



PHOTOS BY SHAUNA ROSE HERMEL

► Truly the first line of defense, antibodies in colostrum provide a measure of protection against infection until the calf's own immune system develops.

Colostrum is

The First Line of Defense

by **Troy Smith**

For most cattlemen, calving season is a favorite time of year. Few scenes inspire more satisfaction than a healthy crop of frisky calves frolicking about the pasture. But calving season can be fraught with misery and plenty of extra work when calves don't get off to a good start. Regardless of geography or climate, the environment is laden with disease-causing microorganisms that challenge the newborn.

Since its own immune system is undeveloped, every newborn calf needs a jump start — a stout dose of passive immunity acquired from its dam. Highly concentrated antibodies are transferred to

the calf through the cow's first milk, or colostrum. Truly the first line of defense, antibodies in colostrum provide a measure of protection against infection until the calf's own immune system develops.

But not only does colostrum fill that initial immunity gap, it also influences long-term calf health, growth and performance.

"There have been limited studies on the link between passive immune status in baby calves, and their postweaning performance," says Gary Rupp, University of Nebraska Extension veterinarian at the Great Plains Veterinary Educational Center. "But we know calves that experience health

problems early in life don't grow and perform as well. And we know calves that don't receive colostrum have early health problems."

Rupp points to research conducted jointly by the University of Nebraska-Lincoln (UNL) and the Roman L. Hruska U.S. Meat Animal Research Center (MARC), in Clay Center, Neb. The study quantified the effect of passive immune status on pre- and postweaning health and growth performance.

Among 263 beef calves, blood samples were collected at 24 hours after birth to determine levels of plasma protein and serum IgG — the principal immunoglobulin present in bovine colostrum. Disease (morbidity) and death (mortality) among the study population were monitored from birth to weaning, and after weaning throughout the feeding period.

Of calves classified as having an inadequate IgG concentration at 24 hours of age, 25% subsequently suffered various health problems as babies. Only 5% of calves that acquired adequate levels of IgG became sick during the same period. The risk of death prior to weaning was more than five times greater for calves classified as having inadequate transfer of passive immunity. Calves that displayed low passive immune status posted the lowest weaning weights and were at greater risk of feedlot morbidity.

"The study suggests that inadequate transfer of passive immunity (from colostrum) is directly associated with health problems before and after weaning," Rupp explains. "The effect on growth and performance in the feedlot is indirect, because a higher incidence of health problems hampers performance."

But colostrum offers much more than immunity. A power pack of nutrition, colostrum is high in total protein, and its high fat content provides energy. It contains 10 times the amount of vitamin A contained in normal milk and is higher in vitamins E and D and several minerals. Rupp likens colostrum to a miracle drug — one that a newborn needs as soon as possible.

Time-sensitive

"We used to say that if a calf didn't receive colostrum within 24 hours of birth, it wouldn't get full benefit of the nutrition and bacterial inhibitors colostrum contains. That led to the idea that as long as a calf gets colostrum within the first 24 hours, it'll probably be okay," Rupp says. "But a newborn calf has almost no defense against infection until after it receives colostrum."

And antibodies are absorbed at a decreasing rate, even during that first 24 hours. So it's really a race against time to get colostrum into the calf and transfer immunity as soon as possible."

After a normal birth, Rupp says he likes to see a calf on its feet and nursing within an hour. He might allow a little more time for a first-calf heifer, provided neither she nor the calf has experienced excessive stress. First-calvers sometimes need more time to mother-up (respond to their mothering instincts). Rupp says delaying administration of colostrum for up to four hours after birth shouldn't significantly affect the rate at which antibodies are absorbed. However, any delay increases the period of time before the calf achieves passive immunity protection.

Intervention

If the calf does not get up and nurse in a timely fashion, or if the delivery is particularly stressful, Rupp recommends intervention. Ideally, the cow should be milked out and the colostrum administered to her calf. Usually for the sake of convenience, producers have sought alternative methods. Collecting, freezing and storing colostrum for future use is a common practice.

Rupp says University of Missouri-Columbia research showed no significant difference in IgG absorption between calves receiving fresh or frozen colostrum. Some questions do remain regarding how long-term frozen storage might affect IgG absorption and efficacy. However, Rupp has confidence in colostrum that has been in frozen storage for up to one year.

Many producers have turned to dairies as readily renewable sources of freshly frozen colostrum. Rupp says producers should remember that while a dairy cow produces a greater volume of colostrum, the beef cow's colostrum is more concentrated. A producer might milk out that 2-year-old heifer and collect only a quart, but it's very concentrated and probably more valuable to the calf than a gallon of colostrum from a dairy source.

Producers should consider the biosecurity of their beef herds, too, and realize that purchasing colostrum carries an element of risk. Several different infections, including Johne's disease, can be transmitted through milk; and Rupp says salmonellosis might be an even bigger threat.

"Salmonellosis is nasty and can spread throughout the herd," he warns. "When buying colostrum, make sure it has been cultured and tested."

Rupp has little faith in commercial



► In research described in this article, the risk of death prior to weaning was more than five times greater for calves classified as having inadequate transfer of passive immunity.



► Limited studies have shown a link between passive immune status in baby calves, and their post-weaning performance, says Gary Rupp, University of Nebraska Extension veterinarian.

colostrum substitutes, calling them inferior to the real thing. If natural colostrum simply isn't available, a substitute might be better than nothing, "But not much better," he adds.

To manage for colostrum needs without going off the farm or ranch, Rupp recommends collecting and freezing the first milk of any cow that loses her calf at birth. Although more labor-intensive, a supply can be built by robbing a half-pint or so from several heavy-milking cows.

"To me, the best colostrum management is the same as commonsense precalving management. Just manage your cows to

minimize calving problems. Having those cows in adequate body condition prior to calving is as important as anything you can do after they calve. If the cow is in poor shape, her calf won't be as vigorous and the quality and quantity of her colostrum could be poor, too," Rupp says.

"In the case of calving difficulty or other stress factors, you'll probably want to step in and make sure the calf gets colostrum. Tube-feed the calf if nursing is delayed. The important thing is to make sure the calf receives it as soon as possible."

