

## Diseases Common in Beef Cattle

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**BC-7005** – Revised: January, 1998

*Dr. John C. Spitzer – Professor, Reproductive Physiology*

### Campylobacteriosis (formerly called Vibriosis)

This venereal disease of cattle is caused by the bacterium *CAMPYLOBACTER FETUS* (previously known as *VIBRIO FETUS VENEREALIS*). This bacterial agent infects the female genital tract, resulting in infertility, early embryonic death, or sometimes abortion. *CAMPY* bacteria are transmitted mechanically by a bull during mating. Signs of herd infection are reduced calf crop (with conception rates sometimes dropping as low as 40% or 50%), and repeated breeding and irregular heat cycle in cows (caused by failure of conception and early embryonic death), resulting in extended calf crops.

Virgin heifers are most susceptible because they have not been previously mated, and therefore, have no previous exposure to *CAMPY* even if they are in an infected herd. In non-infected herds, one infected cow can transfer campylobacteriosis to a bull at mating and he subsequently infects all cows he mates.

Since the bacteria are usually eliminated within 4 to 5 months as immunity develops, infected cows eventually recover. However, by the time these cows recover, they will conceive late, and since they will come into heat and be bred every 21 days while infected, they will have continuously exposed bulls to *CAMPY*. Campylobacteriosis is often overlooked because low levels of herd infection may reduce calf crops by only 5% to 15%, a level often regarded as insignificant by cattle producers.

The disease can be very effectively prevented by vaccination. Generally, oil adjuvanted products are preferred because of more durable immunity. Effective immunization requires 2 doses in virgin heifers (at yearling weight collection and 1 month prior to breeding are good times) with a yearly booster 1 month prior to breeding in all cows. Annual immunization of bulls is also recommended with use of 2.5 times the recommended vaccine dose. Immunization prior to calving will work and may be more practical in commercial herds.

### Leptospirosis (5-way)

Leptospirosis is caused by the *LEPTOSPIRA* bacteria, which localize in the kidneys and cause destruction of red blood cells. In about half the cases, infected calves pass bloody, port wine-colored urine, and *LEPTO* can be confused with "redwater disease", caused by *CLOSTRIDIUM HAEMOLYTICUM*. The five *Leptos* that are most frequently diagnosed in cattle are *L. POMONA*, *L. GRIPPOTYPHOSA*, *L. HARDJO*, *L. ICTEROHAEMORRHAGIAE*, and *L. CANICOLA*.

Leptospirosis can be transmitted through direct contact of an infected animal with a susceptible animal (deer, dogs, rats and swine also shed leptos) or by contaminated food and water. Leptospire usually infect the kidney; thus urine from shedding animals can contaminate pens, corrals, pastures, drinking water, feed, etc. Alternatively, aborted fetuses, afterbirth or uterine discharges can contaminate the environment. Infected bulls can also transmit the infection through semen. *LEPTO* organisms can survive for up to six months in moist, warm conditions. Stagnant water is an ideal source of infection.

In cattle, the age group most susceptible to the acute form of Leptospirosis is calves up to one or two months of age. Affected calves will run a temperature as high as 41.5°C (107°F), are depressed and off feed, and their mucous membranes are often pale and show small hemorrhages. Jaundice is commonly observed, and blood-colored urine is passed. The calves often develop anemia, which results in an increase in respiratory and heart rates. The death rate is frequently high, and any calves that do survive may undergo a long convalescence. Calves born to infected cows are further stressed by extended periods of reduced milk production experienced by their dams. Thus, in herd outbreaks,

malnourished calves from infected dams are most severely affected by Lepto infections. Vaccination of cows prior to calving may be most practical, as this will raise colostral antibodies for protection of young calves, and in most cases, protect cows from LEPTO.

Infected cows may go off feed, lose body weight, and develop a roughened, dry hair-coat. In pregnant cows, abortion (usually in last trimester) is common with some strains of LEPTOSPIRA and occurs several weeks after the mild, initial signs of sickness have passed. There is no effective treatment for Leptospirosis. For years, streptomycin was the drug of choice, and it was believed that one single dose would prevent animals from shedding the organism in the urine. It is now known that no antibiotic will eliminate the organism from the animal body, and at best, treatment merely minimizes shedding during the period that an animal is receiving antibiotics. Annual vaccination with 5-way Leptospirosis vaccine is recommended in closed herds. But, in exposed herds or in areas with severe challenge, vaccination every 6 months may be necessary for good protection.

## Clostridial Diseases

CLOSTRIDIA are a large group of common bacterial organisms. These bacteria, as resistant spores, live for long periods of time in the soil and are passed to a susceptible animal from soil or vegetation either through a wound or by ingestion. Such diseases as Botulism and Tetanus (lockjaw) are clostridial diseases, but are generally vaccinated against only in specific instances in cattle.

Blackleg is a general term used by many producers to describe clostridial diseases. However, this is technically incorrect and there are specifically recognized diseases. Blackleg is characterized by lameness, swelling and a dark red to black discoloration of the heavy, active muscle tissues. In late stages, there will be gas production which will accumulate in all muscle areas and subcutaneously. Malignant Edema resembles Blackleg, as there will be gaseous swelling of affected muscles, which become gangrenous as infected tissue dies. Black Disease is often characterized by black lesions in the muscles of the throat and brisket, while SORDELLII affects muscles of the throat and brisket as well as many other muscles. With SORD, marked yellow gelatinous swellings will often be seen between muscle layers. Redwater is characterized by severe depression, abdominal pain and labored breathing. Animals infected with enterotoxemias exhibit signs ranging from abdominal pain and diarrhea to convulsions and blindness.

High fever is a characteristic of all clostridial infections. Onset and progression of these diseases are rapid and many animals die before signs are noticed. In fact, sudden death is a common feature of all these clostridial diseases. Unless observed very early in the course of the disease, antibiotics are generally of little value and death rates approach 100% in spite of attempts at treatment.

The "7-way" vaccine protects against Blackleg and Blackleg-type diseases, as well as Enterotoxemia. The organisms involved are:

- Blackleg - CLOSTRIDIUM CHAUVOEI
- Malignant Edema - CLOSTRIDIUM SEPTICUM
- Black Disease - CLOSTRIDIUM NOVYI
- Sord - CLOSTRIDIUM SORDELLII
- Enterotoxemia - CLOSTRIDIUM PERFRINGENS TYPE B, C AND D.

The "4-way" vaccine contains CL. CHAUVOEI, CL. SEPTICUM, CL. NOVYI, AND CL. SORDELLII and not the CLOSTRIDIA causing enterotoxemia. Other combinations may include only a portion of these CLOSTRIDIA and some also include CLOSTRIDIUM HAEMOLYTICUM (Redwater).

Cattle 5 to 15 months of age are generally the most susceptible, with younger animals generally protected by passive immunity acquired from colostrum ingested at nursing. The disease is seldom contracted by animals over 3 years of age. Caution: In some herds (areas), the bacteria spores are so concentrated that calves only 2 or 3 months old, as well as mature cows, are infected. Current recommendations are for vaccination at 3 months of age and again at weaning. In some cases, annual re-vaccination of the entire cow herd is required. Generally, vaccination with "7-way" vaccine is the most cost-effective route for disease prevention.

## Infectious Bovine Rhinotracheitis-Parainfluenza Type 3 (IBR-PI3)

Infectious Bovine Rhinotracheitis (IBR), sometimes known as "red nose", is a highly infectious and contagious disease caused by BOVINE HERPES VIRUS (BHV-1). The IBR virus infects the membranes of the nasal passages and trachea, and thus interferes with the normal protective mechanism of the upper respiratory tract and lungs.

Highly contagious, IBR virus is transmitted when an animal's breathing or coughing sprays contaminated droplets into the air, feed, or water. In pregnant cattle, the virus may invade the placenta and fetus via the dam's blood stream, often causing abortion. Signs of IBR infection include temperature rise, loss of appetite and depression, accelerated respiration, accompanied by deep, moist coughing, excessive clear nasal discharge and inflamed muzzle ("red nose").

Following infection, animals maintain this virus in a latent stage for life and studies have shown that IBR will persist in animals without causing observable signs of disease. Shedding of the virus from these "life-time" carriers may be induced periodically by stress, such as inclement weather or transportation.

BHV-1 also causes the disease known as infectious pustular vulvovaginitis (IPV). The IPV form affects the genital mucosa of both bulls (penis) and cows (vagina). If the infection is severe, these pustules may interfere with pregnancy rate by reducing mating activity because of pain. IPV does not appear to cause abortion. Herds rarely experience "red nose" and IPV simultaneously.

PARAINFLUENZA TYPE 3 (PI3) is a virus found worldwide. Although PI3 infects the respiratory tract, in general it works in concert with other agents (IBR, BVD). Therefore, its symptoms and results of these symptoms are closely allied with IBR and BVD.

The virus is shed in nasal and eye secretions and probably enters susceptible host cattle via nasal passages and mouth. By itself, PI3 is a relatively mild infection, although it has a high incidence of secondary infection with pasteurella bacteria, resulting in the classic shipping fever syndrome (bovine respiratory disease syndrome).

Modified-live combination vaccines for IBR-PI3 are available and give very good immunity against both respiratory disease and abortion in cattle. However, since modified-live vaccines must replicate (multiply) to stimulate immunity, caution should be used in planning the herd vaccination program so susceptible or pregnant animals are not exposed. Because of this, an intranasal vaccine probably provides the best combination of safety and effectiveness; it can be safely used in pregnant cows or calves nursing pregnant cows. The onset of immunity with intranasal IBR-PI3 vaccines is rapid, but duration of immunity has not been determined. Therefore, calves should additionally receive a modified-live intramuscular vaccine after weaning, followed by at least one dose of a modifiedlive intramuscular vaccine some time at least 1 month prior to their first breeding in heifers. Since declining immunity may be stimulated by natural infection or reactivation of latent virus (once infected, animals are always carriers), annual re-vaccination of mature cows is probably unnecessary.

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

BOVINE VIRUS DIARRHEA (BVD) is a viral disease that suppresses an animal's immune system by reducing the number of white blood cells in the spleen and lymph nodes and allowing other viral and bacterial diseases to establish themselves and spread. Signs are fever; profuse diarrhea; ulcers in the mouth; loss of appetite; coughing; profuse salivation; nasal discharge; erosions beneath the muzzle's roughened, dry, crust; inflammation of the eyes; and "humped-up" appearance and painful walking if feet become infected.

Major impacts of BVD infection are reproductive failure and immunosuppression that results in lowered resistance to other pathogens responsible for the bovine respiratory disease syndrome and/or enteric disease. Reproductive disorders resulting from BVD depend on the stage of gestation in which the infection is acquired. Abortions, fetal mummification, and birth defects are expressions of transplacental infections of the fetus. Congenital malformations associated with BVD are primarily related to the nervous system and eyes. However, failure of an ovulated egg to become fertilized is the main result of BVD infection. In this case, cows continue to recycle every 21 days.

Bovine virus diarrhea is one of the most important cow-calf diseases because it exists in cattle of all types and all ages. It occurs primarily in calves over two months of age; however, baby calves can also be infected in utero (within the uterus). Fetuses infected in utero may be born alive but the virus is present in their blood. These calves' immune systems do not recognize the virus as foreign; thus, the animals do not fight the disease, and may not respond to BVD vaccination. Many carriers of BVD do not show observable signs of BVD infection but intermittently shed the virus.

Like IBR, direct contact among animals and infected water and feed are sources of BVD infection, and the virus may invade the placenta and fetus via the dam's blood stream, causing abortion or fetal infection. Many authorities believe bovine virus diarrhea may prove to be the single most important cause of bovine abortion.

Critical studies comparing the ability of modified-live and killed BVD vaccines to prevent disease and abortion are not available. Presently, most veterinarians and scientists now believe optimum protection is available only if

modified-live BVD vaccine is given after weaning and again 1 month prior to breeding in heifers. Long duration of immunity with modified-live vaccines and constant exposure to natural reinfection in vaccinated animals argues against annual re-vaccination of mature cows. However, under certain situations, annual vaccination before calving and breeding may be advisable. In this situation only, is a killed vaccine recommended.

## **Bovine Respiratory Syncytial Virus (BRSV)**

BOVINE RESPIRATORY SYNCYTIAL VIRUS (BRSV) alone produces variable signs in cattle, but may be an important part of the bovine respiratory disease complex. While the virus affects mainly calves, signs due to the virus may be seen in cattle of all ages. Species specific respiratory syncytial viruses have been identified in cats, dogs, horses, pigs, sheep, goats, deer, antelope and humans.

Carrier cattle are believed to be the reservoir of infection for other cattle. Transmission is probably by inhalation, and after a short incubation period, a sudden onset of signs is noted. The condition is more likely to be seen in the fall and winter, as is to be expected with any infectious respiratory disease of cattle.

Frequently seen clinical signs include nasal discharge, salivation, tearing and increased respiratory rate. Signs progress rapidly and sudden death without signs being seen may occur. Later signs include open mouth breathing, frothy salivation, and subcutaneous edema. Affected animals that recover will do so in one or two weeks. Treatment includes antibiotics to prevent secondary pneumonia. Corticosteroids and antihistamines have also been shown to be useful. A safe vaccine is available and appears to be a useful aid in the reduction of BRSV.

## **Brucellosis**

This disease is caused by the bacterium BRUCELLA ABORTUS. Brucellosis is a contagious disease generally manifested by abortion in susceptible females but also characterized by infection of reproductive organs in the male. Natural transmission of the disease is through ingestion of the organisms that are present in large numbers in the aborted fetus, membranes, uterine discharge, and milk.

Cattle may ingest feed or water that is contaminated with B. ABORTUS and occasionally lick the contaminated genitals of other animals or recently aborted fetuses. Transmission by infected bulls to susceptible cattle by natural service occurs but is very rare.

Following invasion, the organisms become established in the lymphatic system where they multiply for a variable period of time. Invasion of the pregnant uterus rarely occurs before the second trimester of pregnancy. Mechanical vectors, such as dogs, other animals and man can act as a means of spreading infection. Under certain circumstances, the organism will live for weeks outside the body. B. ABORTUS has been recovered from the fetus, and from manure that has remained in a cool environment for more than two months. Exposure to direct sunlight kills the organism in a matter of a few hours.

Localization of B. ABORTUS in the uterus and placenta and the resulting death and abortion of the fetus are the most obvious manifestations of the disease. Establishment of the carrier state in a large proportion of animals may lead to a 20% reduction in the milk yield of infected cows, the production of dead calves at term and an increased frequency of retained placenta. In uncomplicated abortions, there usually is no impairment of the general health.

In the bull, the vesicular glands, the ampullae, the testicles and the epididymides may be infected, which results in the organism being shed in the semen. Abscesses of the testicles may occur.

No practical effective treatment has been found; efforts have, therefore, been directed at control and prevention. Eventual eradication of the disease depends upon testing and elimination of reactors. An infected herd is depopulated or tested at regular intervals until two or three successive negative tests are obtained. When reactors are found, they are immediately removed.

Clean herds must be protected from reinfection. The greatest danger is from replacement animals. New additions should have been vaccinated as calves. If pregnant or fresh cows must be added, they should originate from brucellosis-free herds and be negative to test. It is advisable to segregate such replacements from the herd for at least 90 days and retest them before permitting them to associate with the main herd.

Vaccination with B. ABORTUS Strain 19 is widely used in heifer calves and is effective and highly recommended. (It is mandatory for transport into some states.) Experimental evidence indicates that the immunity following calthood vaccination does not decline with the passage of time. Only females between 4 and 8 months of age are to receive Strain 19 vaccine. Do not vaccinate bull calves. Vaccination as the sole means of control has been effective; the

degree of reduction of reactors is directly related to the degree that calfhoo d vaccination is practiced. This procedure plus the elimination of reactors by blood test is the most effective method of control. State and Federal laws concerning Brucellosis vaccinations, blood tests and transport of cattle have been changing rapidly (tightened regulations), as we are close to eliminating this disease in the U.S. Still, vaccination is highly recommended. Contact your local veterinarian, as he must administer this vaccine and will be familiar with regulations in your state. Caution: Man is highly susceptible to Brucellosis. The disease, called Undulant Fever in humans, can be contracted by drinking contaminated milk or by direct contact if there is an open skin wound.

### Haemophilus Somnus and Pasteurella Multocida - Haemolytica

HAEMOPHILUS SOMNUS and PASTEURELLA MULTOCIDA - HAEMOLYTICA are bacteria which infect the upper respiratory tract. These bacteria are the most common involved with pneumonia in cattle. In fact, these bacteria are key secondary invaders and work in concert with IBR-PI3 and BVD to produce the classic "shipping fever complex", which is more correctly called Bovine Respiratory Disease Syndrome or BRD. In fact, PASTEURELLA and/or HAEMOPHILUS are usually the cause of death from pneumonia.

Treatment with high levels of antibiotics over several (3-5+) days is recommended, but often times, treatment response is disappointing. Several antibacterial agents are available for treatment, but all are expensive and a treatment regimen should be carefully chosen after consultation with your veterinarian. Cost effectiveness of HAEMOPHILUS SOMNUS or PASTEURELLA MULTOCIDA - HAEMOLYTICA vaccines is questionable, and their use does not appear to be warranted if cattle are properly immunized against IBR-PI3 and BVD with modified-live vaccines.

*Summary of Diseases Common in Beef Cattle*

Disease	Organism	Symptoms	Vaccinations
IBR Infectious Bovine Rhinotracheitis	Virus	Bovine Respiratory Disease	Combinations of intranasal modified-live IBR-PI, and intramuscular modified live IBR- PI-BVD
PI3 Parainfluenza 3	Virus	Renders animal susceptible to secondary bacterial infections, BVD also causes infertility and abortion	
BVD Bovine Virus Diarrhea	Virus		
BRSV Bovine Respiratory Syncytial Virus	Virus		Two doses of BRSV and/or Haemophilus somnus and/or Pasteurella 2-4 weeks apart
Haemophilus Somnus Pasteurella multocida - haemolytica	Bacteria		Pneumonia Shipping Fever Complex
Brucellosis Brucella abortus	Bacteria		Abortion; Infertility
Clostridial diseases Cl. chauvoei - Blackleg Cl. septicum - Malignant edema Cl. novyi - Black diseas Cl. sordelli - Sord Cl. perfringes - Types B, C & D - Enterotoxemia	Bacteria		Generally 100% mortality rate; Primarily young animals
Leptospirosis L. pomona L. hardjo L. grippotyphosa L. icterohaemorrhagiae L. canicola	Bacteria		Abortion; Kidney Failure
Campylobacter fetus	Bacteria		Veneral disease; infertility

*Summary of Diseases Causing Abortion in Cattle*

Disease	Organism	How Spread	Stage of Gestation at Abortion	Samples Needed for Diagnoses	Vaccination	Remarks
Campylobacteriosis	Bacteria (Campylobacter fetus)	Veneral disease spread by infected bulls	Early abortion (sporadic)	Vaginal mucus from cow; fetus; washing from bull	Oil-adjuvanted vaccine 30-60 days before breeding	High incidence of repeat breeding and open cows
Trichomoniasis	Protozoa	Veneral disease spread by infected bulls	2-4 mo.	Preputial washings from bulls; uterus from cull cow; fetus	Vaccine (maybe?)	Treatment: sexual rest for 60-90 days; AI; cull infected bulls
Leptospirosis	Bacteria (at least 5 serotypes)	Infected urine or aborted fetus	Any stage, usually 6-9 mo. or calves dead or weak at birth	Blood sample 10 mature cows or 10% of herd	Annually - more often if needed; 5-way Lepto vaccines	Laboratory should determine serotype
Brucellosis	Bacteria (Brucella abortus)	Aborted fetus, uterine discharge or milk	6-9 mo. <b>but</b> don't always abort	Blood sample from cow; fetus; placenta	Dairy heifers: 2-6 mo.; Beef 2-8 mo.	Totally depopulate herd or cull infected animals
Red Nose (IBR)	Virus	Infectious from cow to cow	Any stage, usually 6-9 mo.	Fetus; placenta; blood samples	Combination of intranasal and intramuscular modified-live vaccines	Abortion may or may not occur.
Virus diarrhea (BVD)	Virus	Contagious from cow to cow	Variable, usually early in gestation	Two blood samples, 3 weeks apart	Modified-live vaccines after weaning	Calves may be born with brain damage.

*AI - Artificial Insemination*

*Serotype - there are several types of Lepto organisms. They can be differentiated through serology.*

**For Additional Information Contact:**

**Dr. Larry W. Olson**, Extension Animal Scientist

Edisto Research & Education Center

64 Research Rd., Blackville, SC 29817

Email: [LOLSON@clemson.edu](mailto:LOLSON@clemson.edu)

Phone: 803-284-3343 ext 231 Fax: 803-284-3684

<http://www.clemson.edu/extension/bulltest>