

Screening for ketosis in dairy herds: a new option for routine milk testing

By Richard Mills, rim@foss.dk



Ketosis in dairy herds can reduce yield by over 500 kilos of milk per cow per year while also having an adverse effect on reproduction and welfare for the individual cows. A new screening system can help milk testing centres to provide an early warning of ketosis in dairy herds and has just gone on trial as a new service to farmers in the Netherlands.

The sky is the limit it seems when it comes to discovering new things from a sample of raw milk.

Beyond the normal tests for fat, protein and bacteria count, the sophisticated infrared technology behind modern milk testing equipment can reveal many other valuable data. Options include testing casein content for cheese production, fatty acid profiling for a healthier balance of saturated and unsaturated fats, screening for possible adulteration of the milk, and now - the latest weapon in the dairy improvement armory – screening for signs of ketosis.

Ketosis occurs in dairy cattle when energy output for milk production is too high relative to energy input from feed and uptake from fat deposits. Sub-clinical ketosis occurs when too little feed (or too low energy concentration in feed) is offered to the cow.

Clinical ketosis occurs if the cow stops eating due to acidosis or other diseases while still producing milk.

In both cases, energy uptake from fat deposits is too high, as is the conversion of fat to glucose in the liver. As a result, acetone and beta hydroxy butyrate (BHB) are excreted as residues.

Caught on the FTIR radar

An indication of levels of the acetone and BHB residues can be provided by the Fourier Transform Infrared (FTIR) technology used in analytical instruments such as the MilkoScan FT+ Analyser and, in response to requests from dairy herd improvement associations, FOSS has developed a calibration for the analyser that allows routine screening for ketosis as part of routine milk testing.

The idea is to provide an indication of possible

ketosis allowing the milk testing centre to single out suspect samples for further investigation. The result of the analyses is therefore not provided as a specific measurement, but as a warning that a cow is at risk.

Laboratories using the system can give the herd manager a monthly screening of his early lactation cows for ketosis, and individual cows can be pointed out for treatment. As ketosis can often be a herd problem, a single alert gives the herd manager a timely warning to examine all early lactation cows for problems and to take proactive action as necessary.

Laboratories already measuring acetone using wet chemistry methods can also save resources by limiting the number of samples to those identified by the MilkoScan.

A new service for dairy farmers

Two independent datasets, each consisting of around 800 samples, have been used to validate the calibration. These have been mainly collected among early lactation cows. The system has been tested by a number of laboratories and has shown that results are reliable enough to offer the test as a screening option.

The first to offer this service is the Qlip laboratory in the Netherlands, which launched a trial screen-

Performance comparison of MilkoScan FT+ against reference method.

Reference method: Autoanalyser, JoDS 90:1761-1766:

Acetone, r: 0.06 mmol/L up to 1.5 mmol/L

BHB, r: 0.03 mmol/L up to 0.6 mmol/L

Milkoscan performance:

Acetone, r: 0.020 mmol/L

SEP 0.15 up to 1.5 mmol/L
(SEPCor 0.07 up to 1.5 mmol/L)

BHB, r: 0.020 mmol/L

SEP 0.10 up to 0.6 mmol/L
(SEPCor 0.07 up to 0.6)

More information

Laboratories wishing to try the screening option can contact their local FOSS representative for assistance.

Further reading about screening with FTIR:

J. Dairy Sci. 90:1761–1766, 2007.

Screening for Subclinical Ketosis in Dairy Cattle by Fourier Transform Infrared Spectrometry
A. P. W. de Roos, H. J. C. M. van den Bijgaart, J. Hørlyk and G. de Jong.

ing option for farmers on 1st March 2011. This consists of screening of all samples, selection and collection of 'suspect' samples and confirmatory testing with AutoAnalyzer equipment. There is no reporting of figures, just a risk indication for individual cows and the herd.

Operations Manager, Harrie van den Bijgaart explains the screening principle: "It doesn't have to

be perfect in order to be of value. Every signalled cow/herd is a 'win' without additional effort for dairy farmers, and at a limited cost," he says.

The new screening option can also have an impact on a broader level. As the dairy industry strives for efficient and sustainable output, every cow grazing on the global pasture must deliver its best.

 [Learn more MilkoScan™ FT+](#)

The effects of ketosis

Metabolic disorders such as ketosis cause economic losses through losses in milk production and reduced reproductive performance of dairy cattle.

According to researchers, subclinical and clinical ketosis is a major problem in modern dairy herds. A prevalence of 7 to 32% has been reported worldwide.

Further reading:

Interaction between Clinical Mastitis, Other Diseases and Reproductive Performance in Dairy Cows
Amin Ahmadzadeh, Mark A. McGuire, Joseph C. Dalton
Animal and Veterinary Science Department, University of Idaho, Moscow, ID 83844-2330 WCDS
Advances in Dairy Technology (2010).

FOSS study

In connection with the Herd Navigator on-farm monitoring system, FOSS has tracked the effect of ketosis across seven farms in Denmark.

A total of 1,362 cows were monitored. Ketosis incidence percentage varied from 3.8 to 38.5% (average 25.7%). A profit protection figure of euro 70.5 per cow, per year, can be calculated. This is based on a milk price of euro 0.34, a value of not culling the cow of euro 48.00, and a treatment cost of euro 50 for clinical ketosis and euro 15 for subclinical.