Bovine Reproductive Disorder: An Approach to Diagnosis

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Summary and Conclusions

When the supply of available food dwindles for a given animal population, there is often a resulting decrease in fertility and reproductivity. The veterinarian often observes similar principles at work in the cow-calf herd.

He has encountered the three P's. **P**eriods of **P**oor **P**rofitability will result in **P**itifully **P**oor **P**erformance by the herdsman with respect to management of breeding programs. If they are not going to make money anyway, why try? Watch for additional P's in the rest of this story.

Pasture conditions might be sparse or heavily **P**opulated. Funds may not be available for supplemental feeding with adequate energy or **P**rotein levels. Mineral supplements, if fed, will be the cheaper variety, low in relatively expensive **P**hosphorus. **P**regnancy **P**alpation will be restricted or discontinued. **P**rophylactic vaccination **P**rograms will be **P**ared to the bone.

Punchline

In periods of poor profitability, begin diagnosis of any reproductive problem by paying primary attention to those management factors, those nutritional factors that are the *non-infectious* causes of impaired reproduction. Only then proceed to consideration of how these factors influence vaccination programs and relative susceptibility of the herd to the common *infectious* causes of infertility and abortion.

Your services to your cattleman client obviously need to emphasize these basic considerations first, and to leave the bills for better times. Your challenges are as great as his as you tailor programs for maximum cost efficiency that will keep him and you both in business.

History

Take a very careful history as you approach investigation of any reproductive problem. If you have previously worked with this herd, so much the better. Without adequate animal identification, without concise records, without adequate knowledge of herd nutrition, then you will have a very tough job. Impress upon the owner the need for these records now for accurate diagnosis, as well as in the future for preventive purposes.

From the records available, along with your clinical observations, determine the specific category of reproductive failure:

a) Infertility
b) Poor heat detection or breeding management
c) Early embryonic death or delayed conception
d) Abortion
e) Dystocia and/or stillbirth
f) High neonatal mortality (weak calf syndrome)
g) Fetal anomaly

Use this information to evaluate management, nutrition, genetic aspects or the potential toxicological causes of reproductive failure. These are the tough ones for you. These are the harder ones for a laboratory to confirm. Do not leap to the conclusion that you are dealing with an infectious disease process. Even if true, infectious disease problems are often a result of these management deficiencies anyway.

This information will be extremely valuable in reaching a tentative diagnosis, will dictate the most efficient herd sampling methods for laboratory submission, any high-priority tests to request, as well as to suggest the best treatment or control measures. Include this complete history with any laboratory submission or discuss it by phone with laboratory personnel to expedite diagnostic confirmation when necessary. Evaluate laboratory findings in relation to this history and your observations. If there's not a concise fit, go back to square one. Find out what the owner forgot to tell you.

Some Common Non-Infectious Causes

Heifers with insufficient age, size or maturity will not cycle and will not conceive. Heifers that are too fat may have dystocia problems. Heifers on a declining plane of nutrition near parturition may lack reserve energy for difficult calving.

Decreased fertility in cows accompanies nutrient deficiencies in general. Any combination of nutritional management that results in decreased total serum protein levels and subnormal serum phosphorus levels can be implicated as a significant cause of infertility. If not now, just

wait till next year when you try to breed them back. Request these tests for protein and phosphorus on a routine basis with any laboratory submission.

Beef cows wintered in dry lot solely on poor quality silage ration have been observed to have small premature calves with poor survivability, possibly due to a shortage of both energy and protein. The same can be suspected of corn stalks in the midwest, wheat straw in the Dakotas, or dried Bermuda grass in the south.

In other areas of the country, abortions have been attributed to pine needle consumption. Grazing of perennial broomweed (Xanthocephalum microcephalum) has been associated with abortions, placental retention and difficult rebreeding. Cows with a shortage of good feedstuffs or with the depraved appetites of phosphorus deficient status will eat strange things. When do nutritional deficiencies stop and toxic causes of abortion start?

We have always tried to maintain beef cows on junk food. Economics suggest we may be getting junkier. Sure is a good way to reduce cattle numbers, isn't it? A dairyman in this area recently spent $200.00 in laboratory costs to diagnose a nutritional problem only to see a $2,000 per month increase in his milk check. Don't we wish beef cows were as profitable?

Toxic causes of reproductive disorders do exist. Fortunately they often require critical timing with respect to the gestation period in order to cause a deleterious effect. This generalization best applies to the teratogenic plants. One therefore needs to document exposure to, or consumption of the poisonous substance as well as to carefully consider breeding dates. This spring's calf crop from a herd in the Texas Panhandle was observed to have a 50% or greater incidence of deformity of all four legs and exteriorization of viscera through umbillical fissures. With genetic and infectious causes largely eliminated, it is suspected that the problem is associated with contamination of the pasture by a gas well blow-out which occurred during the first month of gestation. Calves born later in the season in this herd were less dramatically affected, suggesting that exposure perhaps needed to occur at a critical stage of fetal development.

Some Common Infectious Causes

Brucellosis. Despite intensive control and eradication efforts, *Brucella abortus* infection continues to be a major reproductive problem in beef herds. Clinically, it may be manifested by apparently decreased fertility, abortion, and/or weak calf syndrome. Do not neglect the possibility of brucellosis in differential diagnosis of any reproductive disorder.

The most serious problems are to be expected when newly-acquired carriers are added to the clean, susceptible breeding herd. Replacement heifers may test clean at the point of origin, may be seronegative on retest one month post-arrival, only to become seropositive shedders subsequent to calving. Do not add replacements to a susceptible herd if it can possibly be avoided, until they have passed one clean test subsequent to calving on the new premises. Do not be lulled into a false sense of security by negative testing prior to that time.

From any aborted fetus, foramlin fix lung tissue for histopathological examination to detect the presence of inflammatory changes typical of *Brucella abortus* infection. Do this in addition to the bacterial isolation attempts and the serological diagnostic approaches. Culture of milk, placenta or lymph nodes may yield additional helpful information of value in the infected herd.

Vibriosis. No replacement heifer should be bred without benefit of prior vaccination to enhance immunity to *Campylobacter fetus* infection. Since this is a venereally transmitted infection, there is little if any value to vaccination following breeding. In a recent case, the veterinarian vaccinated bred heifers after the infection was diagnosed in the herd. The owner was greatly disappointed when many proceeded to abort due to vibriosis despite the vaccination and the presence of exceptionally high humoral antibody titers.

Campylobacter fetus is quite readily detected from fetal stomach contents. Recovery from the bull or from vaginal mucus samples poses a slight problem since these specimens require protection against exposure to oxygen enroute to the diagnostic laboratory. Microtiter agglutination tests on serum samples are helpful on a herd-wide basis. Post infection titers usually exceed those resulting from vaccination, on the average, but cannot be strictly interpreted from one individual.

Listeriosis. Abortion due to *Listeria monocytogenes* infection is more common than is the classical central nervous infection of cattle. The etiological agent can be isolated readily from stomach contents and the liver of the aborted fetus.

Consumption of corn silage is a relatively common source of infection, but such is not always the case. Immunity to listeriosis appears to exist. In two separate field cases, only that portion of the cow herd that was being fed corn silage for the **first** time was observed to suffer an abortion storm. Other cows, not new to corn silage ration were clinically unaffected. Tetracycline therapy is recommended, and will terminate an outbreak in progress. Listeria abortions will cease within a week after initiation of oral medication but can be expected to begin again if the drug is removed from the feed.

IBR. In susceptible cow herds, not previously vaccinated with IBR, nor exposed to IBR carriers, natural infection or intramuscular vaccination of pregnant cows often can cause a devastating abortion storm. In many areas of the country, IBR-induced abortion is now diagnosed with lessening frequency, probably since cow herds have a higher incidence of immunity. Vaccination of replacement heifers is still highly recommended. Recurrent IBR-associated

conjunctivitis has been observed in a dairy herd which did not suffer any concurrent reproductive disturbances in the infected cows.

IBR virus can be isolated from the cotyledons, the thoracic fluid or stomach contents of the aborted fetus. Focal hepatic necrosis is the most characteristic fetal lesion encountered with frequency.

BVD. The viral infection poses a serious diagnostic problem, and the practitioner should exercise care in interpretation of laboratory reports he receives. To conclusively diagnose BVD-associated abortion or reproductive problems, one would ideally desire:

a) A history of the introduction of carrier cattle or the use of a modified-live BVD vaccine for the first time in a *susceptible* herd during the critical early stages of pregnancy.

b) Temporary anorexia, febrile response and a production drop are to be expected in the diary cow, although these clinical signs would likely escape detection in the beef herd.

c) At least some of the calves with cerebellar hypoplasia, white cloudy eyes, ataxia, or elevated neonatal mortality should be expected. Some abortions (not many). Some calves clinically normal at birth with actively acquired immunity.

The mere isolation of BVD virus from an aborted fetus, the detection of humoral antibody titers in the dam or even in the fetal serum and fluids are **not** conclusive diagnostic findings of significance. These are frequent test results in the normal herd, or even worse, in herds with reproductive problems due to other causes. If you have reason to suspect that this is not the first and only time that BVD infection has been detected in this herd, do **not** stop with a BVD diagnosis. Proceed with your search for the **real** cause of the problem.

Trichomoniasis. A difficult disease to diagnose by examination of aborted fetal tissues, or by serological means, trichomoniasis is often first suspected when other common infectious causes of infertility, early embryonic death or abortion such as vibriosis have been excluded by laboratory submissions.

Special transport medium is helpful to facilitate microscopic examination of preputial washings or cervical mucus samples. While individual animal identification is always desirable, it becomes of critical importance in the herd infected with trichomoniasis. It's essential to know which bulls have been used on infected cows, and which bulls remain unexposed. The time and energy required for treatment and follow-up testing dictate that one should attempt to treat no more bulls than is necessary.

Miscellaneous causes. Leptospirosis has not been encountered by this author as a significant cause of reproductive problems in beef herds in recent years. Perhaps lack of disease is attributable to widespread vaccination, although the same supposition certainly does not apply to other infectious diseases such as vibriosis and brucellosis. In one dairy herd, with confirmed *L. hardjo* infection, the clinical illness in these cows was associated with infertility, and abortions were not observed.

Infectious pustular vulvovaginitis (IPV) has been associated with IBR viral infection, yet this author has met with minimal success in his attempts to recover IBR from field submissions. Either IBR is more difficult to isolate from this source that from other tissues, or it is present in relatively few cases.

Bluetongue virus infection has been associated with abortions and structural anomalies in beef calves. Like BVD virus infection, the diagnosis of bluetongue presents some problems. Normal reproductive performance is observed in many seropositive herds, and positive serological test results must be interpreted cautiously. Viral isolation from fetal tissues or from the cow's blood, along with typical fetal lesions suggestive of this infection being observed, should be required for confirmatory diagnosis.

Corynebacterium pyogenes is very frequently isolated from problem herds with cases of post-parturient metritis. It can serve as a very good example of an opportunistic pathogen. Correction of predisposing factors such as fat cow syndrome in the dairy herd, or a mineral and vitamin deficient status in the beef herd will be the best means of attack on this type of problem. Again the history is the key to success in detection of the probable underlying cause. Find out about the incidence of retained placentas, and their means of removal, for example.

The list of infectious agents capable of causing bovine abortion is too lengthy for consideration in this paper. Fortunately, regardless of the specific etiology, the same diagnostic principles apply. One more time. Start with an adequate and complete history. It is critical.

Editor's Note: Dr. Everyman's paper will appear in the 1982 Bovine Practitioner.