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Colostrum: The First Line of Defense

by **Troy Smith**

For most cow-folk, calving season is a favorite time of year. Few scenes inspire more satisfaction than a healthy crop of frisky calves frolicking across 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, which challenge the newborn.



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Colostrum provides a measure of protection against infection until the calf's own immune system develops. Colostrum also influences long-term calf health, growth and performance.

Since its own immune system is undeveloped, the 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 influences long-term calf health, growth and performance too.

"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, Clay Center, Neb. "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."

To Rupp, the conclusion seems obvious, but to explain he points to related research conducted jointly by the University of Nebraska-Lincoln and the 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.

Twenty-five percent of calves classified as having inadequate IgG concentration at 24 hours of age subsequently suffered various health problems as babies, while 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 also 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," explains Rupp. "The effect on growth and performance in the feedlot is indirect, because 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.

"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," offers Rupp.

"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 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 have experienced excessive stress. First-calvers sometimes need more time to mother-up. 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 does increase the period of time before the calf achieves passive immunity protection.

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. 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 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 meet 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 common sense 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." **HW**



PHOTO BY ANGIE STUMP DENTON

A 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 — colostrum.