FrontLine®
TECHNICAL INFORMATION FOR TODAY'S FEED PROFESSIONAL

Intestinal Disorders Caused By Viruses
Part 2

This article is the second in a 2-part series on intestinal disorders in claves caused by viruses.

MUCOSAL DISEASE/BOVINE VIRUS DIARRHEA (MD/BVD)

Mucosal disease (MD) is a condition where the pathogens invade particularly the mucosae of the digestive tract, but also those of the respiratory tract. Today there are an increased number of cases where the respiratory tract is affected, for which reason the condition must also be included under the crowding disease complex. However, in young calves the most striking, and usually only, characteristic of the disease is severe intractable diarrhea which results in death in many cases. For this reason, this form of the disease is called "bovine virus diarrhea" (BVD).

Incidence

Investigations in cattle stocks have shown that the virus causing mucosal disease is widely distributed and that more than half of the cattle have been exposed to the pathogen and have formed antibodies to it. It has been found that the increase in intensive rearing over the past few years has brought with it a substantial increase in the incidence of the disease. Cattle of all age groups may contract the disease, young animals being particularly at risk. If the dam becomes infected during pregnancy for the first time, the virus may even attack the fetus in the womb.

Pathogen

The pathogen belongs to the group of toga viruses that includes, interalia, the virus of swine plague. The viruses are very resistant and can survive for long periods outside the animal body.

Transmission

Intensive rearing farms with frequent changes of animals are especially at risk. On such farms it is possible that outwardly healthy animals are brought into the stock which excrete the pathogen without actually being affected themselves. When exposed to the infection, such animals do not form any antibodies, yet do not become infected. This applies to 1-5% of the cattle population. Such animals harbor the virus in the blood and in the lymph organs and excrete it with the nasal mucus, saliva, feces, urine or blood. These "chronic carriers" usually contract the disease sooner or later, but may in some cases remain outwardly healthy as long as they live. The pathogen may also be transmitted by humans, vehicles, clothing etc. from one stock to another, resulting in animals being affected which have not yet formed any antibodies to the disease. The state of health of such animals does not permit the disease to be contained in its latent form, and there is therefore an outbreak of MD or BVD. Typically, only some animals at a time show visible symptoms. The disease progresses through the stock over a prolonged period in which it manifests itself again and again.

Course and Symptoms

The period from the initial infection to the outbreak of manifest disease is approximately one week. A preceding attack of fever usually goes unnoticed. In the majority of cases the feeder's attention is not attracted until the second viral attack causes high temperature, loss of appetite and dullness. Accelerated breathing, increased aqueous nasal discharge and conjunctival inflammation are observed.

If a calf has ingested the virus, e.g. by licking a carrier or with the feed, the pathogens pass into the small intestine, invade the epithelial cells on the tips of the villi and multiply in them. In this process the cell is destroyed, the newly formed viruses are released and invade further epithelial cells. The animal body reacts to this rapidly progressing infection with a slight increase in body temperature over a period of 1 to 2 days (first feverish attack). After a short recovery phase in which the body temperature decreases again, although the viruses continue to multiply, there is a second attack of fever with the body temperature rising to 104° F (40° C) and above. Lo ss of appetite, dullness, aqueous nasal discharge, conjunctival inflammation and accelerated breathing now appear as clear manifestations of disease.

As a result of the progressive destruction of the mucosa of the small intestine, the formation of intestinal juice and enzymes is reduced. The chyme is no longer adequately processed and broken down, resulting in decomposition and fermentation and

FOR MORE INFORMATION, CALL OR WRITE MILK PRODUCTS, LLC
P.O. Box 150, Chilton, Wisconsin 53014, (920) 849-2348, Fax (920) 849-9014 www.milkproductsinc.com

thus in a shift in the intestinal pH value. The body tries to balance the degree of acidity by an increased release of fluid from the body tissue into the intestine. This also causes a loss of vital salts from the body tissue. The feces are greatly diluted and the increased filling of the intestine as well as the shift in the pH value stimulates peristalsis, leading to diarrhea. At first the feces are extremely liquid, yellowish brown to grayish green in color. Later on, they also contain bloody components and fibrin fragments. Within a short period the feces become yellowish gray and aqueous. In contrast to a rota/corona virus infection where in most cases a secondary bacterial infection with coli pathogens soon leads to a drastic deterioration in the animal's state of health, the course of MD or BVD is characterized solely by a virus infection. As a result of the progressive destruction of the villi of the small intestine, the diarrhea persists and more and more fluid and body salts are released from the tissues into the intestine. At the same time re-absorption of fluid from the large intestine into the body tissue is insufficient or ceases altogether. Due to the complete destruction of the villi of the small intestine, breakdown of the feed and absorption of the nutrients are no longer possible. The collapse of the energy supply also entails the breakdown of the metabolic processes: The body temperature decreases to below normal, the calf is unable to rise, has convulsions and dies. Up to 90% of infected calves die. Together with the onset of severe diarrhea, mucosal erosions (superficial losses of tissue on the mucosa) in the nostrils, the muzzle and in the oral cavity occur in some cases. Furthermore, skin defects appear in the space between the claws, leading to lameness. However, these signs are often absent in calves during the first few weeks of life, and diarrhea is the most prominent sign of disease. In such cases the condition is called "bovine virus diarrhea" (BVD). Apart from the acute form of mucosal disease, there is also a chronic form where the animals suffer from diarrhea over a period of weeks and months with recurrent attacks of fever. The infection of pregnant animals with MD/BVD virus is also of importance to the calf. The uterus, otherwise a "protective barrier" for the unborn, is unable to prevent the transmission of virus from the mother to the fetus. Here the consequences for the calf depend of the stage of pregnancy:

- Infection between the 50th and the 100th day of pregnancy:
  Death of the fetus and subsequent mummification or abortion.

- Infection between the 100th and 150th day of pregnancy:
  Malformations of the lungs, skin, eyes or central nervous system; small size of the fetus.

- Infection between the 150th and 190th day of pregnancy:
  The calf is born viable and carries the pathogen from birth in its blood and lymph nodes, but has not been able to form antibodies. In such animals the disease often appears shortly after birth in the form of BVD in the newborn and they quickly die. However, the animals may also appear outwardly healthy for varying periods of time and may thus, as carriers of the disease, infect other calves until they later, in most cases, contract chronic MD themselves.

- Infection after the 190th day of pregnancy:
  After the infection the calf has been able to form antibodies in the dam's body and remains healthy. The antibodies can be demonstrated in the blood even before the first Colostral milk is ingested. The main economic loss from mucosal disease is no doubt due to the acute form with its high mortality rate. However, the chronic form of the disease with its persistent diarrhea and recurrent episodes of fever, can also cause significant losses.

Diagnosis

Severe diarrhea characterizes the clinical profile of mucosal disease in young calves. The mucosal changes on the muzzle and the nostrils, which are additionally in some cases point to MD. Infection of the oral mucosa, particularly the gums that show a reddened edge, are also an indication of the disease. However, the mucosal defects are not always present in calves.

The diagnosis is established by carrying out an autopsy of an animal that has died and by isolation of the virus. When the cadaver is dissected, redness, erosions and a flaky yellowish coating (fibrin exsudate) are found on the mucosa of the preliminary stomach compartments and on the entire intestine. The intestine lymph nodes show pronounced swelling. Longitudinal erosions and necroses (tissue portions dying off) on the pharyngeal mucosa are typical feature of MD/BVD. As with all virus infections, specific treatment of MD/BVD is not possible. Since the diagnosis has yet to be established when the disease breaks out, treatment should be attempted in every case. MD/BVD in the young calf is a disease with severe diarrhea and greatly impaired general condition. For this reason, supportive, alleviating and life-preserving measures need to be taken.

Treatment

Treatment is more likely to be successful with calves under three months of age than with older animals. The therapeutic measures are initially the same as with a rota/corona infection, but in contrast to the latter, emergency vaccination with live vaccine is possible with MD/BVD even after the outbreak of the disease. This vaccination can also be carried out successfully in newborn calves.

Preventive vaccination is the most effective method of combating MD or BVD. The disease does not appear suddenly, but over a prolonged period with individual animals being affected in turn. In livestock threatened in this way, emergency vaccination with live vaccine is possible.

If MD/BVD occurs in calves during the first few weeks of life, the cows should be vaccinated before calving. If the dams (e.g. when purchased) have not been vaccinated, the calves can be given live vaccine immediately after birth.

On ranches and feedlots MD often appears with influenza-type disease manifestations. On such farms MD vaccination as well as the use of medicated feed should be included in the general preventive program.

FOR MORE INFORMATION, CALL OR WRITE MILK PRODUCTS, LLC
P.O. Box 150, Chilton, Wisconsin 53014, (920) 849-2348, Fax (920) 849-9014 www.milkproductsinc.com