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Enhancing Immunity

Calves getting colostrum early is critical for their performance later.

by **Heather Smith Thomas**

Infectious diseases occur when the body is overwhelmed by pathogens. A healthy animal with strong immunity is less likely to become sick than an animal with poor immunity. Immunity refers to the body's ability to fight off pathogens, and this ability is developed in a complex process in which the body creates specific weapons for fighting specific invaders.

One type of weapon involves the production of antibodies. When pathogens, such as viruses or bacteria, enter the body, they cause damage by multiplying and creating toxic products. This stimulates the body to create an antibody — a serum protein called an immunoglobulin — to react with the invading agent and to neutralize it. These antibodies are carried throughout the body in the bloodstream. The main role of one type of lymphocyte — the white blood cell — is to produce antibodies. Those antibodies are the proteins that can neutralize certain infectious agents.

If an animal already has antibodies against a specific disease organism, then any time that particular organism invades the body again an army of white blood cells and antibodies converge on the site to kill the invader. Exposure to one strain of an organism may result in immunity to that specific strain, but it might not protect against other strains of the same organism. Antibody immunity depends on the level of exposure, stresses on the animal, general nutrition status and current health. A severe outbreak of disease in a herd may eventually break down a healthy animal's immunity, and it will overwhelm a stressed animal's defenses even sooner.

Vaccination can stimulate production of antibodies, since the vaccine serves as the antigen — an invading pathogen. The

body builds protective antibodies to fight the perceived invader. When the animal comes into contact later with the actual infectious agent, the antibody is present in the bloodstream and can inactivate the pathogen. If enough antibodies are present to inactivate the agents invading the body, the animal will not get sick, and the invasion stimulates rapid production of more antibodies for future protection.

A cow in a natural environment may not become exposed to very many disease-causing organisms, but most cattle are grouped or confined during some parts of the year and come in contact with other cattle, providing more chance of disease spread. However, with vaccination and natural exposure to various pathogens, the cow develops antibodies and strong immunity. During late pregnancy, she puts these antibodies into the colostrum she produces, so her calf will have instant immunity after it suckles.

Passive immunity from colostrum

Andy Acton, DVM, Deep South Animal Clinic, Ogema, Saskatchewan, reminds producers that baby calves are not born with their own antibodies. He says it is critical they absorb antibodies from their mother's colostrum because they don't get any from her via the bloodstream while they are in the uterus.

"There is more to it than this temporary immunity," he explains. "There are more benefits from the colostrum than just the antibodies absorbed when calves suckle the first time. There is also some absorption of white blood cells of different kinds in that colostrum from their mother. These are not present in a colostrum replacer you'd buy."

Calves always get more actual protection from the dam's colostrum than from a commercial product. He says some of the immune modulators in colostrum that are not actual antibodies are also important to the calf. It is important that producers remember newborns have a limited window of time to absorb antibodies from colostrum.

"The optimal time is during the first six hours of life, but it may be less than that in certain conditions — perhaps just the first two hours in cold weather," Acton notes.

As soon as the calf suckles, the "open gut" starts to close to prevent absorption of pathogens. Suckling stimulates the gut to close up, because it's always a race between the antibodies from colostrum and the pathogens the calf might ingest. If a calf manages to suck a little bit or if the producer feeds him a little, the gut closes up quicker than if the calf has had nothing. "The time window for the gut to absorb something in this situation is a lot longer than if the calf gets a small amount of colostrum," he explains.

Acton has 40 cows himself and he recalls a situation where an old cow made her bag just before she calved, and it left him with a challenge in the end. "When I went into the barn after she calved, it looked like the calf had sucked one quarter. I thought he was off to a good start," he notes. A number of hours later I looked at that pair again and wasn't sure, because the other three quarters were still full. I put that cow in the chute to check, and the quarter I thought he'd sucked was blind. The calf might have been sucking on it, but there was no milk. I got fooled because she hadn't bagged up till the end, and I didn't know that quarter wasn't producing anything." By then the calf was 14 hours old and had never had anything to eat.

Acton says that in his own small herd over the years, he has had cows show a number of ways in which he thought the calf did suck but actually hadn't. The confusion did not result from not looking or checking but, instead, an abnormal situation. Even in a well-managed herd, there will be approximately 6 to 20% of calves that don't get as much colostrum as they should. He says they are below what veterinarians consider the cutoff for good antibody levels.

In some situations, the calf is unable to get any colostrum. Sometimes a heifer won't let her calf get to the udder. In other situations, the calf may be at the udder, but the calf is just sucking the side of the teat and doesn't really have the teat in its mouth.

In cold weather, a cow's teats may get frostbitten before she calves, and there may be a little scarring or scab at the end of the teat and the calf can't get the teat started. The calf may get nothing unless the cow is restrained to get those scabs off and get the teats started.

"On some of my calves I check antibody levels in their blood," Acton explains. "They need a bit of time to absorb the colostrum, but afterward you can get an idea pretty quickly — from a blood sample, a centrifuge and a refractometer — to know if they've had any." Acton says when he notices a calf is low, he can supplement with colostrum every two hours until the levels are normal.

"A person must be careful doing that, however, watching the calf to make sure it is strong enough to handle the extra

feeding,” he warns. “You don’t want to overfeed a weak calf that might regurgitate.

“Producers must decide how much intervention and effort to put into making sure every calf suckles on time,” he advises. “We know that if colostrum intake is managed well, the health of the calf and performance of that calf will be far better.”

Colostrum prompts performance

Acton recalls a study testing approximately 1,000 calves from several different farms. Researchers blood tested the calves to measure the calves’ antibody level, as one of the measures of whether they had nursed or not. The bottom one-fifth was called a fail because those calves probably hadn’t gotten much colostrum. Later, those calves weighed about 30 to 40 lbs. less at weaning than the other calves. This lower weight was not due to sickness; the calves just didn’t perform as well.

Calves get off to a better start if they have adequate colostrum soon after birth. “It becomes the producers’ decision regarding how they want to manage this,” he notes. “If they have the facilities, they can manage it if they want to. Certain kinds of extensive operations where cattle are calving in large areas with range cows, this would be difficult. Those cows are generally on their own. With that kind of setup, you want really good calf vigor — calves that can get right up and suckle quickly.”

That producer wouldn’t want to be calving in severely cold weather. Also, the cows would need adequate nutrition to have a strong, healthy calf. Acton says calf vigor at birth is the key to success on many ranch operations. It requires good nutrition with the cows in good shape and all the vitamins and minerals needed in a good supplement program. With that, the calves have a good chance to be vigorous at birth, especially if they are not at the heavy end of birthweight. If a cow must calve unassisted with a strong, lively calf that can get right up, it is ideal to have some genetic selection for moderate birthweights.

Calving in warmer weather is an advantage in this situation because the calf doesn’t get chilled and has a longer time to work at trying to suckle before it gives up. There are some advantages to calving later with cows out in big pastures unassisted, but if something goes wrong, the breeder is not there to intervene in order to correct a problem. Mother Nature is very impartial and doesn’t care if some of those newborns don’t make it.

“When producers want the cows to take care of it on their own, they do have to accept a certain amount of loss,” Acton notes. “There is some definite benefit to making sure every calf suckled an adequate amount of colostrum soon enough but this requires some facilities and more labor. The rancher must weigh these alternatives. Is this a payoff that will be worth your time? Producers must make these choices.”

Dealing with ill young calves can be an uphill battle for veterinarians. Acton says when they don’t have the needed antibodies in place it creates a whole new challenge in treating them.

“There are some things that can be done when they are older, and you know they didn’t suckle soon enough,” he explains. “You can try plasma transfusions or blood transfusions. I’ve done a few of those — from the mother to the calf — but it’s difficult because you have to give so much volume. I do process some plasma myself to have on hand in case a purebred calf or club calf comes in and the client really wants to have this done. I’ve seen remarkable results doing this with foals that didn’t get adequate colostrum, and it can also be done in calves.”

He says a transfusion can be very labor-intensive in the clinic. However, it has helped those calves get up to a normal level and do well. Still, it’s much simpler, however, to try to work within that window of time after birth and to make sure the calf suckles enough colostrum.

Colostrum alternatives

Sometimes when the producer knows the calf hasn’t suckled, a colostrum alternative is used. Acton’s clinic uses a lot of powdered colostrum products. An option some stockmen use is dairy colostrum, but because of the volume produced by a dairy cow with less concentrated antibodies, twice as much is needed to get enough benefit.

“Today it’s not advisable to use dairy colostrum, and we now have better quality colostrum replacers,” Acton explains. “Commercial replacements don’t have the cellular components found in fresh colostrum, because those cells won’t survive the processing, but they do have fairly good immunoglobulin levels. One or two of the 100-gram packages will provide a calf with seemingly adequate immunity. It is certainly better than nothing.”

The best option, however, is to milk some extra colostrum from the herd to freeze for later use.

Acton recommends putting approximately one quart of colostrum into a two- or three-quart Ziploc freezer bag, freezing it flat. Bags can be stacked in the freezer easily and will thaw quickly in warm water. The frozen colostrum, thawed and warmed to a calf’s body temperature, can be very helpful, when needed.

Only the first milking should be used for colostrum. It is soon diluted by regular milk. “After a cow has calved and you want to milk colostrum from her, we suggest giving her at least 1 mL of oxytocin before milking her [if you are sure she doesn’t have a twin still inside her], so she will let down her milk,” he explains. “You can get a lot more from her more easily that way.”

With a gentle cow that produces a lot of colostrum, Acton says to sneak up beside her calf as it is nursing the first time and milk some as her calf is sucking. She will let her milk down nicely for her calf, and extra can be milked out to freeze.

“For some of our clients who are milking colostrum, we suggest using a small dose of mild sedative,” he advises. “This is something to discuss with your own veterinarian. This will relax the cow if she’s nervous. This is probably the only time in her life that she’ll ever be milked, and she will likely hold up her milk. If she is relaxed, you will be much more successful. We give our clients the sedative and oxytocin together.”

A small container should be used to collect the colostrum. “Milking into a large container is risky because if the cow kicks, you may lose all your colostrum,” he says. “We milk into a small container that can be held with one hand that can be quickly pulled out of the way.” A small plastic pitcher with a handle works nicely — the smaller the better. He says to keep dumping the milk into a larger container so that if some is lost, there is still some to use. **HW**



Supplementing calves with colostrum can be done, but producers should assure the calf is strong enough to handle the extra.

PHOTO BY KENNETH YOUNG

Vaccinations to boost immunity

Andy Acton, DVM, Deep South Animal Clinic, Ogema, Saskatchewan, says some people vaccinate calves at birth, some vaccinate at branding time and often the producer wonders when the best timing might be. “When calves are very young, antibodies received from colostrum interfere with the calf producing antibodies,” he explains. “Earlier thinking was that vaccinating a very young calf didn’t do any good because of these maternal antibodies, but more recently we’ve found out that early vaccination does produce a cell-mediated immunity and also a memory. Then when you re-vaccinate that calf later, the second vaccination acts as a booster.”

He says the calf won’t get as much antibody production when it is vaccinated young, but the calf will get some cell-mediated response. Thus, vaccinating calves earlier is more common all the time. Acton advises all calves get a blackleg vaccine — generally in a combination vaccine that also protects against *C. perfringens* and other clostridial diseases — by approximately two months of age.

“At about the same time we also use respiratory vaccines on these calves, such as modified live viral vaccines [IBR-BVD-PI3] in combination with bacterial pneumonia vaccine [pasteurella, hystophilus],” he explains. “This provides some protection against summer pneumonia and gives an excellent base for fall boosters at weaning time. When producers give vaccines at or before weaning, the immune response is much higher and much better and more protective.” This vaccination pays off in less sickness at weaning, especially if the calves are weaned with minimal stress.

There are intranasal respiratory vaccines that some producers use, depending on the individual operation. For herds that are winter calving, purebred herds with higher value calves or a commercial herd with a history of baby calf pneumonia, intranasal vaccines have been very helpful. He says they are easy on the calf, and because they are given intranasally, they are producing an immunoglobulin A response right where it is needed — locally, in the respiratory tract.

“We are using those in some of the winter-calving herds that are confined and show a history of risk for early respiratory disease in young calves,” he says. “We give intranasal vaccines when the calves are a day or two old.” **HW**