

# Use Nutrition to Boost Transition Cow Immunity and Health

The transition period and immunosuppression often go hand-in-hand. Cows are in the midst of a physiological transformation and their weakened immune system leaves them vulnerable to a variety of metabolic and infectious health disorders—like ketosis or metritis—that can reduce reproductive performance in the ensuing lactation.

Nutrition has always played a critical role during the transition period, but new research that addressed nutrition's impact on cow immunity is helping to clarify immunity's role in keeping these animals healthy.

An accelerating field of research now demonstrates that immune cells are directly involved in a surprising array of metabolic functions, explains Barry Bradford, Kansas State University associate professor of animal science.

“Nutritional strategies that control body condition in dry cows, provide adequate dietary antioxidants and use bioactive nutrients to influence inflammatory signals can help limit disease incidence during the transition period,” he adds.

## NUTRITION CONNECTION

For example, mechanisms have been discovered which link nutrients, such as saturated fatty acids, calcium, selenium, vitamin D, volatile fatty acids, ketone bodies and Omega-3 and Omega-6 Essential Fatty Acids, to altered function of immune cells.

“The vast number of bidirectional cross-links between the metabolic system and the immune system have fundamentally altered our view of physiology, especially during times of stress,” Bradford adds. Recent research in dairy cattle has highlighted the role of systemic inflammation in infectious diseases, and has suggested that inflammation is involved in metabolic diseases as well.

A key role for inflammation in numerous transition cow disorders may help to explain links between these diverse conditions, he suggests. For example, research shows that cows with milk fever are more than five times more likely to contract clinical mastitis when compared to cows without milk fever.<sup>1</sup>

On the other hand, inflammatory pathways play important roles in normal immune function, metabolism and reproduction. An improved understanding of the necessary and pathological aspects of inflammatory pathways in transition cows may improve our ability to predict and prevent transition disorders, says Bradford.

## PUT NUTRITION TO WORK

So how can you put this work on better understanding the underlying and complicated roles of inflammation and immunity to use? Go back to your nutrition program and make sure it's providing cows with the support they need to deal with these issues.

“Careful nutritional management to provide highly bioavailable nutrition and to maximize metabolic health is currently our best strategy to maximize immune function,” says Matt Waldron, University of Missouri assistant professor of animal science.

To help improve transition cow immunity through nutrition, use these recommendations from Waldron:

1. **Monitor feed intake and feeding behavior.** “There is no replacement for watching the cows to truly tell you how good your nutrition program is,” he notes. “Any significant imbalances have the potential to alter immunity.” Pay attention to how much cows actually consume and watch for changes in behavior patterns.
2. **Focus on prevention.** Prevent problems, or at least catch them early, to prevent “train wrecks.” This can happen through increased attention to detail, as well as improved management and nutritional strategies.
3. **Avoid stressors.** Overcrowding, heat stress, pen moves and other cow stressors can negate even the best nutrition program. Work to minimize these common issues.
4. **Manage for metabolic health.** Invest in and practice strategies to minimize negative energy balance and the accompanying fat mobilization and ketone body production. In addition, management of calcium metabolism to prevent hypocalcemia may have benefits beyond just the avoidance of metabolic disorders because calcium is important for intercellular metabolism and the signaling in most cell types, including the leukocytes of the immune system.
5. **Don’t skimp on micronutrients.** Short-term ramifications of marginal or even deficient micronutrient supplementation may not be noticeable. But, over time and as management stressors or immune insults accumulate, negative results will become apparent. When deficiencies catch up to the cow, the result is often increased somatic cell count, increased rates of metritis and mastitis, retained placenta, poorer reproductive efficiency, increased metabolic disorders and lowered milk production.

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“In addition to sound nutritional management, best management practices to maximize hygiene and minimize cow stressors are crucial to helping prevent infection,” Waldron says.

Adds Bradford, “The demonstrated links between the immune and metabolic systems of the dairy cow highlight the importance of viewing health problems in transition cows from a holistic perspective.”

<sup>1</sup> Waldron MR, Metabolic Implications for Transition Cow Immunity, in *Proceedings*. 2011 Four-State Dairy Nutrition and Management Conference; 22.