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CALF SCOURS RESEARCH

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The condition commonly called calf scours is known by a variety of names, including calf septicemia and scours-pneumonia complex. It affects both beef and dairy herds and is worst where animals are concentrated and sanitation is poor. Many bacteria and viruses may cause the disease, making it difficult to control.

Calves vary in susceptibility to scours. In herds where a high percentage of calves have scours, some calves appear to have immunity and do not become sick. In case of a severe scours outbreak, the natural resistence of the calves is the most valuable asset the owner may have.

University of Idaho scientists set out to determine what differences could be observed between susceptible and resistant calves. Blood serum of dams, sires and calves was studied to determine serum protein levels, since certain serum proteins are essential for defense against disease.

Two groups of cows and two bulls were selected for the research. One group of 20 cows had high serum protein values and had produced calves that did not scour. These cows were mated to a bull that had a high protein level. The other group of 20 cows had low serum protein levels and had produced calves that did scour. These cows were mated with a bull that had a low protein level.

PROTEIN ANALYSIS OF BLOOD SERUM AND COLOSTRUM (FIRST MILK)

Blood samples were taken from cows at 2- to 4-week intervals. Samples were taken from calves before they nursed and frequently during their first 6 weeks. Colostrum was collected before the calves nursed.

The total protein and the amount of various protein fractions were determined for each sample. The protein fraction of particular interest was gamma globulin, because it contains antibodies against numerous disease-producing agents. Animals that lack gamma globulin have little resistence to disease.

Protein levels in cow serum were found to be highest approximately 2 months before calving. Levels dropped near calving time, when gamma globulin was concentrated in the udder, resulting in a much higher concentration in the colostrum than in the blood.

This concentration is necesary to supply antibodies to the newborn calf, which is born without detectable amounts of gamma globulin. Calves usually absorb gamma globulin from colostrum as they nurse during the first few hours after birth.

The highest gamma globulin levels were reached at 24 hours after birth and gradually declined to a low at 4 to 8 weeks of age (Figure I). Gamma globulin from colostrum began dissipating early and was replaced by gamma globulin produced by the calf as it matured enough to produce antibodies to numerous disease agents. Some colostrum antibodies, however, are known to persist to weaning age.

Also shown in Figure I is the difference in gamma globulin levels between calves from cows with high and low gamma globulin levels. This difference suggests an inherent capacity to produce gamma globulin.

In one experiment, 19 calves were withheld from nursing until 12 hours old. All remained vigorous and nursed readily when allowed, but their ability to absorb gamma globulin was reduced. A higher percentage of these calves scoured than in the group allowed to nurse at will. Three calves absorbed no gamma globulin, developed scours and died within 3 to 5 days.

The period in which calves may absorb gamma globulin from colostrum varies greatly. Stress factors such as cold may shorten the period to only a few hours after birth. Therefore, it is essential that calves nurse as soon as possible after birth.

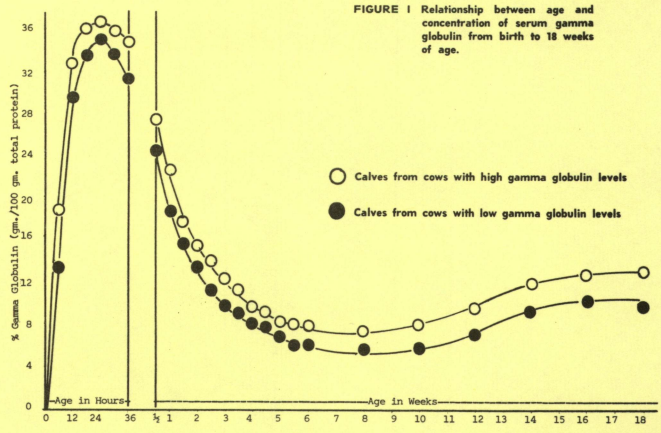

FIGURE I Relationship between age and concentration of serum gamma globulin from birth to 18 weeks of age.

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ORAL INOCULATION OF CALVES WITH BACTERIA

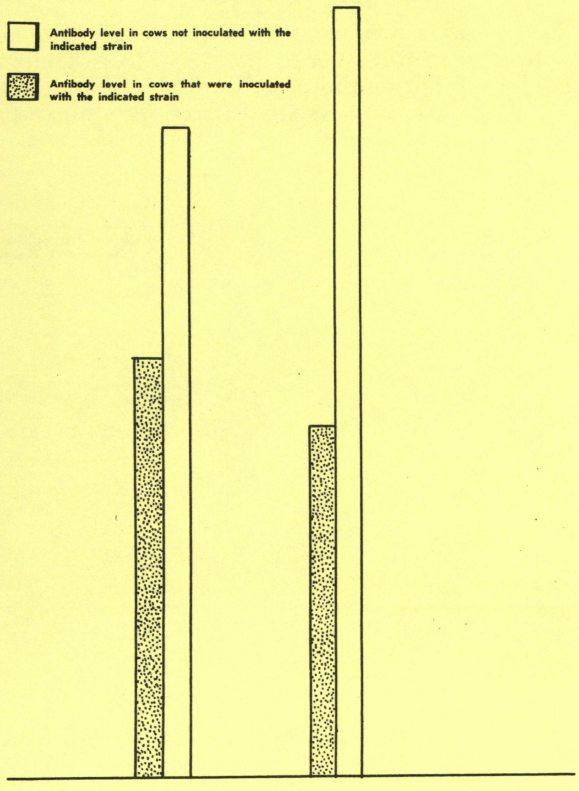
Escherichia coli is a bacteria that normally inhabits the intestine. Most of these bacteria are beneficial, but some strains cause scours.

Newborn calves were orally inoculated with a mildly pathogenic *E. coli* strain. Attempts were made to isolate the strain from fecal material when the calves were 3 to 7 days old. At 3 days, 92.8 percent of the identifiable *E. coli* were of the inoculum strain. At 7 days, 56 percent were of the inoculum strain. This shows that the intestine of the newborn calf is highly susceptible to infection by these organisms. However, susceptibility to intestinal infection decreases rapidly after calves are 5 days of age.

Scours produced in the inoculated calves were generally mild or of short duration, except in calves that had been withheld from nursing.

Establishing non-pathogenic, essential bacteria in the intestine helps retard growth and penetration of scour-producing bacteria. *Lactobacillus* is regarded as an essential bacteria of the normal calf and may be supplied in capsule form. Inoculation with these essential bacteria should be done immediately after birth; however, it is not warranted in all circumstances.

FIGURE II Comparisons between antibody levels in colostrum to E. Coli strains A and B.



ANTIBODY RESPONSE TO E. COLI INOCULATION

Cows build antibodies to disease organisms to which they are naturally or artificially exposed. These antibodies are concentrated in colostrum and serve to protect the newborn calf from disease. However, if the cow is moved to a new location just before calving, she may not have time to produce antibodies to newly encountered organisms. The calf then receives colostrum without antibodies to some diseases it will encounter. Disease organisms may also be introduced by bringing a new animal into the herd.

In this phase of the research, cows were orally inoculated with *E. coli.* Antibody levels in blood serum were measured before inoculation and then at 2-week intervals. The serum antibody level was low before inoculation, but rose rapidly to a peak 6 weeks later. Inoculated cows had many more antibodies to the test organism than cows that were not inoculated (Figure II).

Calf serum was also tested for antibodies to the inoculum organism. Calves were born with negligible antibody levels, but the levels rose as calves absorbed gamma globulin from the colostrum. Calves that absorbed gamma globulin slowly or not at all had few or no antibodies.

CONCLUSION

The chances for calf survival are enhanced by: ability of the dam to produce immune antibodies, ability of the dam to concentrate the antibodies in the colostrum and ability of the calf to assimilate the antibodies. If any of these fail, calf susceptibility is greatly increased.

Early colostrum feeding is extremely important. Colostrum contains proteins, fats, minerals and vitamins A and D in quantities much higher than in normal milk. It is, therefore, a concentrate of the essential nutrients as well as of disease-fighting antibodies and is the best calf starter ever devised.

Research is continuing on the relationship between gamma globulin levels and calf susceptibility and on the heritability of serum protein production. The goals of the research are to establish ways to identify a susceptible calf before illness occurs, and to increase calf immunity to disease.

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