DCRC
DAIRY CATTLE REPRODUCTION COUNCIL

Preserve and Protect Transition Cow Immunity

Much has been researched and written about transition cow management for very good reason—it's a complicated time for cows in terms of health, nutrition and disease management. Physiological stress, ration management, metabolic challenges, infectious pathogens, grouping and movement strategies all play a role (positive or negative) during transition, and add up to create a vulnerable situation for cows and dairy managers.

Nearly all cows experience some form of immune suppression during the two to three weeks before and after calving. Typically this is in the range of a 25% to 40% decline in both neutrophil function (innate immunity) and lymphocyte function (acquired immunity).[1]

This matters because cow immune function is the cornerstone of an animal's ability to successfully navigate the transition period, and is greatly influenced by a myriad of management decisions. To this end, following are a couple of key areas to consider when it comes to preserving and protecting transition cow immunity.

NUTRITION'S INFLUENCE

The role of proper nutrition in supporting immune function cannot be overemphasized. Researchers have come to view the two as part of an integrated system, where the activity or events in one system have direct effects on the other. Nutrition impacts immune function and immune activity alters metabolism.[2]

For example, there have been several university studies documenting the effects of decreased dry matter intake on animal's immune systems, as well as its significant effect on the incidence of postpartum uterine infections, according to veterinarian Dr. Robert Corbett.

"The greater the decrease in dry matter intake, the greater the chance those animals had to develop a severe case of metritis postpartum," he says. "This is mainly due to the adverse effects that decreased dry matter intake have on the normal function of the immune system." Therefore, it's essential to monitor intakes and feeding behavior to make sure your nutrition program is on track.

Furthermore, it's also necessary to ensure that dietary micronutrients are fed at sufficient levels since researchers are learning more about their impact on cow health—like the fact that trace minerals and vitamins are important to immune function. Scientists are working to learn more about exactly what level of these nutrients maximizes immunity, but it's clear that deficiencies impair immunity.[2]

VACCINATION VACUUM

Vaccination is another key tool to help boost an animal's immune function. However, vaccination protocols and the science behind them are often misinterpreted on dairies.

"Many dairymen are under the assumption that if they vaccinate an animal for a particular disease, that animal is fully protected following the vaccination," says Corbett. But that's not necessarily the case.

A number of factors influence whether an animal has the ability to respond to the vaccine as well as its ability to respond to the disease, he cautions.

These factors include:

- **Stress.** Cortisol is a hormone that can help an animal deal with stress, but increased levels can suppress the immune system. Calving is an extremely stressful situation for the cow, as are a number of activities that take place in the transition period, like moving and regrouping, which can also increase cortisol levels. Therefore it is not a good idea to vaccinate cows at, or shortly after, calving.
- **Environmental stress.** Severe heat or cold stress also reduce an animal's ability to respond to vaccinations. Even periods when there are extreme differences between day and night temperatures can have a negative effect on vaccine performance. Therefore, avoid vaccinations during these situations. Also avoid vaccinations for a week after major pen moves to give animals time to adjust to their new environment.
- **Negative energy balance.** All cows go through negative energy balance after calving, which compromises immune function and decreases their ability to respond to an infectious disease or vaccination. Cows that lose a significant amount of body condition in early lactation due to negative energy balance will have an especially difficult time responding to a vaccine administered at that time.
- **Vaccination timing.** Some dairies have chosen to vaccinate twice annually, rather than at a specific time during a cow's lactation or dry period. This may reduce effectiveness because it fails to take into account where cows may be in their lactation.
  - If the vaccination takes place early in lactation, the cow may be immune suppressed, as discussed earlier, reducing animal response.
  - Or, if the cow is near calving, dry matter intakes are usually decreasing, also influencing immune response.
  - If the cow is in mid-lactation, she may not have as much antibody to add to her colostrum at calving, which compromises calf health.

  Avoid this vaccination practice.

MILK PRODUCTION IMPACT

As a result of these factors, veterinarians now suggest that fresh cows should receive vaccinations at least three to four weeks after calving, rather than at two weeks.

"It doesn't make sense to stress the animal with vaccinations at one of the most critical points in her lactation, when she is on her way to reaching her peak milk production," says Corbett. "Vaccinated animals will drop in milk production for several days, and may have a slight drop in dry matter intake.

"Since these cows are on their way to peaking, most people do not think that the drop in milk from vaccinating has a permanent effect on that animal since it goes back up in milk production until peak milk is reached," he adds. "Even if only one or two pounds of peak milk is lost, there would be a cost of approximately $45 to $90 of lost milk."

Work with your veterinarian and nutritionist to hone transition cow programs to minimize stress and increase cow immunity through improved nutrition and health protocols.

1 Goff JP. Transition Cow Immune Function and Interaction with Metabolic Diseases, in *Proceedings*, Tri-State Dairy Nutrition Conference, April 22-23, 2008.

2 Waldron MR. Nutritional Strategies to Enhance Immunity During the Transition Period of Dairy Cows, in *Proceedings*, Florida Ruminant Nutrition Symposium, January 30-31, 2007.