

What We Presently Know About Calf Scours

I. A. Schipper

The fetal calf is a highly protected individual living under a socialistic environment. It is secured within several sacs of fluid, allowing unimpeded growth and protection from mechanical injury. It is free from all infectious agents, provided food without having to make an effort to obtain it, provided oxygen and has carbon dioxide and other wastes removed without the effort of breathing while being maintained at a constant temperature of 101°F.

After nine months in this highly protected environment, the calf is now going to enter a rapid and drastic transitional period, from a highly protected and well nourished living fetus to a calf through the process of birth. This will be the greatest challenge of its entire life. As the fetus-calf passes from the disease-free uterus and into the vaginal part of the birth canal, it will be confronted with every disease producing organism known to exist in the environment of cattle. It also passes from a protected environment of 101°F to a much lower temperature, sometimes as much as 20-30 degrees below zero. The newborn must now provide its body heat, breathe for itself and find its own food. A wet calf confronted with a 60°F ambient temperature will have a 10°F lower temperature within the core of its body within one to four hours, and will require eight to nine hours for the temperature to return to normal when dried and placed in a 40°F temperature room (5, 6).

The newborn calf is more highly susceptible to temperature exposure than mature cattle because its heat conversion mechanism and cold defenses have not experienced previous challenge and hence are not fully functional. These factors are enhanced because of a high ratio of body surface to body mass, thin skin, minimum fat under the skin, inadequate function of circulation at the body surface and evaporation of heat loss from the wet skin.

In addition, the calf is now confronted with the task of breathing for itself and finding its own food. After surviving the first challenge in its new environment, it will possibly find the cow's teat, but be confronted with all of the filth and disease producing organisms on the teat along with the possible closure of the teat canal that occurs during pregnancy.

GIVING THE NEWBORN CALF A GOOD START

What can be done to aid the newborn calf to successfully make the transition from its socialistic uterine life into the "real" world?

First of all, close observation of the pregnant cow and maintaining her in an environment as free of microorganisms that cause respiratory disease or diarrhea as possible. Preliminary observations would indicate that an overfed pregnant cow is more likely to have calving problems and the calf is more prone to diarrhea. Most important, attempt to dry the calf as rapidly as possible to avoid the body heat loss.

Second, dip the navel in a tincture of iodine, particularly if the calf was born in an area previously or presently being used by other cattle. Navel infection can serve as the stress required for initiating diarrhea or respiratory problems.

Third, be sure the calf nurses. Sucking a teat does not necessarily mean that the calf has received colostrum. Forced milking of each teat will open the teat seal and make it easier for the calf to nurse. The colostrum provides the vitamins, minerals, proteins and other essentials for the newborn, but most important, it provides the antibodies to all diseases for which the cow has antibodies (immunoglobulins). This provides the calf with a specific, as well as general, resistance to infectious disease.

The protection for the calf can be increased for some specific diseases by vaccinating the cow to produce a high antibody titer. Some of the salient facts to remember about vaccination of the dam to increase specific antibody levels in the colostrum include: (1) utilizing vaccines, bacterins or toxoids to produce activity immunity in the dam requires a minimum of three weeks following vaccination to obtain the maximum protection or antibody level in the blood, (2) colostrum formation begins in the mammary gland five to six weeks prepartum and (3) antibodies present in the colostrum are there through passage from the blood stream. They are not produced in the mammary gland. (1, 2, 9, 10).

With these well established facts in mind, it is obvious that to have the greatest quantity of antibody in the colostrum, the maximum antibody level must be present in the dam's blood at least five to six weeks prepartum. To accomplish this, all dams should receive their booster vaccination, or last vaccination, not later than eight to nine weeks prepartum. On initial vaccination, all dams should be vaccinated twice, with the first vaccination made at least eleven to twelve weeks prepartum and the second vaccination made three weeks later. Following initial vaccination, an annual booster vaccination should be given not later than eight to nine weeks prepartum.

Dr. Schipper is professor, Department of Veterinary Science.

Some of the vaccines that are available to cattlemen include: *Clostridium perfringens* C and D (enterotoxemia), bacterins-toxoids, *Escherichia coli* bacterins and rota-corona viral vaccines.

The enterotoxemia vaccination has appeared to be helpful in preventing digestive problems in the newborn calf, particularly those of heavy lactating cows. The *Escherichia coli* bacterins have reportedly been helpful in preventing diarrhea. It is quite possible that within the next year the *Escherichia coli* bacterins will be available to the livestock industry.

Antibodies in the colostrum consumed by the calf will be present in the ingesta of the gut, thus providing local immunity. The local immunity or "gut" immunity will provide protection from infectious diarrhea. The local immunity will last for approximately the first three days of the life of a calf. It is for this reason that numerous cases of diarrhea appear in the newborn after three days of age.

In addition to the local immunity, the antibodies in the colostrum will pass through the gut wall and into the blood for the first 24 hours post-birth. The absorbed antibodies provide systemic antibodies that have little benefit in preventing diarrhea, but will decrease death loss due to diarrhea or respiratory infections.

WHY DO CALVES HAVE DIARRHEA

The causes of diarrhea may be divided into two major groups: (1) inefficient management, and (2) infectious agents.

Management could include negligence (such as failure to dip navel), poor protection in inclement weather, utilization of poor quality milk replacers, overfeeding, insanitary feeding utensils, overexposure to cold, exposure to highly contaminated surroundings and deprivation of colostrum within four to six hours of birth.

Infectious diarrhea may be caused by numerous forms of bacteria, but primarily *Escherichia coli* (colibacillosis), *Salmonella* spp. and *Clostridium perfringens* toxins. Viruses associated with calf scours include rotaviruses, coronaviruses, BVD, IBR and numerous enteric viruses.

In addition, internal parasites, such as coccidia and some intestinal worms, have been reported to cause diarrhea in older calves.

Regardless of the cause, the result is an interference with the normal physiological function of the intestinal lining resulting in decreased transit time for feces, decreased intestinal motility, increased intestinal secretions and increased intestinal absorption, but not of sufficient level to counteract the increased intestinal secretions. The intestinal cells are destroyed and expelled in the feces and cannot be replaced fast enough to repair the intestinal lining and increase absorption. The total end result is body fluid loss (dehydration)(8).

Fecal water loss is increased 28 times with a 22-fold increase in fecal volume loss. Along with decreased water loss, there is a decreased absorption of nutrients and a decrease in blood volume. Constriction of blood vessels to the legs, exterior body and vital organs (such

as the heart and liver) follows the dehydration in an effort to compensate for the blood loss. The decreased blood volume places extra effort on the heart liver and kidneys. The decreased supply of oxygen and nutrients to these vital organs results in an acidosis, decreased body heat, decreased blood sugar and a general toxicosis (3).

When the advanced state of dehydration and toxicosis is reached, the chances of the calf surviving become greatly reduced. The only means of reversing the adverse trend is administration of electrolytes by the intravenous route.

TREATING THE CALF WITH DIARRHEA

Medication should be initiated upon observing the first signs of diarrhea and before the calf loses its luster and alertness.

Because dehydration is the primary result of diarrhea and the cause of most fatalities, immediate steps should be taken to prevent or correct fluid and electrolyte losses. This can best be accomplished by oral electrolytes administered immediately upon detection of diarrhea. Early administration also has the advantage of having a calf that is still capable of nursing and thus having the fluid enter the abomasum (true stomach) rather than the inactive rumen where it will remain, ferment and cause toxicosis. In addition, delays in administering oral electrolytes often result in advanced dehydration which requires intravenous electrolyte administration and decreased chances of recovery. Remember, all electrolytes should be warmed to at least body temperature before administration either orally or intravenously (7).

Antibiotics and sulfonamides have become of minimum value in medication of diarrhea because of increased drug resistance to nearly all bacteria associated with diarrhea and because these drugs have no effect on viruses.

Probably one of the greatest aids to helping the scouring calf in addition to the administration of electrolytes would be to provide sufficient heat to maintain body temperature.

Determination of the choice of therapy and the quantity of fluid should be based on estimated body weight loss. Twelve per cent fluid loss is equal to 6 liters (quarts) or 12 pounds in a 100 lb. calf.

Calves that have lost 5 to 10 per cent weight should be fed 2 liters of warm oral electrolytes three to four times per day.

Those having a 10 per cent or greater fluid loss should receive electrolytes orally and intravenously.

The early administration of oral electrolytes has the advantage of being administered by the owner, does not need to be sterile, is the safest and easiest route of administration, will aid in warming the body and are absorbed over a period of time, thus providing a sustained fluid replacement.

The calf can remain with the cow during oral electrolyte medication, which will minimize stress to both and aid in recovery of the calf.

DETERMINATION OF DEGREE OF FLUID LOSS (4)

| Percent Weight Loss | Clinical Signs |
|----------------------------|--|
| 0-5% | None - will suckle, eyes bright, skin elastic and warm. |
| 6% | Loss of skin elasticity, dry mouth injected conjunctiva. |
| 8% | Sunken eyes and increase of above signs. |
| 10% | Legs and oral cavity colder than rest of body, unable to stand and increase in previous signs. Will not suckle, rectal temperature subnormal. |
| 12% | Shock, recumbent, requires assistance to set up, increase in previous signs, eyes sunken - dull, rectal temperature subnormal, extremities cold. |
| 12 + % | Fatal. |

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An appropriate discussion is presented by Dr. Staples on page 21.