

NEONATAL CALF DIARRHEA

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Neonatal calf diarrhea (NCD), also known as calf scours, is a common disease affecting the newborn calf. The most critical period is in the first few days following birth of the calf. Greatest losses occur when calves are kept in close confinement, where the opportunity for transmission of the causative agents of NCD is enhanced by their build-up in the environment.

The diarrhea and other clinical signs seen with the disease are caused by the interaction of any of several possible infectious causes and predisposing factors such as lack of colostrum, failure to absorb colostral antibody, poor nutrition and environmental affects. NCD is a costly disease, with losses estimated to be over \$250 million annually and death loss of up to 25% of the U.S. calf crop.

SIGNS AND EFFECTS OF NCD

Neonatal calf diarrhea is characterized by diarrhea (scouring), progressive dehydration and death. The neonatal or newborn calf with scours will have a watery yellow, gray or greenish diarrhea containing varying amounts of mucus which may be tinged with blood. Soiling of the hindquarters and tail with the diarrheic feces is common. Checking the litter in the calf pen may reveal the diarrhea. At first, the animal may appear alert and otherwise normal, but

soon refuse's feed and becomes depressed, weak, and unable to stand. Dehydration occurs as a result of fluid loss resulting from the severe diarrhea and is characterized in the calf by sunken eyes, dry skin and weakness. If the disease is allowed to progress untreated, dehydration and electrolyte (ions of body salts such as sodium, potassium, chloride, and bicarbonate) loss will kill the calf. Body temperature readings will vary, depending to some extent on the disease agents involved. One consistent fact, however, is a subnormal body temperature in the terminal stages of the disease. Regular observation of calves several times a day will permit early detection of the disease.

The normally solid fecal mass is formed by absorption of water from the liquid intestinal content by the cells lining the large intestine. Diarrhea or scouring occurs when the capability of the intestine to absorb fluid is impaired. Interference with this absorptive function of the intestine may occur in two ways. Damage to the cells lining the intestine may result from cell destruction by certain infectious agents, resulting in loss of the digestive and absorptive capability of the intestine as well as inflammation. Other infectious agents produce toxins that cause the cell lining of the intestine to produce fluid rather than absorb it. Diarrhea, dehydration and electrolyte loss occur in both instances and have especially severe effects in the newborn animal.

CAUSES OF NCD

There are numerous infectious causes of NCD, which may be present either singly or in combination. The more common ones are described below:

A) Bacteria

Escherichia coli: *E. coli* is a very common and serious bacterial cause of NCD. NCD caused by *E. coli* is called colibacillosis. Several forms of colibacillosis occur with some variation in the symptoms produced. There are many strains of disease-causing (enteropathogenic) and non-disease-causing (non-pathogenic) *E. coli*, so it is essential that the disease-producing types be recovered from the diarrheic animal and properly identified in order for a valid diagnosis to be established. There are no distinctive clinical signs that differentiate scours due to *E. coli* infection from those caused by other infectious agents. Some types of *E. coli* produce toxins that cause the intestine to produce fluid rather than absorb it. Death loss from *E. coli* infection may be high, especially in calves under a week of age. Resistance to *E. coli* infection is acquired by the calf from the colostrum or first milk of the cow. Colostrum administration is very important in the prevention of this infection.

Salmonella: Disease in calves due to Salmonella infection is a common problem in Arizona, particularly in confined animals such as dairy calves. Signs of salmonellosis include fever, loss of appetite, depression, diarrhea, dehydration and often swelling of the leg joints. Salmonellosis is most severe in calves under a month of age. These organisms are the cause of paratyphoid infection in man and constitute a potential health hazard for people associated with calves affected with salmonellosis. Diagnosis

of this problem requires isolation of the salmonella organisms from the feces or tissues of the affected calf.

B) Viruses

Rotavirus: Calves 1-7 days of age seem to be most often affected with this disease agent. The disease will appear suddenly and spread rapidly through a calf herd. The virus causes extensive damage to the intestinal lining, resulting in rapid fluid loss and dehydration in calves. Other organisms such as *E. coli* may infect the calf at the same time.

Coronavirus: This virus usually affects calves over one week of age. It is not possible to differentiate this virus infection from other virus infections producing the same signs. Feces and tissues from affected calves may be submitted to a veterinary diagnostic laboratory where the virus can be identified.

C) Other Causes

While usually less common, numerous other infectious causes of NCD exist, including protozoa such as *Cryptosporidia* and coccidia, and additional types of bacteria, viruses and virus-like agents.

Non-infectious causes, while not discussed in detail here, may also be important; these include improper diet or feeding practices, or poor quality milk replacer.

PREVENTION

In general the occurrence of NCD will depend on the level of contamination of

the environment by causative organisms and the level of resistance in the calf. Best results in preventing diarrheal disease will be achieved by reducing exposure of the calf to a contaminated environment and insuring adequate resistance by colostrum feeding soon after birth.

A) Reduce Exposure to Infectious Agents

1. Calves kept in confinement should be housed in individual calf pens for at least the first month of life. Portable calf hutches have proven to be very successful, as they afford isolation and can be moved to clean ground when necessary.
2. Clean pens thoroughly between calves.
3. Keep the calf pens clean and dry.
4. Provide overhead shelter for the calf pens.
5. Calves with diarrheal disease should be isolated from healthy calves and fed last.
6. Thoroughly scrub and sanitize feeding equipment after each use.
7. Do not overfeed. Milk intake should be restricted to 10% of the body weight daily for the first 7-10 days. Calves should be fed on a regular schedule with fresh whole milk or **good quality** milk replacer. Inferior quality milk replacer can cause or contribute to diarrhea, as can overfeeding.

B) Providing Resistance for the Calf

The resistance of the calf to disease depends predominately on the

quality and amount of colostrum it receives from the cow during the first hours of life after birth, as there is no transfer of resistance from cow to calf before birth. Ideally it should receive colostrum within the first 6-8 hours after birth. Antibodies, which are substances which provide this resistance, are manufactured by the cow's immune system and are concentrated in the first milk, which is called colostrum. The calf's digestive system will absorb these antibodies in progressively decreasing amounts for only the first 24 hours or so after birth. It is absolutely necessary that the calf receive colostrum as soon after birth as possible for maximum absorption. Milking the cow and hand-feeding the calf is the best way to ensure that the calf receives colostrum. Two liters of colostrum fed soon after birth is recommended for dairy calves.

The types of antibodies present in the colostrum will depend on the previous exposure of the cow to disease agents. In order to provide maximum resistance to disease for the calf, a vaccination program must be developed for the cow herd in order to ensure that antibody specific to the disease problem is present in the colostrum of calving cows. A vaccination program should be based on a good diagnostic knowledge of diseases present in the herd. Qualified professional veterinary assistance should be sought in this regard.

TREATMENT

The most important consideration in NCD, regardless of cause, is prompt replacement of fluid and electrolyte (sodium, potassium, chloride and bicarbonate) losses. The calf with severe NCD suffers from dehydration

and shock, which progressively worsen and are ultimately responsible for the death of the animal.

The dehydration and electrolyte losses may be corrected by oral administration of formulas containing water, glucose and a mixture of electrolytes. The oral route is the safest and easiest way to administer the formula to the scouring calf.

An easy-to-prepare oral formula, recommended by veterinarians at Colorado State University, has proven to be effective in treating the scouring calf. It is prepared as follows:

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| 1 | 2-oz. package jam and jelly pectin |
| 2 | level teaspoons low sodium table salt |
| 2 | level teaspoons baking soda |
| 1 | 10 1/2 oz. can beef consommé |
| | water to make 2 quarts |

Diarrheic calves should be taken off milk or milk replacer and bottle fed two quarts of the oral formula three times a day. After two days, mix half formula and half milk and feed for one day, then resume milk feeding. Mix formula only as needed, as spoilage will occur readily. Commercially prepared formulas are also available from veterinarians or animal health suppliers.

Diarrheic calves that will not nurse a bottle but are strong enough to lie in an upright position may be given formula by stomach tube or esophageal feeder. Esophageal feeders consist of a plastic fluid container and a stainless steel probe, which is passed into the esophagus, and formula is given by gravity flow. The manufacturers of these items usually supply directions for their use or instruction may be obtained from a veterinarian or other individual trained

in their use. In general, esophageal feeders should be lubricated and inserted gently, as rupture of the esophagus can occur easily and will be fatal to the calf.

Calves severely dehydrated, down, and with subnormal (less than 100.5°F) body temperature will usually require skilled intravenous therapy and often the results of treatment are poor.

The routine use of oral and injectable antibiotics cannot be recommended, although occasionally they are of benefit. Antibiotic therapy may be of benefit for some bacterial organisms such as salmonella, but antibiotic-resistant strains of bacteria are very common or may develop quickly and these drugs may soon have little or no effect. Indiscriminate or improper use of antibiotics promotes the development of antibiotic-resistant strains of bacteria as does continuous low-level feeding of these drugs. Antibiotics have no effect against viruses and will not compensate for a lack of colostrum. Inappropriate use of antibiotics, particularly nonapproved ones, may lead to the development of illegal residues in the tissues of treated calves. Prolonged treatment or overdosage of calves with antibiotics may lead to fungal overgrowth in the gut resulting in chronic, non-responsive diarrhea and death in calves so treated. In herd outbreaks of NCD, and accurate diagnosis of the cause is essential for optimal treatment. Qualified professional veterinary assistance should be sought in the diagnosis and treatment of herd outbreaks of NCD.

When NCD occurs in a group of calves, every effort should be made to isolate the affected animals from normal ones. All new cases should be treated as soon as they are detected. Underlying any treatment program is the effective nursing care a calf must receive in addition to replacement of fluid losses and, if indicated, antibiotics. The sick calf should be kept in well ventilated,

clean and dry quarters, handled gently, and protected from temperature extremes.

SUMMARY

Reduction of the incidence of NCD by using a preventive approach should be the primary objective and is practical in progressive dairy or cow-calf confinement operations, especially if qualified veterinary assistance is utilized. On the other hand, operators buying calves from auctions and a variety of sources and mixing them together will have variable success in reducing the incidence of NCD. Results may range from good to poor when new calves that are susceptible or are carrying infections are continually introduced. These operators usually have no control over whether a calf receives colostrum. Routine diagnostic work-

ups are necessary to establish the cause(s) of NCD. This may provide information leading to more specific preventive measures.

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