

Application of RFID in central milk testing logistics

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The Netherlands





- Private organization built in 2007
- Merger of non-public activities in
 - Organization for Certification of Dairy Farms
 - Netherlands Milk Control Station (MCS)
 - Netherlands Controlling Authority for Milk and Milk Products (COKZ)
- Shareholders
 - Dutch Organization for Agriculture and Horticulture (LTO)
 - Dutch Dairy Association (NZO)
 - Joint Dairy Federation (Gemzu = dairy trade)



- Integrated service supplier
in the dairy chain
 - Auditing and inspection
 - Sampling
 - Analysis of ex-farm milk and milk products
 - Proficiency testing services
 - Certification programs, incl. development
 - Education and consultancy services
- 210 employees (fte)
- Annual turn-over: € 22 million

Two locations



Zutphen
(Farm milk)

Leusden
(Dairy products)

Dutch raw milk production

year 2008

Number of dairy farms	20 000
Annual milk delivery (x 1000 kg)	10 800 000
Average delivery per farm (kg)	500 000
Number of dairy cows (85% DHI)	1 430 000
Number of dairy goats	170 000

Testing of ex-farm milk



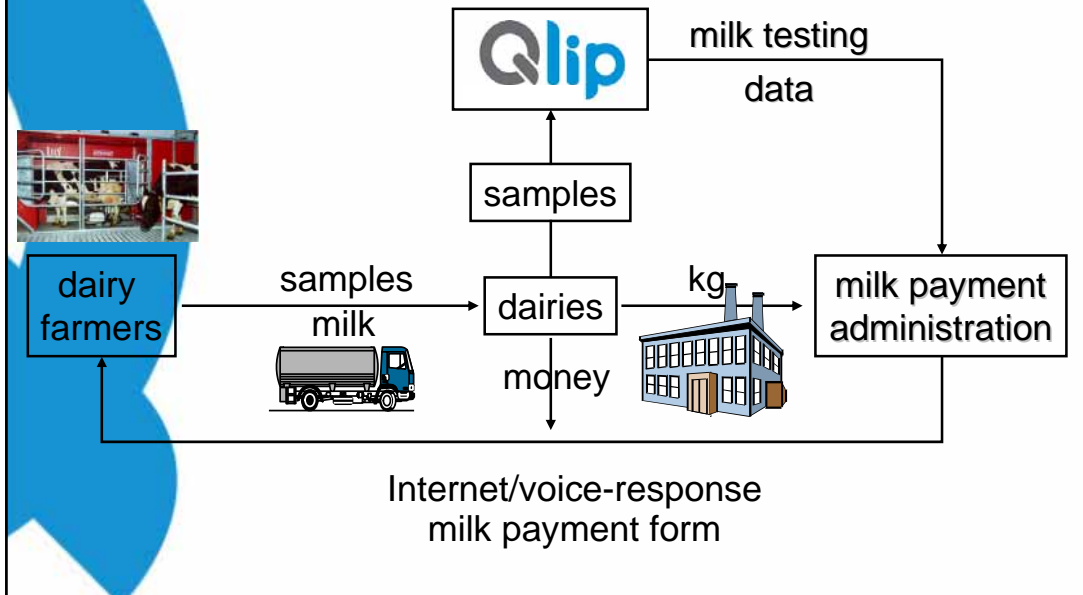
- Payment testing (payment and assessing compliance with EU 853/2004)
 - 9 000 samples/day
- Testing of milk recording samples
 - 50 000 samples/day
- Additional analysis on request
- Co-operation with Animal Health Service



Further contents (1)

- RFID concept in payment testing
 - Drivers for change
 - From paper to practice
 - Critical success factors
 - Experiences as per 2008
- Changes in milk recording logistics
- Take home message

Milk collection and payment



Drivers for change (1)

- Rationalization in dairy farming
 - NL number of farmers: -4% per year
 - NL average production: +4 to 5% per year
- Milk info is management info!
- Increasing differentiation in demands
 - Dairies
 - Farmers

Milk payment scheme

*Differentiation in demands
required more flexibility in lab operation!*

Parameter	Frequency	Limit	Penalty (points)
Fat, protein, lactose, urea	every haul		
Inhibitors	every haul	positive	€0,25-0,38/kg
Bacterial count	2x/month	100.000 – 250.000 cfu/ml	1
		> 250.000 cfu/ml	2
Somatic cell count	2x/month	last result and geom. mean >400.000/ml	1
Butyric acid spores	1x/month	positive	2
Sediment	1x/month	positive	2
Free fatty acids	2x/year	> 1,00 mmol/100 g fat	2
Freezing point	2x/year	> -0,505 °C	1

1 penalty point = - € 0,50/100 kg milk during the month
extra penalty points in case of repeated non-compliance

Differentiation in demands

- Frequencies
 - Fixed but varying per dairy
 - Depending on results
- Additional parameters (2008)

Payment	Monitoring
• Coli	• Chloroform
• B. cereus	• Residue monitoring
• IR fatty acids	• Salmonellosis
• IR unsaturated fatty acids	• Selections for Animal Health Service

Drivers for change (2)

- Rationalization in milk collection
 - Larger trucks
 - 24/7 milk collection
 - High speed pumping systems
 - Replacement of data collection systems
 - Optimization of route-planning and introduction of navigation systems (GPS)



Drivers for change (3)

- Sample bottles
 - Use of glass bottles for sampling beared a risk in the dairy chain
 - Cost of re-usable vs. disposable

Drivers for change (4)

- Identification technology

- Barcoding



- RFID



- Fast, contactless data transfer
- Flexible contents
- Functioning in 'hostile' environments
- Memory can be paged
- Memory access can be protected

From paper to practice (1)

- Main partners

- Raudszus Electronic GmbH (DE)
- CAPITOL Europe S.A. (FR)
- Flexlink systems (SE)
- Diessel GmbH (DE)
- Foss (DK)
- EDS MCC (NL)

From paper to practice (2)

Sample bottle, sampling, sampling data:

- Disposable vials with 65 ml milk
- Re-usable 13.56 MHz RFID tags (ISO 15693 compliant)
- Applicable with manual and (semi-)automatic sampling
- Farmer ID by transponder or GPS
- All relevant sampling data with each bottle

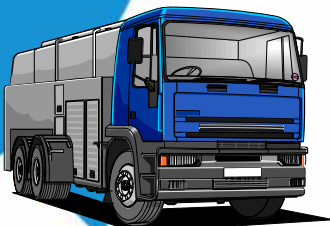


From paper to practice (3)



Dairy ID
Farmer ID

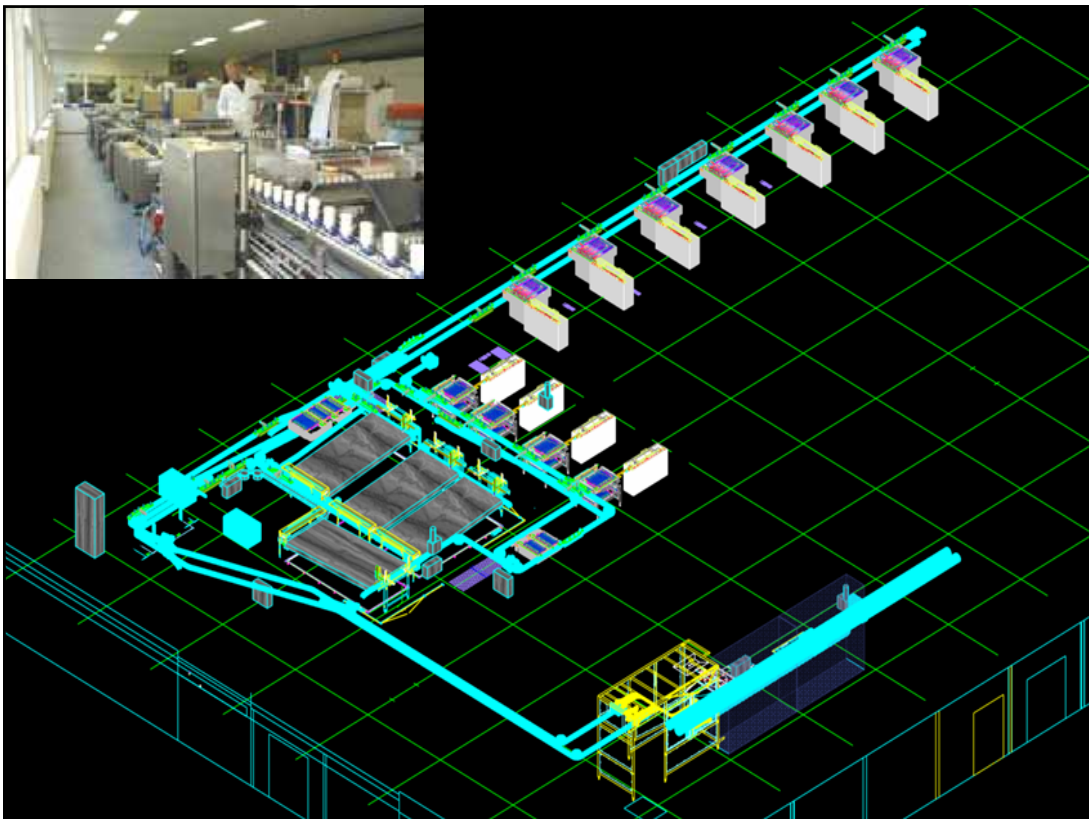
Date and time of sampling
Route/truck number
Additional requests



From paper to practice (4)

Sample processing at **Qlip**:

- From 'rack-oriented' to 'bottle-oriented'
- Conveyor system for sample transport
- Downloading analysis plan at registration
- Sample navigation via gates
- Removal and re-use of RFID tags with tag-removal and tag-insertion devices



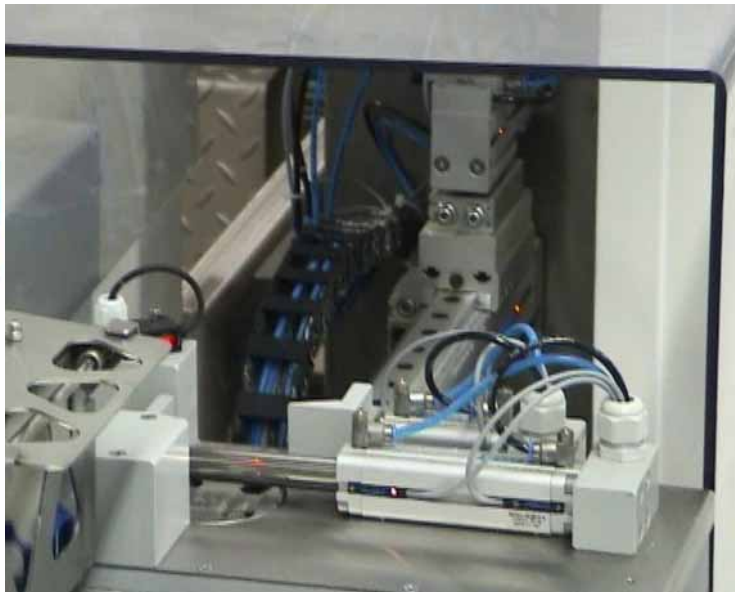
From paper to practice (4)

Unpacking, registration, navigation



From paper to practice (5)

Bacterial counting



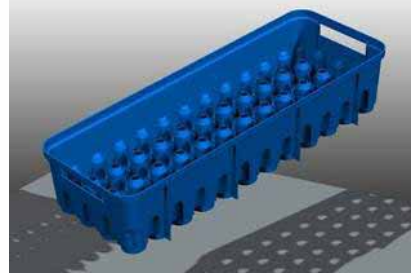
From paper to practice (6)

Water bath and basic unit for compositional analysis



Critical success factors (1)

- In-deep analysis of present situation, relevant developments/future needs
- Solid co-workingship with dairies
 - Compatibility with existing equipment
 - Practicability of sample bottles, racks and procedures
 - Changes in data communication
 - Robust identification facilities



Test results on robustness (2001)

	Type 1	Type 2	Type 3
Number of R/W cycles	941.000	350.000	624.000
No. R/W cycles/hour	5.040	6.000	3.000
No. not written	4	343	18
No. not read	0	87	8
No. wrongly written	0	276	11
No. wrongly read	0	154	5

Robustness in 'hostile environments

- ✓ High temperature (4h, 125 °C)
- ✓ Low temperature (72h, -23 °C)
- ✓ Storage in water, ice, milk, iodophore, ethanol
- ✓ Monitors, mobile phones, pagers
- ! Shielding by metal
- ! Reading/writing angle
- ✗ Microwave heating

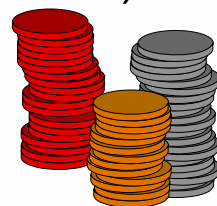
Critical success factors (2)

- Interfacing at laboratory
 - Sample registration - belt system
 - Belt system - analytical devices
 - Analytical devices – LIMS
- Transition facilities
 - Gradual transition on trucks
 - Lab switch-over in March 2004
 - Temporary facilities at lab



Critical success factors (3)

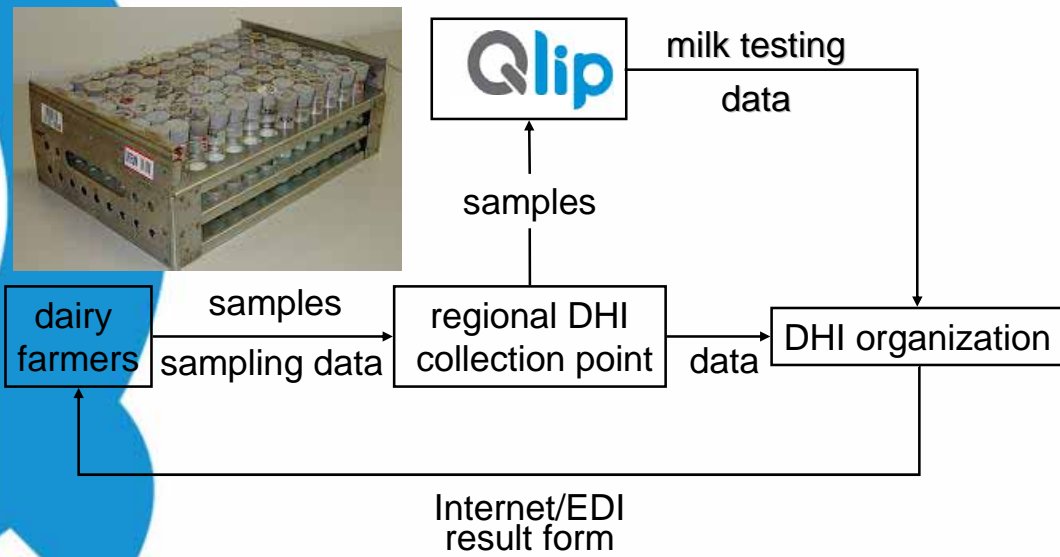
- System integrator (Hans van Hemert!)
- Regulatory changes
- Meeting with ISO/IEC 17025
- Communication (external, internal)
- Return on investment!



Experiences as per 2008

- Concept has proven robustness
- Improved tracking and tracing facilities
- Differentiation in demands even more than expected
- Full use of available facilities
- Accommodating with further adaptations
- Less labour, more flexibility, same cost!

Milk recording



Drivers for change (1)

- Solid participation in milk recording
 - On-farm testing will come....but gradually
- Increase in % DIY sampling (B-system)
- Rationalization in logistic chain
 - Less stops
 - Less labour in repacking samples
 - Data recording with use of PDA's
- Creating compatibility with Flanders (BE)

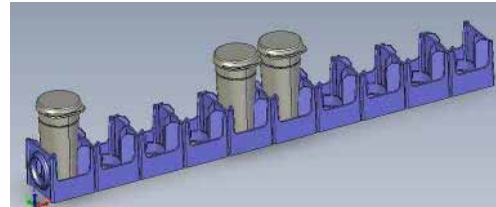
Drivers for change (2)

- Larger sample volume
 - Retesting
 - Additional tests
 - Ketosis
 - Fatty acid composition
 - Mastitis bacteriology
 - IBR
 - BLV
 - Leptospirosis
 - Paratuberculosis
 -

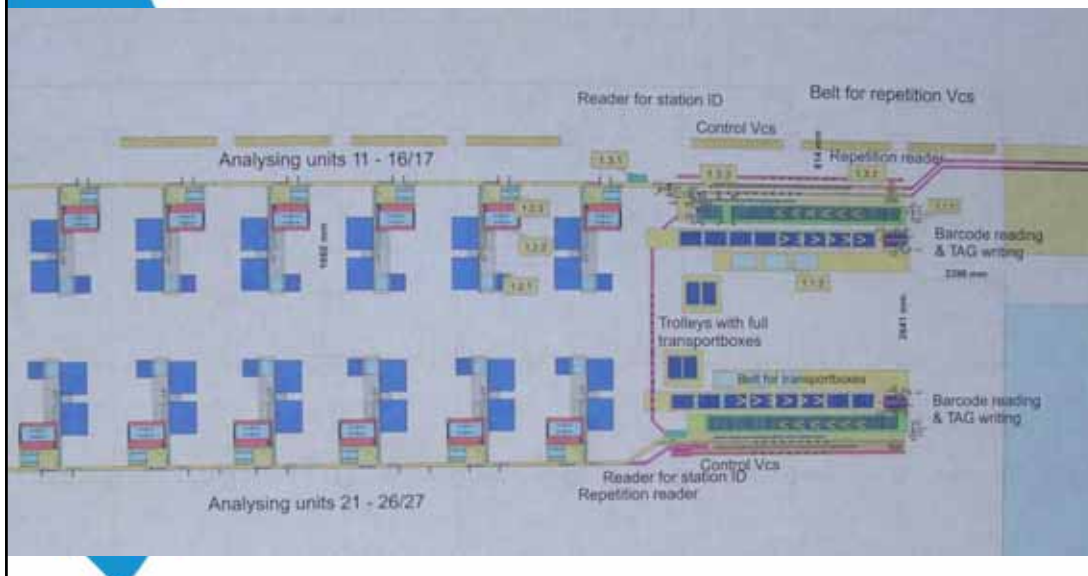
Key points in new concept

- Disposable vials in re-usable vial carriers (RFID)
- One-stop exchange of materials at dairy farms
- Cow data collection with PDA
- RFID tag holds farm ID/additional requests
- Two processing lines, 6 combi's each
- All samples F,TP,L,U + SCC

Being implemented
in NL and Flanders
right now!



Overview of laboratory line-up



Laboratory process in 10 pictures

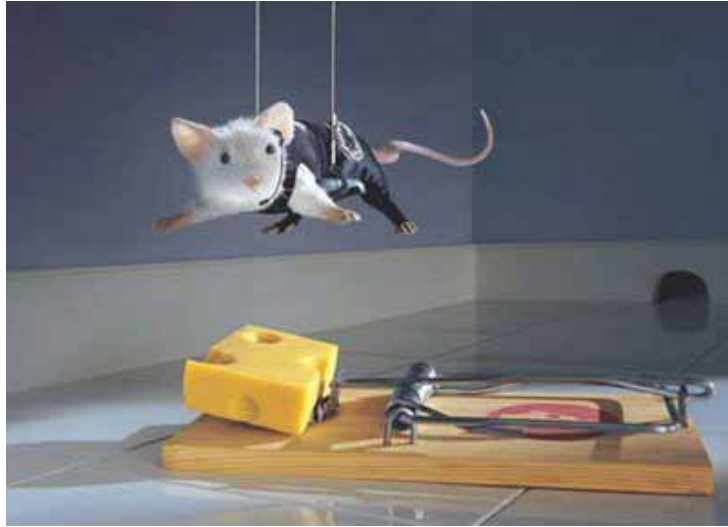


Take home message

- Application of RFID can create robust flexibility in central milk testing logistics
- RFID solutions to be based on in-deep analysis of local situation, relevant developments and future needs
- Whole logistic chain to be integrally considered
- Solid partnerships are essential!

.....go find your own cheese!

Mouse on a mission.....



Thank you for your attention!!