concentrations of prostaglandin (PG) F2a and lower concentrations of estradiol. If the replacement corpora lutea were induced after day 36 on the ovary adjacent to the embryo, all pregnancies continued.

To maximize fertility in the cow, treatmentsfor synchronizing estrus must provide high progesterone and low estradiol before estrus and mating. They must reduce luteolytic influences such as excesses of PGF2a or estradiol, early after mating and during maternal recognition of pregnancy and the late embryonic period.

E. .K, Inskeep Division of Animal and Veterinary Sciences, West Virginia University, Morgantown, WV, as reported in Veterinary News, PennState, University Park, PA December 2000

Performance Evaluations

"It takes him two hours to watch 60 Minutes."

Diagnosis of Bovine Salmonellosis

When dealing with salmonellosis, the rate of new infection correlates with the degree of environmental contamination. Salmonella persists on a farm or in a herd because of its continuous excretion by carrier cattle and by its ability to survive in the environment for extended periods. Carrier cattle DO NOT exhibit any evidence of the disease, but transmit infective bacteria to other susceptible animals. The carrier state usually refers to adult cattle, as calves tend to clear the infection over time. However, calves may be nonclinical shedders for a few months after clinical signs of disease have disappeared. Salmonella may reside in large intestinal contents of calves for some time during and after convalescence.

Three types of carriers have been described: active carriers, latent carriers, and passive carriers. Active carriers tend to be adult cows that have recovered from clinical salmonellosis. These active carriers may excrete Salmonella for years, particularly during periods of stress. Latent carriers carry Salmonella in tissues such as lymph nodes, and usually do not excrete Salmonella in feces until stressed. Passive carriers pass the bacterium through their intestinal tract into feces without invasion of the bacterium into the intestinal mucosa or lymph nodes. Passive carriers stop shedding Salmonella when removed from a contaminated environment.

It is best to culture the bacterium from feces in live animals. Two to 5 grams of fresh feces should be collected directly from the rectum, placed into sterile containers and submitted to a diagnostic laboratory for culturing. In the case of aborted fetuses, submit whole fetuses or collect abomasal contents, liver, lung, and placenta for bacterial culture. At necropsy, suspect tissues should be collected and placed into sterile containers. Feces, ileum, spiral colon, mesenteric and ileocecal lymph nodes, liver, spleen, lung, and body fluids from dead animals should be cultured. Necropsy tissues must be placed in clean containers and not contaminated during collection.

Submitted by Dr. Robert Holland, Iowa, Vet-Med, March 2001, as reported in Dairy Veterinary Newsletter, Utah State University, Logan, UT May 2001

Diarrhea in Iowa Feedlot Cattle Associated with Bovine Coronavirus

Three Iowa feedlots experienced winter dysentery like outbreaks of diarrhea in calves weighing 500 to 800 pounds. Morbidity ranged from 22% to 100% and mortality ranged from O to 3.6%. Dark brown-black feces in affected calves frequently contained frank blood, the most severely affected calves had elevated rectal temperatures (104.0 to 106.5 F and 2 of the 3 herds reported concurrent coughing, dyspnea, and nasal discharge.

At necropsy, the spiral colon and rectum contained frank blood and large clots Microscopic lesions were predominantly restricted to the spiral colon and were typical of the necrotizing colitis associated with bovine Coronavirus infection in neonates.

Immunohistochemistry revealed abundant coronavirus antigen in affected colons. Fecal samples were positive for bovine coronavirus by ELISA, immune electron microscopy and virus isolation These cases suggest that bovine coronavirus should be included in the differential diagnosis of diarrhea in feedlot calves along with coccidiosis, salmonellosis and BVD.

Gary Osweder, Nebraska Vet. And Biomedical Sciences Newsletter, Vol.39, No.6, June 2000, as reported in Veterinary News Penn State University, University Park, PA December 2000

Performance Evaluations

"If you gave him a penny for his thoughts, you'd get change."

Summer Fly Control on Cattle

With summer conditions come the worry and loss associated with fly infestations of cattle. Economic losses occur because of the worry of the flies, because they suck blood from the animals and because they spread cattle diseases such as pinkeye. Effective control measures will allow increases in profitability in beef cattle operations.

The first major type of fly that affects Virginia cattle is the horn fly. So named because it does rest on the horns of cattle with modern polled cattle the flies tend to rest on the withers, back and sides but the flies also spend time on the undersides of cattle where most of the biting occurs.

Losses associated with horn fly infestations have been studied extensively. The crucial level of flies for losses to begin to occur is 200-250. If either young animals or cows have this many flies or more than treatment will result in increased weight gains. Studies done at Texas A&M University have documented average increases in weaned calf weights of 20-27 pounds when effective control of horn flies is implemented

The second major type of fly that affects Virginia Cattle is the face fly. This fly is larger and more robust than the horn fly and spends only periodic feeding times on the flies during the day. As the name implies these flies prefer to be on the face and consume the secretion form the eyes and nostrils. They are particularly important because the y transmit the pinkeye organism from one animal to another and because they damage the cornea of the eye during feeding and thus allow a port of entry for the pinkeye-causing organism.

A number of methods and products are available for the control of cattle flies. More emphasis has been placed on horn fly control, perhaps because their study is easier and because they are generally easier to control. The topical products that are currently approved for control and available fit into three major categories: organophosphates (OP's), pyrethroids and endectocides. Table 1 summarizes the products according to their application class.

Table 1. Products for control of Horn Flies and Face Flies.

Pour-Ons	Ear Tags	Spray Formulations	Dusts
5 Pyrethroids (1-10 % Concentrations) (3%)	8 pyrethroids	4 Pyrethroids (10-42.5%)	1 Pyrethroid
1 OP (7.6%)	5 OP's (5-40%)	6 OP's (5.8-50%)	2 OP's (1-50%)
2 Endectocides with claims for flies	2 combo OP & Pyrethroids		

Other products that are approved for fly control are feed-through and rumen bolus products that prevent fly development in manure pats. Since both horn flies and face flies lay their eggs in manure and the development proceeds there, inhibiting compounds will prevent the hatching of flies. An important consideration in the use of these products is the availability of other untreated cattle in the proximity. If there are many neighbors (within 1-5 miles) with cattle who do not use these control products producers often see little benefit from mineral and bolus treatments for flies.

When making decisions about fly control it is important to realize that there are many effective program s. Producers should develop a program for their operations which is cost effective and most convenient. Some of the factors to consider when developing a fly control program for a herd include:

- Young cattle should receive more attention than older cattle. Because they are growing decreases in gain effect income directly.
- Young cattle are much more susceptible to pinkeye.
- Fly tags are convenient but have some drawbacks.
- Full season control from fly tags, especially for face flies, is generally not possible.
- Horn flies developed resistance to the original pyrethroid eartags quite rapidly. Newer pyrethroids and OP's have been slower to have resistance develop. Combination pyrethroid and OP products are quite good against resistant flies in theory.
- The use of two fly tags (one in each ear) extends control by only 10-14 days in most areas.
- Dustbags, oilers, face mops and other "self medicators" can be very effective because they provide for long-term high concentrations of insecticides on cattle.
- Locations for "self-medicators" must be careful chosen so that cattle will get frequent contact

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Use of Presynchronization Protocol and bST with Ovsynch to Improve Reproduction

At the recent Western Dairy Management Conference in Las Vegas, Dr. William Thatcher from the University of Florida gave an interesting talk on Factors Influencing Reproductive Efficiency. I want to focus on one set of experiments that he reported because they illustrate a couple of points regarding reproduction that may be of interest to you.

I suspect that most of you have heard about the Ovsynch protocol. It was originally developed at the University of Wisconsin and has been modified and tested by many other researchers. In summary, the protocol begins with a shot of GnRH (e.g., Cystorelin) at some predetermined point in time after calving. This is to cause ovulation of any existing follicle on the ovary. Seven (7) days later, a shot of PGF2 (e.g. Lutalyse) is given to 'kill' the resulting corpus luteum (C.L.) on the ovary. Two (2) days after that, another shot of GnRH is given, and cows are inseminated approximately 16 hours later. The value of this protocol is that NO heat detection is required because ovulations should be synchronized. The downside is that this protocol works best if the cow is between days 5 and 10 of her estrous cycle at the first GnRH injection. Dr. Thatcher added a presynchronization protocol to the Ovsynch protocol in an effort to get as many cows as possible into the days 5 to 10 window. He did this by injecting cows that were between days 34 - 40 after calving (average 37) with PGF2, then gave another PGF2 injection 14 days later. The Ovsynch protocol was begun 12 days after that (if you are keeping track, Ovsynch would begin on day 63 after calving and insemination on day 73). Cows were checked at 32 days after insemination for pregnancy, and open cows began the Ovsynch protocol again. Pregnant cows were checked 42 days after this to reconfirm pregnancy.

Pregnancy rates from this part of the experiment were 41.7% for those cows that were cycling and 22.4% for those animals not cycling. Overall, 23.4% of the cows were not cycling by day 63 after calving. Repeating the Ovsynch protocol induced cyclicity in 74.5% of the cows that were NOT cycling, with 28.4% of these cows becoming pregnant. Presynchronization of cows increased the pregnancy rate from 25.3% to 42.6%. The take-home message is that presynchronization can improve pregnancy rates and that the Ovsynch protocol can induce anestrous cows to cycle.

An additional twist to the experiment was to give bST on either day 63 or 73 (i.e., at the start of Ovsynch or the day of insemination). Administering bST increased first-service pregnancy rates by approximately 23% (34% to 57%) for presynchronized compared with nonsynchronized cows (Table 1). This supports earlier research by Dr. Thatcher and other researchers that bST given with an Ovsynch protocol increases pregnancy rates. Many producers are concerned about the possible negative impact of bST on reproduction; however, most research supports Thatcher's findings that this product should not impair, but may even enhance, reproduction.

In summary, if you are having a hard time catching cows in heat, consider using an Ovsynch protocol. Thatcher's data suggest that there is an added benefit from using some type of presynchronization program, and that bST used at the beginning of an Ovsynch protocol or at insemination during the same protocol enhances reproductive performance and could be used to improve reproduction on your farm.

Table 1. First service pregnancy rates for cycling cows following Ovsynch protocol.

	First Service Pregnancy Rate (%)
No Presynchronization control	25.3
No Presynch + bST - d 63	34.2
No Presynch + bST - d 73	33.7
Presynchronization control	42.6
Presynch + bST - d 63	58.1
Presynch + bST - d 73	56.1

Allen Young, Dairy Extension Specialist, Utah Sate University as reported in Dairy Newsletter Utah State, Logan, UT May 2001

Johne's Disease Tool Now Patented

A diagnostic tool for identifying dairy cattle in the early stages of a costly disease has been patented by Agricultural Research Service scientists in Ames, Iowa. An article appearing in a recent issue of Agricultural Research magazine highlights this and other ARS advances in animal research.

The new test detects Johne's disease, which costs U.S. dairy producers, more the $200 million annually. The newly patented gene probe is based on a genetic sequence discovered by ARS researchers. The probe can pinpoint *Mycobacterium paratuberculosis* -the organism that causes Johne's disease in dairy cattle - in blood, tissue and fecal samples.

Using this genetic sequence and another previously discovered genetic sequence for *M. paratuberculosis* in a DNA-based test allows diagnosticians to accurately identify animals infected with the organism even in the early stages of infection. Current tests can detect the presence of an antibody, but it takes years before an infected animal's immune system produces antibodies to *M. paratuberculosis.*

Early diagnosis is critical to eliminating the disease because the primary control method is removing infected animals from the herd. Infected animals often don't show signs of disease, but they can still pass the organism to healthy animals. Johne's is spread within and among dairy herds in three ways: by an infected cow passing the organism to an unborn fetus, by calves coming into contact with bacteria laden manure, and by calves nursing an infected cow.

ARS is USDA's chief research arm. Amore detailed story on this research appears in Agricultural Research magazine, and online at: http:// www.ars.usda. govfis/AR/archive/dec99/agric 1299.htm. Cattle Health Report, Spring 2000. As reported in Veterinary news Penn State, University Park, PA August 2000

Mannheimia: New Disease or Old Enemy?

How many cattle producers have heard of Mannheimia? If you haven't chances are you will soon be running across it in either an article from a popular farm magazine or on a drug or vaccine bottle. Mannheimia is not a new disease causing organism but rather a bacteria that has been around for a long time: *Pasteurella haemolytica* the major cause of shipping fever.

Bacteriologists have begun to use DNA typing, a technique similar to the DNA tests police use, as a means of classifying bacteria that have been thought to be the same bacteria. For several years we have thought that cattle carry a certain type of *Pasteurella haemolytica* as part of the normal bacteria of the upper respiratory tract (nose and throat). Only when the cattle were stressed in some way did this Pasteurella undergo changes and move down to infect the lung. It now looks like there are two separate bacteria involved; *Mannheimia glucosida*, a part of the normal flora of the upper respiratory tract and *Mannheimia hemolytica* the primary pathogen that causes the severe pneumonia of Bovine Respiratory Disease Complex (shipping fever).

There are three important issues to understand. First, when you read an article or a label on a bottle understand that *Mannheimia hemolytica* is basically the same bug as the *Pasteurella haemolytica* with which you are more familiar. Second, current recommendations have not changed for controlling and treating this disease. Third, our understanding of this family of bacteria is increasing which will hopefully lead to better control measures for this disease that is of such economic significance to both beef and dairy cattle producers.

Dr. John Currin, Extension Veterinarian, Virginia-Maryland Regional College of Veterinary Medicine

Performance Evaluations

"A photographic memory but with the lens cover glued on."

Eradicating Diseases in Cattle

The Foot and Mouth Disease (FMD) outbreak worldwide has brought the subject of disease eradication to the forefront in many discussions since vivid pictures of dead animals have been common in the news media. A review of the great advantages and details of eradication programs in cattle disease may serve to remind cattle producers of some important principles.

Significant programs for cattle disease eradication began as early as the late 1800's. It was then apparent that there were some diseases that had characteristics that would allow their complete elimination from a country's borders. In general these characteristics include:

- The disease organism only survives in a limited number of hosts. A disease caused by an agent that infects large numbers of animal species would be very hard to eradicate.
- The disease organism must not be able to survive outside the animal host for long periods of time. Disease organisms that can survive in the environment for months or years would be nearly impossible to eradicate.
- There must be a precise way to identify infected animals and distinguish them from non-infected ones. In some cases infected animals can be readily recognized but generally tests that identify infected animals must be developed and applied.
- The disease must be serious enough that it motivates the large effort that must typically be mounted to eradicate it.
- Eradication of the disease is judged to be less expensive, in the long run, than other approaches to controlling the disease.

A number of diseases have been or are being eradicated from cattle in the US. These include Foot and Mouth disease of current interest as well as Brucellosis (Bangs Disease), scabies and Tuberculosis which are in the final stages of eradication. Other diseases are less familiar to cattle producers but, had they not been eradicated would have still been important causes of animal loss. These include such diseases as Contagious Bovine Pleuropneumonia and Piroplasmosis (tick fever). Mad Cow Disease is currently being eradicated from Europe at a huge cost.

A number of approaches to eradication exist. Sometimes more than one of these tools is used for eradicating a disease. Approaches include:

- Test and slaughter. Although this is a harsh approach, with many diseases where no effective treatments exists or where spread is very rapid, removing infected or high-risk animals from the population is the only effective track towards eradication.
- Treatment. Dipping cattle to kill the mites that cause scabies is the major thrust to eradication with this skin disease.
- Vaccination. Only very rarely is vaccination effective enough to totally eradicate a disease (human small pox is a very fortunate exception). Sometimes, however, vaccination can be coupled with test and slaughter. Brucellosis is an example of this approach. In some cases with Foot and Mouth disease eradication cattle in the area of the outbreak are immediately vaccinated to slow the spread of the disease, then later (when there may be more resources for carcass removal), these animals are slaughtered. Vaccination alone does not completely prevent animals from becoming infected with the FMD virus nor from then shedding it. Vaccination does prevent sever disease and decrease shedding of virus.
- Some novel approaches. Screwworm has been eradicated from the US and Mexico by releasing sterile male flies.

As livestock producers in the US we have great reason to appreciate former and current eradication efforts that make our cattle population quite disease free and thus allow the economical production of animal products. This disease freedom allows us to keep large numbers of animals in a small area and to move them around for breeding, sale and exhibition very freely.

Are cattle disease eradication efforts in the US now almost history? This question is an interesting one. There are still diseases that are eradicable and have been eradicated in some countries. The US approach to these diseases has either been to live with them or to practice wide scale vaccination. Diseases that fit this category are Johne's Disease, Bovine Leukosis Virus, Anaplasmosis and even BVD.

Whether additional eradication programs are begun in the US will depend on a number of factors. One of these is producer's interest in such programs. Whether we embark on additional eradication or not there will always be the need for surveillance to be sure that the diseases have not return. There should also be great appreciation for the freedom that past eradication efforts have afforded us in our livestock programs.

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