



NORTHWEST VETERINARY ASSOCIATES, Inc.

Stephen Wadsworth DVM
Peter Averill DVM
Jennifer Hull DVM
Tom Linden DVM
Erica Sebestyan DVM
Carter Wallinger DVM

6 FAIRFIELD HILL ROAD • ST. ALBANS, VERMONT 05478 • (802) 524-3222 • FAX (802) 524-3177 • nwwavet@comcast.net

June 2020 Newsletter

I have seen several herds in the past few months that have been battling varying degrees of ketosis in their fresh cows and heifers. I thought it might be a good idea to review this very common metabolic disease of dairy cattle, and try to shed some light on why they develop ketosis, what we can do about it, and come up with some strategies to see if it might be a problem in your herd.

Ketosis can be defined as a condition characterized by abnormally high concentrations of ketone bodies, including beta hydroxybutyric acid (BHBA). The modern dairy cow has been genetically “programmed” to have some degree of this disease, as she cannot physically eat enough calories, at least in early lactation, to meet the demands of her high milk production. Thus, she is in a state of negative energy balance for up to six to eight weeks into her lactation, until her appetite catches up with her milk production. Consequently, she burns body fat to make up the difference, and in doing so, produces ketone bodies. These ketones are then burned by the cow for energy needs. When these ketones are produced in high enough levels, their breakdown products can lead to clinical sign of this disease, including reduction in appetite, lethargy, reduced milk production, and on occasion, neurologic signs, like excessive licking and chewing, head-press, and staggering (nervous ketosis).

Ketosis can be **primary**, where the main issue is excess loss of body condition leading to excess ketones, and non-esterified fatty acids (NEFA) in the bloodstream, and **secondary**, where the ketosis is the result of another, primary, condition (usually metritis, mastitis, etc.). Primary ketosis can further be divided into two types. **Type I ketosis** is primarily caused by underfeeding, as these cows simply cannot keep up with energy demand because of some deficiency in nutritional management. It usually occurs between three and six weeks postpartum, when highest milk output occurs. **Type II ketosis** essentially is a disease in cows that develop negative energy balance and consequent fat mobilization prior to or at calving. Although overly conditioned cattle, or “fat cows” are at a higher risk for developing this type of ketosis, any cow or heifer can be affected under the right conditions. These cows develop a fatty infiltration in the liver, largely by the time calving has occurred, but does not have its effect on the cow until after freshening. A fatty liver has impaired energy-producing capacity and thus cannot convert by-products into glucose which she needs to make milk and maintain her health. Immune function is also affected. Ketosis is seen typically within the first two weeks postpartum.

A third type of ketosis seen in dairy cattle is that produced by feeding ketogenic silages. Haylage that is chopped too wet or that is low in water-soluble carbohydrates favor the growth of Clostridial bacteria species. These bacteria can ferment some carbohydrates to butyric acid instead of the desired lactic acid. Pretty much any butyric acid taken in dietarily is converted to BHBA, which causes the ketosis. Feeding these haylages to transition cows is not advised. It is important to realize that in many situations, there is overlap in the different types of ketosis and that there may be more than one type affecting a herd at any one time.

Diagnosing ketosis in an individual cow is quite simple. By now, most of you have seen one of us vets at NWVA use a Precision Extra BHBA meter to test a fresh sick cow. Any cow with a

reading of 2.8 or higher are considered clinically affected by ketosis. Urine and milk test strips can also be used, although results can be subjective. On a herd basis, the BHBA meter can be used on a minimum sample size of 12 eligible animals (say between 5 and 50 days in milk (DIM)). If three or more of the 12 tested show BHBA levels above the 1.4 reading, then a ketosis problem more than likely exists. If the affected animals are early DIM, between 3-14, then the problem is most likely a type II ketosis issue. If they are between say 3-5 weeks in milk, then type I is suspected. More animals might need to be tested if results are borderline for either type. NEFA testing can also be done on seven or more pre fresh cows to see if they are elevated. This might help to substantiate results found with BHBA testing.

As far as treatment goes, there are several options and variations that focus on replacing the glucose precursors that the cow with ketosis requires. It is best to consult your herd health veterinarian for details!

Prevention is by far the best approach when it comes to ketosis. The key to preventing type I ketosis is to maximize energy intake in early lactation. Work with your herd nutritionist to be sure diets are correctly balanced for fiber, soluble carbohydrates, and protein. Dr. Garrett Oetzel, from the University of Wisconsin, feels that problems start when post-fresh NEL is less than about .76 Mcal/lb in combination with crude protein above about 19%. Neither factor by itself causes problems, but the combination can. The main problem with high crude protein content is the energy required to detoxify the extra ammonia that is absorbed from the rumen. This leaves the cow with less available energy for her reduced body condition loss. Fat supplementation is not advised as it tends to decrease dry matter intake and can flood the liver with more of the fatty acids that it is already struggling to breakdown. Provide energy from grain sources which then ultimately lead to the production of much needed glucose. Overstocking and reduced feed bunk space can also contribute to insufficient energy intake in early lactation (one stall and 30" bunk space per animal).

Type II ketosis is a much greater challenge to deal with. Maintaining positive energy balance up to the time of calving can be difficult, since dry matter intake is naturally depressed for about the five days prior to parturition. Nutrient densities for pre-fresh groups have to be set with the lowest expected dry matter intakes (i.e., just prior to calving) in mind. Formulating pre-fresh diets for the average intake of the group will result in negative energy balance in those cows approaching calving. Pre fresh management factors that impact dry matter intake are critical to get right to prevent type II ketosis. Things like overstocking, inadequate bunk space, dirty environment, frequent disruptions by adding new cows to the pen too often, and frequent pen moves can stress a close-up cow and reduce her dry matter intake, negatively affecting her energy balance. Comfortable stalls and keeping cows cool during the warm weather months are important as well. Body condition management is also critical, as cows with condition scores greater than 3.75 are at much higher risk for this disease development. Cows having troubles getting pregnant frequently end up in this category and may best be culled prior to drying off.

If your fresh cows seem to be getting off to sluggish starts, talk to your herd health vet about doing a ketosis work-up to see if see if that may be a problem in your herd.