

# **Beef Cattle Breeding Management Seminar**

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## **Infectious Diseases that Affect Cattle Fertility**

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### **Introduction:**

Calving percentage, the number of calves weaned divided by the number of females exposed to bulls the previous year, is the most important production parameter that can be measured. The first priority of cow/calf health and production programs should be to emphasize reproduction.

### **Nutrition:**

The most common cause of reproductive failure in beef herds is failure to conceive in the first place. Failure of cows and heifers to come in estrus while exposed to bulls is the leading cause of conception failure. The most common cause of anestrus, in turn, is nutrition; specifically lack of energy intake during the early lactation period. Body condition and energy intake pre- and post-calving are critical aspects of maintaining high herd fertility. A basic health program should include condition scoring cows in late fall and feeding accordingly through the post calving period. Infectious diseases are often immediately blamed when unacceptably high numbers of open cows and heifers are encountered. Cow condition and nutrition should be the first consideration. Protein deficiency is uncommon as a cause of infertility. Minerals such as phosphorus, selenium, copper, zinc, and others should be considered, but can usually be handled when mineral and salt mixtures designed for beef cows are available in a palatable form. Toxins such as endophyte infected fescue should also be considered when infertility problems occur.

### **Other Causes of Infertility:**

Dystocia is a major cause of calf loss but can also have secondary effects on fertility. Heifers that have had a severe dystocia often return to estrus many weeks or even months after herdmates. Dystocia prevention has the added benefit of helping improve herd fertility. Use sire EPD)s and pelvic measurement, especially if more than 8-10% of first calf heifers require calving assistance. Proper heifer growth and development is also extremely important.

### **Environmental Concerns:**

A combination of high environmental temperatures and high humidity can devastate conception rates. Early embryonic death may be even more problematical. Conception may occur but high body temperature results in death of the embryo. If this occurs prior to implantation, usually at about 17 days after breeding, females usually return to estrus on schedule. Later than this, they may return to estrus at 30 to 42 days. Early embryonic death is much more common than many producers realize.

## **Bulls:**

A thorough breeding soundness examination should be performed on all bulls approximately 6 weeks prior to the breeding season. This examination should include a physical examination as well as semen evaluation. Bulls with feet and leg problems often fail to adequately "cover" females, especially in extended breeding situations. Footrot often renders a bull temporarily infertile and should be treated immediately.

Approximately 11% of yearling beef bulls are either sterile or subfertile. This is often due to immaturity. British breed bulls usually mature at a younger age than continental breeds. Bulls with Brahma (*Bos indicus*) breeding mature later than British or continental breeds. Many producers feel that mature, proven bulls can be regarded as fertile. This is not true. Data on large numbers of breeding soundness examinations shows that 4% of mature "proven" bulls are sterile.

## **Brucellosis:**

Brucellosis is nearly eradicated from the United States. A few areas in Florida and in bison in Yellowstone Park remain problematical. Iowa is officially a brucellosis free state. Despite this, when abortion occurs, cows should be tested for brucellosis (and leptospirosis). Calfhood vaccination with the RB 51 strain is still recommended, although this may be re-evaluated in the near future.

## **Leptospirosis:**

Leptospirosis is a common infectious disease of cattle. It can cause infertility, probably due to early embryonic death, and abortions later in pregnancy. In cattle, the disease is caused primarily by one of five serotypes of the organism Leptospira interrogans. The five serotypes are:

Leptospira pomona  
L. canicola  
L. grippityphosa  
L. icterohemorrhagiae  
L. hardjo

Leptospirosis begins as an infection of the blood stream that later localizes in the kidneys. During this process, it may invade the fetus of pregnant cattle, causing abortion. After localization in the kidneys, the leptospira organisms are shed in the urine in large numbers. Contact with the urine of infected animals is a major source of infection. For this reason, farm ponds and slow moving stagnant streams are an important source of infection. Infected cattle may shed the organism in the urine for several months.

Leptospirosis is controlled primarily by testing of a representative sample of open cows in herds with a fertility problem, testing of all cattle that abort, and by vaccination. In most commercial cow/calf herds, it is recommended that cattle be vaccinated annually 6 weeks prior to the breeding season. In some herds, especially dairy herds, persistent infection with L. hardjo is a problem despite intensive vaccination. This organism is a poor immunizer. In most beef herds, leptospirosis can be adequately controlled with one annual vaccination, although some herds are forced to vaccinated twice or more frequently each year.

### **Infectious Bovine Rhinotracheitis (IBR):**

IBR is a common cause of late term (third trimester) abortion. The highly contagious virus is widespread in the U.S. cattle population. Many healthy cattle carry the virus. It manifests itself during periods of high stress. IBR is a major cause of respiratory disease, especially in feedlot cattle. One form of IBR, encountered much more frequently in Europe than the U.S., is Infectious Pustular Vulvovaginitis (IPV). Small pustules form in the vagina, resulting in serious infertility if the disease occurs during the breeding season. IPV is occasionally found in the U.S.

Fortunately, IBR can be effectively controlled with a rigorous vaccination program. Heifers should be vaccinated with a modified live virus vaccine at weaning and again at least six weeks prior to breeding. No cattle should ever be vaccinated with modified live IBR closer than 4 weeks prior to breeding. The field virus and the MLV strains used in vaccines have been shown to cause necrosis (regression) of the corpus luteum, resulting in delayed breeding. Some producers vaccinate with MLV vaccine annually prior to breeding, others vaccinate pregnant cows at the time of pregnancy examination with killed vaccine. MLV vaccine should never be used on pregnant cattle, as it can cause abortion. The nasal form of IBR vaccine can be safely used in pregnant cattle.

### **Bovine Virus Diarrhea (BVD):**

Bovine virus diarrhea is one of the most complicated and important infectious diseases that affect cattle. The virus is widespread in the U.S. cattle population, often in apparently healthy cattle. Two major types and many strains of the virus exist in the cattle population. Depending on when exposure occurs, a variety of symptoms may be seen. The BVD virus can suppress the immune system, resulting in increased susceptibility to bacterial organisms such as *Pasteurella haemolytica*, a common cause of shipping fever in feedlot cattle. It can cause embryonic death or abortion. One major syndrome associated with BVD infection occurs when a susceptible pregnant cow is infected with what is called a non-cytopathic strain of the virus during the first 3 or four months of pregnancy. The virus infects the fetus. The unborn calf is too immature to recognize the BVD virus as foreign and accepts it as part of its own tissues. After birth, these calves shed the virus in very large numbers, often for life. These calves are called persistent carriers and are an important source of infection in the herd. Persistently infected calves may later be exposed to a cytopathic strain of the virus and develop a lethal form of BVD called mucosal disease. BVD virus may cause stillbirths or the birth of weak calves that fail to nurse and die from either malnutrition or from systemic infection. BVD also may cause calve lose due to fetal malformations.

Normally, diagnosis of BVD is accomplished by a blood test. Persistent carriers are now diagnosed by taking a small piece of ear notch tissue and submitting to a diagnostic laboratory for a procedure called immuno-histochemistry. The virus is directly identified by a special staining technique.

Vaccination is controversial. Many veterinarians prefer to vaccinate at weaning and 6 weeks prior to breeding with a modified live vaccine, followed by annual vaccination with a killed virus vaccine. All breeding stock should be tested for BVD (as well as leptospirosis and brucellosis) as a condition of purchase.

### **Campylobacter fetus ("Vibrio"):**

Campylobacteriosis is a true venereal disease caused by a bacterial organism, Campylobacter fetus. This organism was previously called Vibrio fetus, hence the common name for the disease, vibriosis. The organism is carried from infected to susceptible females by infected bulls. The bacterium causes early

embryonic death, often after several days or weeks. In the female, the infection is usually cleared and pregnancy can occur. Reasonably reliable immunity results. In the male, especially aged bulls, the infection can be carried over until the next breeding season. A typical history is that significant infertility occurs the first year the disease strikes the herd, then less so in succeeding years because of immunity, but infertility is still a problem in heifers.

The vaccine for campylobacteriosis is reasonably effective. It is usually given in combination a vaccine with leptospirosis. Vaccinate annually prior to the breeding season. Most veterinarians recommend vaccinating bulls for both diseases. There is evidence that vaccination reduces the ability of bulls to carry the disease for longer than a transient period of time.

Diagnosis is accomplished by swabbing the penis and prepuce of bulls when breeding soundness examinations are performed. Biosecurity recommendations mandate testing for this disease whenever any males other than virgin bulls are purchased.

### **Trichomoniasis:**

Trichomoniasis is another true venereal disease of cattle. It is caused by a tiny protozoan called Tritrichomonas fetus. It causes early embryonic death similar to the campylobacter organism. The protozoan becomes established in the male and infects females at breeding. The disease is more prevalent in the western regions of the U.S. but can occur anytime infected animals are co-mingled with susceptible cattle. Diagnosis is performed with a swab test of bulls and of heifers a few days after breeding. An effective vaccine is available and is widely used in western regions of the country where the prevalence is high, and in herds that routinely purchase mature, proven breeding bulls.

### **Bluetongue/Epizootic Hemorrhagic Disease (EHD):**

Bluetongue is a highly contagious viral disease that is asymptomatic or causes only mild symptoms in cattle. It can be a very severe disease of sheep. Occasionally, bluetongue infection can result in the birth of deformed calves. The virus is carried by culicoides flies, also midge flies, punkies, and no-see-ums. These are tiny flies that are commonly seen swarming over stagnant standing water during the summer months. Several countries will not accept importation of cattle, semen, or embryos from high bluetongue areas and many require testing for this disease.

EHD is a virus related to bluetongue. It is a common disease of white-tailed deer. It occurs every few years in that species, often resulting in significant mortality. In 1998, numerous cases of EHD were diagnosed in beef cows in Iowa and Missouri. Affected cows were lethargic, lame, had a fever, and were often found standing in ponds in order to keep cool. Death loss was minimal but affected cows recovered slowly. A significant die-off of deer occurred that same year. There is some evidence that infected cows gave birth to several deformed calves or suffered subsequent infertility. It is also considered likely that other cows may have become infected but showed no signs of disease. ISU researchers are conducting a field investigation aimed at answering these questions.

### **Neospora caninum:**

An infectious organism related to the coccidiosis family is a common cause of abortion in cattle, especially dairy herds. The organism, Neospora caninum, invades the fetus and causes abortions. Although the prevalence is unknown, the disease does occur in Iowa. It causes approximately 2-4% of diagnosed abortions in Iowa cattle. The disease is a major cause of abortion in West Coast dairy herds, where the

abortion rate has been recorded as high as 30% in a few herds. The organism causes abortion, usually in the second trimester of pregnancy, stillbirths, and infertility. It is transmitted in two ways: horizontally from infected cattle to herd mates, and vertically from infected cows to their offspring. The disease is somewhat unusual in that infection does not appear to convey immunity, and abortions may occur in subsequent pregnancies. Heifers born to infected dams may harbor the infection and experience problems when they reach breeding age. In beef herds in Canada, cows with a titer for *Neospora* showed the following increase in odds ratios for various clinical problems:

Infertility	2.5
Abortion	5.7
Stillbirth	2.8
Culling	1.9

The definitive host for the *Neosporum caninum* organism is unknown. It is likely to be canine species, but the importance of shedding of neospora oocysts (eggs) in the environment of cattle is unknown. In any case, producers should not allow dogs to have frequent access to cattle herds until more is known about the disease. An experimental vaccine has been used in California, but results are not definitively reported at this time.

### **Sporadic Causes of Abortion:**

A large number of infectious agents can cause abortion in the bovine. Usually these are sporadic, often resulting in only one or two abortions in an individual herd. There may, however, be exceptions and careful diagnostic efforts should be made. Organisms that frequently but sporadically cause abortion include *Listeria monocytogenes*, *A. pyogenes* and *Aspergillus sp.* Any infectious disease that causes high fever and/or an infection of the blood stream (septicemia) should be considered as a possible cause of abortion. Trauma such as falling on the ice is a very unlikely cause of abortion.

### **Summary**

It should be kept in mind that many abortions and fertility problems are not caused by infectious agents. There is, however, no such thing as a spontaneous abortion, just as there is no such thing as dying of old age. Every abortion and fertility problem has a cause. Diagnosis of abortion requires diligence and sometimes, considerable expense. The first sign of abortion or infertility should be investigated. Get an aborted fetus to the diagnostic laboratory, along with blood samples from affected individuals. Observe cattle closely during the breeding season for signs of repeat breeding. Herds should be observed carefully and methodically after bulls are removed. Pregnancy examination can be done in most herds about 60 days after the breeding season, and at 35 days for individual cows.

A good vaccination program, accompanied by isolation and purchase of breeding cattle from high health herds will significantly reduce most infectious causes of abortion. This should include bulls as well as replacement females. When A.I. is used, purchase semen from reputable, well-known companies.