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### Feeding Cows to Prevent Scours in Calves

Some of you may look at the title and wonder what the connection between feeding cows and preventing calf scours might be. In this month's column we will explore the connections and try to provide some practical advice for the prevention of calf scours in general. However, it is important to know that the prevention of calf scours begins with the way the cows are fed and managed before they calve.

#### *What causes calf scours?*

This is an important question and one that should be addressed early on. The potential causes of calf scours are a fairly long list of viruses, bacteria, and protozoal agents. However, in most cases there are only four "bugs" that cause the vast majority of our scours problems in beef calves. These common agents are *E. coli*, Rota virus, Corona virus, and Cryptosporidium. The first organism, *E. coli*, is a bacterial agent that usually causes illness within the first few days of life—typically before 5 days of age. Rota virus and Corona virus are obviously viral agents and they cause disease at 10 days to 21 days of life. Cryptosporidium (*C. parvum*) is a protozoal agent and also usually causes scours at 10 to 21 days. In beef calves, a combined infection with Rota virus and Cryptosporidium is very common. All of these infectious agents can be common in beef herds and in the environment. Each of these "bugs" act in its unique way to cause diarrhea in calves and the diarrhea results in dehydration, electrolyte changes and illness or death. Therefore, preventing disease and death loss depends on how well we manage for prevention.

#### *What prevents the calves from getting scours?*

There are basically two factors that prevent the calves from developing diarrhea (scours), becoming ill and dying. One is the dose of the infectious agent(s). The higher the dose in the environment of the calf (the calf's cow and immediate surroundings) the more likely the calf will be exposed to the agent(s) and become ill. Therefore, sanitation is very important in keeping the dose low. Calving the cows in clean fields or pastures is very helpful and keeping the cows spread out (low density) is also important. The second important factor in preventing scours is the immune system of the calf. The calf's immune system has two important facets: (1) the ability of the individual calf to resist disease, and (2) the colostrum the calf receives from the cow or heifer soon after birth. Both of these factors are dependent on good quality nutrition before the calf is born.

#### *How does feeding the cow affect the immune system of the calf?*

The immune system of the calf is developing during the time the cow is pregnant. Rapid development of the immune system begins about day 120 of gestation and continues until the calf is born. One of the most important nutrients for the development of the immune system is protein—all the various amino acids that are the building blocks of the enzymes, antibodies, and other functional proteins that make it possible for the immune system to work. So if the cow is short on protein in her diet, the immune system of the calf will not develop normally. The other important factor in feeding during pregnancy is involved with colostrum formation by the cow or heifer. Colostrum is the first milk produced and is rich (very thick) with antibodies that the cow has made to all the pathogens she has encountered (this includes vaccines). These antibodies are proteins and without adequate protein in her diet the quality and quantity of her colostrum will be decreased. This colostrum is vital to the calf's health for the first 2 months of life. The antibodies in the colostrum are so important that the calf doesn't digest colostrum in the normal manner. Normally, protein in the calf's diet is broken down to individual amino acids in the low pH of the abomasum and intestine. This breakdown would destroy the function of the antibodies; however, when the calf ingests colostrum the entire protein antibody is absorbed through "holes" in the intestine. These "holes" close shortly after birth so the timing of the colostrum meal is also important. Thus, the protein fed to the cow or heifer before she calves is vital for the following to occur: (1) the calf must be strong enough to get up and suck soon after birth (the calf's muscles are made from protein), (2) the colostrum of the cow or heifer must be adequate in terms of quality and quantity, (3) the calf's own immune system must be working at maximum efficiency.

#### *Besides protein, what other nutrients are important for the cow?*

Protein is important for the reasons mentioned above and you have to feed the cows enough energy so they don't lose weight—particularly during the last three months of pregnancy. If they are losing weight during that time, the calf will be born weak and below normal weight. Also, if not enough energy is fed the cow will break down her muscle tissue and use that protein for energy. So feeding enough energy and protein together is important. Other nutrients that are particularly

important for the pregnant cow in California are some of the trace minerals: iodine, copper, and selenium. Iodine is essential for thyroid function and the thyroid hormone functions as the “gas pedal” of growth. Without adequate iodine the calf will be undersized and weak. Copper and selenium are both important for the proper functioning of the immune system. Deficiencies in either one of these trace minerals will result in an increase in sick and/or dead calves.

*How do I feed the pregnant cows to help prevent calf scours?*

Depending on the size of the cattle, 1.5 to 2.0 pounds of crude protein should be fed per cow per day during pregnancy. On permanent pasture this intake will be easily met as the crude protein levels will exceed 15% and the cattle will often consume 25 pounds of dry matter each day—over 3.5 pounds of crude protein per day. On dry foothill range, the crude protein level can be 6% or less and the cattle will only be capable of consuming 10-15 pounds of this material per day—this would equal 0.6 to 0.9 pounds of crude protein per day from the dry feed. Thus, on dry foothill range you should plan on supplementing 0.6 to 1.4 pounds of crude protein each day. This would be equivalent to 4-10 pounds of medium quality alfalfa hay (15% crude protein) per head per day. Many other protein supplements can be fed to achieve these goals and a short table is included for comparison purposes.

Feed	% CP dry matter basis	Pounds per day as fed basis	Supply of crude protein--pounds
Meadow grass hay	12%	9.3	1.0
Oat hay	9%	12.3	1.0
Alfalfa hay (medium)	15%	7.4	1.0
Alfalfa hay (very good quality)	20%	5.6	1.0
Molasses 20% CP	20% as fed	5.0	1.0
Molasses 30% CP	30% as fed	3.3	1.0
Cottonseed meal	44%	2.5	1.0
Soybean meal	50%	2.2	1.0

The important cost factor is the cost per pound of protein you need to supplement, not necessarily the cost per ton of feed. Usually, when protein requirements are met you are feeding enough energy. This may not be true when feeding molasses-based supplements or salt and meal supplements, so be sure to closely watch the body condition of the cows.

Be sure to monitor your trace mineral program. There are a number of good ways to supplement trace minerals: copper boluses, selenium boluses, salt-mineral mixes, molasses based supplements with added minerals, and others. A combination of supplement methods may be necessary to prevent deficiency. The bottom line is how well are they working. A few blood samples at pregnancy checking time will answer that question and allow time to make up deficiencies before the cows calve. Work with your veterinarian on monitoring your program.

*Are there vaccines that will help prevent calf scours?*

Yes, there are some excellent vaccines for Rota virus, Corona virus, and *E. coli* K99. These are given to the pregnant cows/heifers during the last three months of pregnancy. Remember, these vaccines stimulate the cow to make antibodies that are then transferred to the colostrum, so if you short the cow on protein the vaccine will not do its job for you. At the present time there is no effective vaccine for *Cryptosporidium* on the market.

*What are some other management tools I can use to help prevent calf scours?*

The important ideas here are sanitation and isolation to help prevent calf scours. Here are a few areas to be aware of in your prevention program.

1. Calve the heifers earlier than the main cowherd in clean fields. The heifers have lower quality colostrum and lower amounts. Their calves are more susceptible and isolation is helpful.
2. Try to calve at a time of year when it is not wet or muddy in the calving fields.
3. Do not bring in outside cattle during the calving season. These cattle can be the source of diseases your cattle have no immunity against. Also, bringing in dairy calves for cows that lose a calf can lead to severe scours outbreaks.

4. Use strict sanitation when treating sick calves. Treat sick calves only after handling the well calves—never before. Disinfect all balling guns or esophageal feeders after treating sick calves, use disposable gloves, wash your clothes and equipment after treating scouring calves, etc. You can carry the “bugs” on your gloves, clothes, and equipment from a sick calf to a healthy calf. Thus, you can become the cause of an outbreak and not the cure.
5. Isolate sick calves and their cows to a separate field or area to avoid the build-up of pathogens in the main cowherd.
6. Try to avoid feeding hay when the calves are very young. This concentrates the cattle and their feces on the hay feeding areas and increases the load of “bugs”. Use of good pastures or fields put aside during the first 2-3 weeks of the calves’ lives is a good idea. Feeding cottonseed meal (or soybean meal) with 30-40% salt in feeders can be a successful way to supplement during this time.

Preventing calf scours is an important part of management; however, it is not simple to accomplish. Feeding the pregnant cows and heifers is a very important part of this equation that is sometimes overlooked. Your veterinarian can provide you with additional helpful information that is specific to your herd.

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