



# Welcome to the automated laboratory

*Automated operations help a leading milk testing laboratory to keep step with evolving demands while providing a more flexible service for farmers and dairies.*

If only our own transport system could run as well as the one used to transport samples around the Qlip central milk testing (CMT) laboratory at Zutphen in the Netherlands.

Throughout the laboratory there are conveyor belts ferrying milk samples to and from analysis instruments. Rows of plastic vials are lined up like soldiers on parade, marching neatly towards the waiting analysers that are capable of handling hundreds of samples per hour.

The ultra efficient system allows the

laboratory to handle around 9000 samples per day in the payment testing laboratory and 40,000 to 60,000 samples per day in the dairy herd improvement (DHI) testing laboratory. The analysis results are provided by a fleet of FOSS analysers fitted with robot pipette systems for automatic transfer of the milk. The analysers consist of fourteen CombiFoss™ instruments for compositional and somatic cell count analysis; four stand-alone MilkoScans™ and an additional three BactoScan™ analysers for bacterial count in the payment line.

## Flexibility by design

The setup is about more than just processing lots of samples though. “The system provides flexibility down to the individual sample,” says Operations Manager Harrie van den Bijgaart.

Key to this flexibility is a system based on radio frequency identification (RFID), which keeps track of what is to be measured and where. The main element is intelligent sample identification based on

programmed chips containing all relevant sample data, plus the shopping list of required tests.

Payment samples have an individual chip attached to the bottom of the sample vial. GPS identification of the collection vehicle location automatically links farm data and any farmers’ individual demands to the sample bottle. Upon registration in the lab, the analysis plan is written into the chip. This allows automatic gates to control the flow of the vials around the lab to the relevant analysis instruments. After analysis has been completed, the chips are automatically removed and reused and the plastic vials sent for recycling.

Herd improvement samples have a slightly different system based on a vial carrier that contains a chip at one end. If a farmer requires a particular herd improvement parameter, this can be recorded in the RFID chip in the vial carrier for appropriate handling back at the laboratory.

The automated systems have been several years in the making under the project leadership of Hans van Hemert,





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the present Head of Automation and Logistics in Qlip and the whole project was started in response to evolving demands for milk testing.

### From standard tests to management information

One aspect of the business is the ongoing rationalisation in dairy farming. Recent years have seen a four percent per year fall in number of dairy farms in the Netherlands accompanied by a growth in size of remaining farms. The Qlip laboratory currently handles milk from 19,500 farms – a number that is expected to decrease by four percent over the next few years.

Larger collection trucks and 24-hour collection are aspects of modern testing with dairies receiving milk around the clock. In response, the laboratory needs to get the samples tested quickly and get the results back even faster. Likewise, the internet is the main form of communication with farmers keen to get information that will help them to meet the demands of the dairy producers and to optimise their own production.

Changes in Dutch milk payment regulations have provided a high degree of freedom beyond standard tests for obligatory bacteria twice a month and a somatic cell count once a month. This has helped to meet more diverse demands from individual dairies which, in turn, can be accommodated by a more flexible testing service, for example, if a dairy is focussed on cheese production and requires more frequent testing for butyric acid spores.

Testing schemes can also vary according to trends in analysis results. For instance, this has resulted in an agreement with a dairy producer to vary testing according to results. If the bacteria count

starts rising above a certain level, then testing on subsequent samples continues until the level comes under the threshold again.

New or non-standard tests must also be available. Belgian dairies using Dutch milk require Coli tests for payment purposes. Furthermore, the advent of automated milking systems has renewed interest in the testing of free fatty acids (FFA). Testing with analysers based on Fourier Transform Infrared technology (FTIR) provides sufficiently accurate results to serve as valuable management information. The farmer can see the trends and take action if necessary. While for payment, a monthly average can be used to smooth any variations in results.

From 2010, all Dutch dairy farmers will be paid based on monthly averaged free fatty acid content as measured by infrared technology.

### Service through efficiency

With so many changes going on in the milk testing world, the state-of-the-art testing system puts the laboratory in a good position to take on new challenges. Whether it involves replacing glass bottles with plastic vials or barcodes with RFID, the whole milk testing process has been streamlined from sample collection to result delivery. Automation and innovative use of technology allows more testing at less cost and the whole system is highly robust for improved traceability, with little opportunity for error.

One new opportunity being investigated at Qlip is the ability to screen milk for abnormalities caused either by the deliberate adulteration of the supply or by accidents, for example if different types of milk are mixed. While the investiga-

tion of this new option continues, another relatively new test for the unsaturated fatty acid content of milk is already in use. The parameter is used for payment to 400 farmers involved in a scheme to provide milk with a desired fatty acid profile, subsequently used in products containing higher levels of healthier omega-3 and CLA fatty acids. The test is performed simultaneously with the regular tests and therefore requires very little in operational terms for the laboratory.

Despite the fact that central milk testing has been contributing to the quality of dairy products for decades, laboratories still have the opportunity to provide new and valuable services, as van den Bijgaart says: "Milk still holds hidden treasures."

by Richard Mills (*rim@foss.dk*), FOSS

### Qlip

Qlip is an independent service provider for the dairy sector.

Two laboratories at sites in Leusden and Zutphen carry out a wide range of routine-based and specialised analyses including the composition and quality of ex-farm milk for milk payment purposes, as well as the composition and quality of dairy products. The laboratory also assesses and certifies the production process on the dairy farm, the transport of ex-farm milk and dairy processing operations. Under contract to dairy herd improvement organisations, Qlip analyses milk samples from individual animals.

[www.qlip.nl](http://www.qlip.nl)