

Valacta
Dairy Production Centre of Expertise
Quebec-Atlantic

*Dairy knowledge
at your fingertips*

valacta

The life story of a milk sample

From farm to laboratory, here's what happens to samples once they leave your dairy...

Have you ever wondered what happens to those little bottles filled with your cows' milk after they leave the farm? Once they're in the lab, how are they processed? What types of technology are used to analyze them? Let us tell you the life story of your milk samples, from the farm to the laboratory.

Your milk analysis laboratory

The laboratory in your centre of expertise has six testing lines, each consisting of an infrared milk composition analyzer and a somatic cell counter. Milk recording and milk payment samples are analyzed with the same instruments.

There is one difference however: milk recording samples contain a preservative, bronopol, (which gives them their characteristic pinkish orange colour) so they can be stored at room temperature. Milk recording samples are sent by regular parcel delivery.

Because samples for payment are not preserved, the cold chain must be maintained from the time the samples are collected by an expert milk tester until the time they are analyzed. Refrigerated trucks are therefore used to transport these samples from the dairy plants to the laboratory.

Taking into account technicians, supervisors and sample receipt staff, about 20 employees work ten shifts, including one on Saturday, to run the whole analysis process.

Managing all of the laboratory activities is quite a challenge, both logistically and analytically, since the samples must all be analyzed within 24 hours of receipt in Ste-Anne-de-Bellevue.

The forefront of technology

To quantify milk components, Valacta uses cutting-edge Fourier transform infrared analyzers. The advantages of this instrument are its remarkably high sensitivity, resolution and data acquisition speed. We're talking about an analysis rate of up to 600 samples per hour!

Another important advantage of these analyzers is that they save data for an entire spectral range of each component measured, making it possible to develop specific applications for laboratory purposes. Thanks to the introduction of these new analyzers in the laboratory, Valacta is one of the first laboratories in the world to offer analyses of ketone bodies in milk to detect ketosis problems in herds.



The milk sample is collected at the farm and is placed in a 40ml test tube, identified by a unique bar code that includes the herd number and the cow number. It is then sent by DICOM to the Valacta laboratory in Sainte-Anne-de-Bellevue.

The development of infrared technology also makes it possible to measure a wider array of milk constituents, such as fatty acids, casein and freezing point.

opened extensively in the future, making it possible to provide producers with more information and advice based on a single sample collected on the farm.

absorbed are proportional to the contents of the different components. For example, the hydrocarbon (C-H) groups that make up the fatty acid chains are used to determine the fat content of milk.

MANY OTHER DAIRY HERD IMPROVEMENT LABORATORIES AND PROCESSORS IN CANADA AS WELL AS ELSEWHERE IN THE WORLD BUY THE CALIBRATION SAMPLES PRODUCED AND ANALYZED BY THE VALACTA LABORATORY.

European processors offer incentives to producers who adjust the feeding of their herds to produce milk with a higher level of unsaturated fatty acids. Infrared measurements of unsaturated fatty acids can be used to adjust milk payments accordingly and certify milk composition for consumers. This whole analytical side will no doubt continue to be devel-

How does infrared work?

The principle of the infrared analyzer is based on the fact that each molecule has specific functional groups, which form a characteristic "fingerprint" of each component. Each functional group absorbs radiation when exposed to a light source. The amounts of infrared energy

Calibration: what's the purpose?

Infrared analysis is considered to be an indirect method because milk composition is determined from the relationship that exists between the concentration of a milk component and the amount of infrared light it absorbs. The analytical instruments need to be calibrated in order to define this relationship.

To do that, a set of a dozen calibration samples is used; the samples are prepared to obtain the widest possible composition span. The composition of these

samples is determined using a so-called direct method, i.e., chemical means¹.

The calibration samples are then presented to the instrument to establish the infrared light reflection profile and pair the real chemical composition values to it. Through the magic of electronic data processing, the instrument will then be able to accurately predict the chemical composition of other samples, by comparing their infrared reflection profile to those of the samples used to calibrate the instrument.

The instruments are calibrated once a week. As well, a control sample (whose composition has been determined beforehand by direct methods) is inserted among the samples every fifteen minutes to ensure the instrument is working properly. If the result deviates from the range of acceptable values, the analyzer is stopped and checks and adjustments are carried out as required.

Many hundreds of samples must be analyzed by the reference method in order to calibrate the instrument for a new component. To elaborate the calibration for Ketolab, the analysis of ketone bodies, for example, Valacta analyzed close to 2000 samples, as did a collaborating European laboratory, to obtain a reliable prediction of the beta-hydroxybutyrate content.

Valacta is the only supplier of calibration samples accredited by the Canadian Milk Supply Management Committee (CMSMC) for all the Canadian laboratories conducting milk testing for milk payment. Many other dairy herd improvement laboratories and processors in Canada as well as elsewhere in the world buy the calibration samples produced and analyzed by the Valacta laboratory.

Quality control

The analyses carried out are subjected to strict quality control measures to ensure the highest level of reliability. Valacta's laboratories are accredited to ISO 17025 standards by the Standards Council of Canada, the highest level of accreditation possible for a laboratory. Accordingly, the laboratories are submitted to regular checks throughout the year by an external agency to verify the performance of each analyzer used by Valacta.

¹ The chemical methods used by Valacta's calibration laboratory are ether extraction (Mojonnier) for fat, Kjeldahl nitrogen determination for protein and high performance liquid chromatography (HPLC) for lactose.

The figures tell their own story!

Valacta is one of the largest central milk analysis laboratories in North America.

2,600,000 milk samples are analyzed every year by Valacta as part of the milk recording program.

300,000 milk samples are also analyzed every year by Valacta for milk payment purposes.

2,000 milk samples can be analyzed for all components simultaneously in one work shift with the infrared analyzer.

Only **12** samples are analyzed by the direct methods of the reference laboratory... for a single component.