

The Who, What, When, Where, Why And How Of Ketosis In Dairy Cows



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What is ketosis?

Cows with ketosis are suffering from low blood sugar at the cellular level. When a cow's body senses that it is low on blood sugar (glucose or energy), the liver breaks down body fat to form non-esterified fatty acids (NEFAs) as an alternative energy source. NEFA's are further broken down by the liver to create ketone bodies. Ketosis is the build-up of these ketone bodies in the blood stream.

Who is at the greatest risk of developing ketosis?

Cows experiencing a compromised dry or transition period are at higher risk of developing ketosis. There are five categories of dairy cows that that can be deemed "high risk".



They are cows that:

1. Either gained or lost body condition during the dry period
2. Were lame at any point in the dry period or transition period, even if the lameness was successfully resolved prior to calving
3. Calved with twins
4. Have a retained placenta
5. Freshened in with milk fever

When are cows most likely to develop ketosis?

The majority of ketosis cases (93% to be precise¹) occur between 5 and 30 days in milk. Many cases of ketosis are subclinical, meaning that the cow does not look outwardly sick (off feed, depressed production, lethargic, etc.) but is suffering from ketosis. Research from the University of Wisconsin-Madison predicts that 40-45% of dairy cows develop ketosis within the first 30 days of milk². The majority of ketosis cases are subclinical and are undiagnosed by the producers, leading to milk production suppression and poor reproduction. One case of subclinical ketosis can result in a net profit loss of \$330².






Why do cows develop ketosis?

Cows develop ketosis as a result of either 1) a carbohydrate deficiency or 2) inadequate carbohydrate metabolism. Some producers comment, "My cows have ketosis, my ration must need more energy." NO! Cows can be on a perfectly formulated ration and still develop ketosis. The ration is fine, the cows need to EAT MORE of the ration to increase their daily energy intake through an increased dry matter intake (DMI).

Most cows develop ketosis because their DMI is suppressed as a result of overcrowding, poor bunk management, inadequate feed volume and empty bunk syndrome, lameness, etc. DMI suppression leads to a functional carbohydrate deficiency. If your herd is struggling with excessive ketosis levels don't ask for more energy in the ration...ask how to get your cows to eat more total dry matter.

The liver of a cow converts the energy derived

KETOSIS DETECTION TOOLS

					
	KetoCheck Powder	Keto Stix Urine Strips	Keto-Test Strips	PortaBHB Ketone Milk Strips	Precision Xtra Blood Meter
SAMPLE	Fresh Milk*	Urine	Fresh Milk	Fresh Milk	Blood
SIZE	20 or 50 grams	100 strips	20 strips	25 or 100 strips	10 strips
COST PER BOTTLE	\$10 - \$20	\$35	\$50	\$45 - \$110	\$30
COST PER TEST	\$1.00	\$0.35	\$2.50	\$1.80	\$2.50 per strip*
ACCURACY	33% (-)	80% (++)	84% (++)	Unkown	94% (+++)
RESULT DISPLAY	Color Change	Color Change	Color Change	Color Change	Digital Reading (1.2 and above = ketosis)
EASE OF USE	Easy, just need milk	Moderate, need urine	Easy, just need milk	Easy, just need milk	Moderate, need blood
ADDITIONAL INFO	*Can also be used with urine or plasma	Dr. Ryan's Top Pick for accuracy, economy and ease of use	Strips require refrigeration		Meter costs an additional \$40 to buy
					*Test strips may be subject to backorder

from their feed into blood glucose which the cow uses to maintain body functions. If a cow gains or loses body condition during the dry period her liver will become impacted, making it inefficient at creating blood glucose. The cow may be eating a well balanced ration and have appropriate DMI, but the liver cannot efficiently create blood glucose from the feedstuffs due to its fat impaction. Fatty liver leads to inadequate carbohydrate metabolism and subsequent ketosis.

How do I test for ketosis?

The first step in stopping the profit loss associated with ketosis is FINDING THE COWS THAT HAVE

KETOSIS! Remember, many cases are subclinical and the cows may not look outwardly sick. There are five different ketosis detection tools you can use on your farm. Each ketosis screening test has its own set of pros and cons. The decision about which screening test to use should be critically evaluated. The chart above compares each ketosis detection method. Pay particular attention to accuracy and cost per test when comparing the different products.

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Do not rely on your ability to smell ketone bodies on a cow's breath. By the time a producer can smell ketosis on a cow's breath, she is severely ketotic. Use the screening tools in the chart provided to find the cows with subclinical ketosis and treat them promptly.

Where do I treat? In the vein or orally?

Research has proven that oral energy treatment has numerous benefits over IV glucose. The Crystal Creek® ketosis protocol is a total daily dose of 10 oz of Cow Quench™ and 4 Super Boost™ boluses. That treatment can be halved and given once in the morning and once in the evening or can be given all at once. Research evaluating smaller doses of oral energy (like Cow Quench™) twice a day vs larger doses once daily showed no difference in recovery rates. Once vs twice daily treatments is a matter of producer preference as they are equally effective. Treatment should continue until the ketosis is resolved by a negative screening test (listed in the chart provided).

Oral energy supplementation is preferred over IV because it raises the blood glucose levels more gently over time and is less likely to lead to a blood glucose spike and subsequent "crash" afterwards.

If IV dextrose is used, use only 250 ml (half a bottle) once a day. Using more than 250 ml will rapidly spike the blood glucose levels and invoke a compensatory

mechanism to rapidly decrease the blood sugar levels within 12 hours. Rapidly raising blood glucose levels from excessive IV dextrose will cause the satiety center of the brain, the part responsible for causing cows to eat, to shut down and will lead to decreased dry matter intake; further exacerbating the ketosis. Cows exhibiting clinical signs of nervous ketosis should be treated with 250 ml of dextrose IV.

In conclusion, ketosis is a costly and prevalent disease in the dairy industry. Screening for and treating ketosis will keep your cows healthier and help make them more profitable. For additional information regarding ketosis, check out the Crystal Creek® website at www.crystalcreeknatural.com under the ARTICLES tab on the top, right-hand side. There you will find an online library of our newsletters. Read Teresa Hanson's April 2013 article "The Cost of Two Five Gallon Pails: \$8; Their Impact on Herd Health and Profitability: Priceless" for information on preventing ketosis on a herd wide level.

The Crystal Creek® staff is knowledgeable on implementing ketosis monitoring and treatment strategies. Feel free to call and discuss ketosis in greater detail. We can help you to explore how the information in this article can be applied on your dairy to reduce the profit loss associated with subclinical ketosis.

¹ University of Wisconsin- School of Veterinary Medicine's Food Animal Production Course Notes

² K.G. Gohary, et al. Economic considerations for subclinical ketosis in lactating dairy cattle. 46th annual American Association of Bovine Practitioners proceedings.

