# Logistics of the milk sample –
# Data and milk, with focus on additional services on recording samples

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An automated logistics system makes it possible to offer a larger number of different analyzes in addition to the traditional milk recording. A more automated logistic system in milk recording requires that all stages from sampling to analysis and the final test results is discussed with a focus on practical solutions with a minimum of manual work.

## Introduction

Milk recording has traditionally focused on the measurement of milk volume, analyze for fat percentage, protein percentage and cell count. In recent years, there are new tests which options things being equal, increases the need for the handling of the milk samples.
Herd size has also over the last 10 years has grown at a rapid speed in Denmark. Dairy herds are bigger, and the proportion of cows milking with automatic milking is 25 percent.

Table 1. Size of herds in milk recording in Denmark from 2001 to 2011

| | Number of herds | Number of cows. | Average number of cow pr. herd. |
|---|---|---|---|
| 2001 | 7.664 | 559.383 | 73 |
| 2002 | 6.998 | 548.025 | 78 |
| 2003 | 6.496 | 545.504 | 84 |
| 2004 | 5.797 | 521.781 | 90 |
| 2005 | 5.188 | 508.236 | 98 |
| 2006 | 4.708 | 506.084 | 107 |
| 2007 | 4.284 | 496.770 | 116 |
| 2008 | 4.004 | 506.723 | 127 |
| 2009 | 3.816 | 516.441 | 135 |
| 2010 | 3.655 | 521.576 | 143 |
| 2011 | 3.484 | 516.958 | 148 |

## The goal is a broader service and higher value.

The larger herds and the entire technique around milking, has increased the requirement for establishing a more automated logistic system in milk recording.
The aim of the introduction of more automation has been:

- Secure connection between cow and sample.
- Sampling must interfere with milking as little as possible.
- The risk of error must be minimized.
- The sample must be handled with as little labor as possible.
- Development of multiple services offered to each herd.
- Increased value of milk recording.

## All samples of bar code ensuring coherence between the cow and sample.

All milk samples are passed to disposable barcode vials.
Bar code system is selected to ensure clear connection between milk sample and cow num-

bers. The bar code has been selected, rather than a solution with a chip. This is partly a price calculation but also that we have chosen to use disposable vials.
There are used annually almost 6 million disposable vials as applied to a bar code label. The process is automated and takes place in connection with the central milk laboratory (Eurofins)

## Automation in milk recording.

All relevant information about each herd is read out from the central cattle database to the technician's handheld data handler. During milking the cow number is associated with the barcode via the data handler. For all known milking systems we have been developed small software solutions which make it possible to avoid the use of paper or manual solutions. After milking, the data is sent to the central laboratory. Parallel to this, the physical sample is transported overnight, and arrives not later than 6 the following morning.

Table 2. Number of different milking systems and average herd size I Denmark

| | Number of herds | Percent | Number of cows | Percent | Average number of cow pr. herd |
|---|---|---|---|---|---|
| AMS/VMS | 801 | 23% | 139.579 | 27% | 175 |
| Tie stall | 767 | 22% | 41.357 | 8% | 55 |
| Rotary | 139 | 4% | 46.526 | 9% | 284 |
| Side-by-Side | 209 | 6% | 46.526 | 9% | 250 |
| Herringbone | 1.533 | 44% | 242.970 | 47% | 160 |
| Tandem | 35 | 1% | 5.170 | 1% | 148 |

## Additional services for veterinary samples.

In addition to standard milk recording, the individual farmer can identify groups of cows or one particular cow to test for additional services.
The designation may take place at his personal computer or by automatic designation according to a set of criteria for example, previous test results or parity, etc.
There is offered additional analyzes for:

- Johne’s desease.
- Salmonella Dublin.
- PCR Method of 15 different types of bacteria.

After the introduction to the additional services of veterinary samples, the number of additional analyzes has shown a considerable growth.

Table 3. Number of different samples 2011 and 2010 in DK

| | 2011 | 2010 |
|---|---|---|
| Fat, protein, and cell count. | 5.537.006 | 5.615.877 |
| Johne’s deasease | 575.258 | 596.979 |
| Salmonella Dublin | 57.153 | 66.638 |
| PCR | 35.947 | 4.390 |
| Herd´s with additional services | 1624 | 1.428 |

## Handling of samples, in the laboratory.

At the laboratory is the bar code at the heart of the entire sample handling.
All samples pass through an ILAS robot, and in all samples are analyzed for fat, protein, and cells in a Combi Foss. Barcode reading in the ILAS robot determines whether the sample should be send for additional analyzes. If there has been a “chosen cow” for example. PCR analysis of a cow in a rack, the entire rack of 60 tests will be delivered to a pick and place robot after the 60 samples analyzed in the Combi Foss. In the Pic and Place robot it is determined which sample to be send forwarded to additional analyzes.

## Results are continuously shown on the farmers own computer, depending on the analytical method.

All test results are transferred from the central laboratory to the central cattle database
Test results with standard results will after 1-2 days after the test day be available at the farmer's computer. Additional animal tests have a longer response time depending on individual analytical method. As an example, an answer of a sample of Johne's desease, typically take 10 days. When there is an answer receives the individual farmer, an SMS about the existence of an analytical result for the selected samples. One can through the farmers own computer choose different types of prints, with the selected test results presented.

## Summary

Increased automation of milk recording gives the opportunity to create new services.
In Denmark the number of additional services increased significantly after the introduction of a more automated milk recording system based on disposable vials with barcode labels.
Going forward, the system will provide the opportunity to offer several additional analyzes as they become interesting for the industry. It can be samples to combat various diseases, but also documentation in step with consumer's desire for more information on milk ingredients.