

Silent Cow, Silent Costs – Subclinical Ketosis

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Ketosis and subclinical ketosis are common metabolic diseases in dairy cattle. It can affect your herd's performance by lowering milk production, decreasing reproductive success, and increasing the risk of other diseases and culling. Ketosis occurs when a cow cannot consume enough energy to meet the demands of early lactation right after calving resulting in a negative energy balance. Ketosis is associated with an increased presence of ketone bodies in the blood (acetoacetate, beta hydroxybutyrate (BHB), and acetone) caused by metabolism of fat stores to meet energy demands.

Clinical signs of ketosis include a drop in body condition score, appetite loss, decreased milk production, and acetone smell on the breath or in milk. These signs are not always present as most cows experience subclinical ketosis and show no signs or symptoms – generally going unnoticed as having a problem. Even though the period of highest risk is the first few weeks of lactation, ketosis and subclinical ketosis management begins before early lactation in the dry period when the cow is laying her energy stores.

Due to the lack of signs or symptoms for subclinical ketosis, blood and milk tests are used as diagnostic tools to detect ketone bodies concentration in circulation. Increased ketone body concentration in blood and milk correlates with the occurrence of subclinical ketosis. The volatile nature of acetone and acetoacetate make them unreliable as a cow side test. BHBA on the other hand is more stable and is detectable in urine, milk, and blood. Cow side tests have been available for years; such as the hand held meter Precision Xtra, to help to determine which cows may need intervention to ward off metabolic issues in early lactation. However, this does not provide information on herd level risk of ketosis or subclinical ketosis.

Ketoscreen is a new milk test offered by CanWest DHI to screen your herd for ketosis and subclinical ketosis during early lactation. It can be used as a tool to assess your herd management through the transition period. Having baseline levels of ketosis risk

on your farm will help you assess the effectiveness of your dry cow and early lactation management and will help you determine if changes in this area are needed. The test works by near infrared detection of beta hydroxybutyrate (BHB) in milk samples specific to the susceptible period – DIM 5-21 and DIM 22-42. The test can be included in the regularly collected milk samples. The report will give you the percentage of cows that have elevated BHB concentration for that month as well as in 3-month increments, in order to help assess how your percentage of positive cows has changed over time. Caution should be taken when interpreting results from small herds as the number of cows in the susceptible period maybe low.

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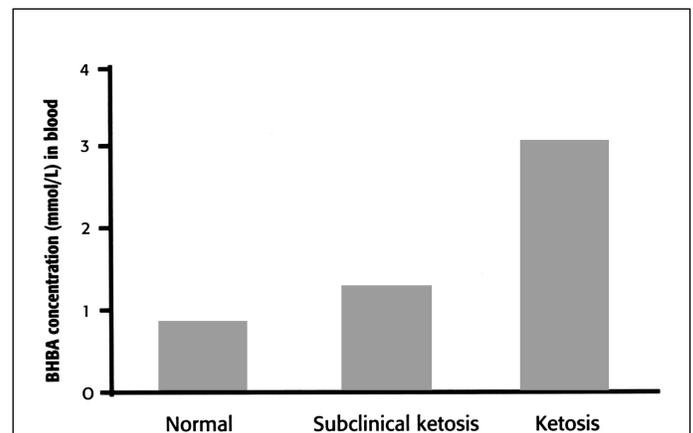


Figure 1 shows BHBA concentration in blood of a normal, subclinical ketotic, and a ketotic cow.

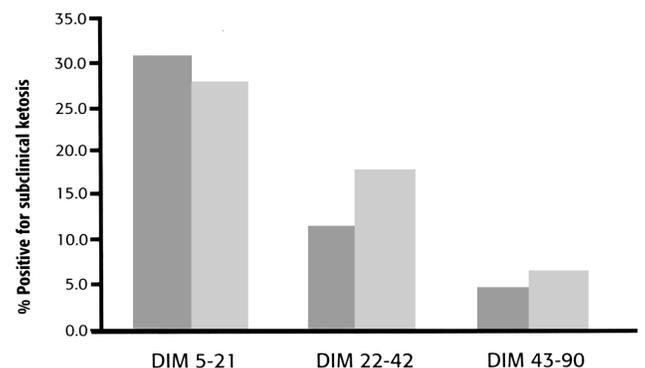


Figure 2 shows the percent of positive cows for subclinical ketosis with a BHB cut-off of 0.15mmol/L determined their lab's milk test, Ketolab.

■ Ontario June 2014 - Sept 2014
■ Quebec Oct. 2011 - May 2014

Recently, Valacta monitored the prevalence for subclinical ketosis from October 2011 – May 2014 hoping to tease out key risk factors for this metabolic disease. This dataset had over 347,000 test day samples from 4,258 dairy herds in Quebec.

The results showed that 27.6% of cows sampled had elevated BHB (>0.15mmol/L) when sampled 5-21 DIM. This percentage of positive cows dropped to 17.6% the further into lactation (22-42 DIM). By 43+ DIM, this percentage drops to approximately 5%. Overall, this shows that cows are most susceptible to ketosis in the early lactation, therefore interventions and prevention would be most effective before or during this time.

Over the past 3 months, CanWest DHI has been monitoring herd level prevalence of subclinical ketosis in dairy herds in Ontario (43,321 milk samples in the 5-42 DIM period) based on the same cut off 0.15 mmol/L BHB. Herd level prevalence of subclinical ketosis was 30.5% in early lactation (5-21DIM). Similar to the Quebec data, this prevalence then dropped to 14.7% at 22-42 DIM. This similarity of herd level prevalence also carried into 43+DIM with a 4% prevalence. As time goes on herd level testing (CanWest DHI Ketoscreen) will help evaluate risk factors for ketosis in Ontario, for example month of calving, breed, parity and management. This data will help develop new protocols to help decrease the effect of subclinical ketosis through prevention and intervention.

Risk Factors for Subclinical Ketosis

A study by Santschi, et al. investigating risk factors for subclinical ketosis based on the Valacta data was recently presented at American Dairy Science Association 2014 meeting. The researchers showed that parity, breed, and month of calving all have an effect on ketosis prevalence.

- Month of calving: Ketosis prevalence are not consistent from month to month – Highest: May-June and October-November Lowest: August –September
- Breed: Jersey had the highest prevalence of ketosis (34.6%), Holstein (24.7%), Ayrshire (24.4%), and Brown Swiss (22.7%)
- Parity: Primiparous cows were more susceptible to ketosis in first week after calving (33.7%) while higher parity cows had more incidences three weeks after calving (33.5%)

Impacts of Subclinical Ketosis

A recent review by G.R. Oetzel, a researcher from University of Wisconsin, highlighted the effects of subclinical ketosis on your dairy herd and your bottom line. In summary, subclinical ketosis decreases milk yield by 3-7%, increases chance of displace abomasum (2-19x), increases metritis by 3.4 fold, and decreases the likelihood of conception at first service (0.7x). Overall, these negative impacts influence your bottom line with less milk in the bulk tank, difficulties in reproduction, and increased culling rates. In a paper released in 2000, Duffield estimated the cost of subclinical ketosis to be \$50-100 CAD per case. Fourteen years later, the cost per case of subclinical ketosis has surely increased. Oetzel states that treatment with propylene glycol decreased these negative impacts of subclinical ketosis. Work with your advisor team to interpret your results and establish a good monitoring, prevention, and treatment program that suits your herd.

Surprisingly, subclinical ketosis and ketosis have a relatively high prevalence on Ontario dairy herds. The only way to decrease this prevalence is to monitor what we cannot see. BHBA or BHB testing gives us a means of evaluating how cows are faring in early lactation. Cow side tests, such as Precision Xtra, and CanWest DHI milk test, Ketoscreen, are complementary to one another. Ketoscreen is set to launch in December. Individual testing is important for determining what cows need treatment while herd screening allows assessment of dry cow and early lactation management. As the saying goes, we cannot manage what we do not measure.

Literature cited:

Duffield, T. 2000. Subclinical ketosis in lactating dairy cattle. *Vet. Clin. North Am. Food Anim. Pract.* 16:231-253.

Santschi, D.E., Moore, R.K., and D.M., Lefebvre. Prevalence of subclinical ketosis detected by near infra-red analysis of BHB in DHI milk samples. Abstract 1779 presented at American Dairy Science Association Meeting. Kansas City, MO. July 20-24 2014.

Oetzel, G.R. Understanding the Impact of Subclinical Ketosis. 24th Florida Ruminant Nutrition Symposium. February 5-6, 2013.