Field Service Advisory Committee (FSAC) Meeting

Tuesday, March 5, 2019
Town & Country Hotel
San Diego, CA

Meeting Room – Pacific Salons 1-2
8:00 a.m. – 4:30 p.m.

The FSAC Meeting and Lunch is for Registered Attendees Only

8:00 a.m.	Call to Order – *Kevin Haase, NorthStar Cooperative*
	Introductions & Agenda Review
	Approval of Minutes from 2018 FSAC Meeting (attached)
	Call for Nominations for FSAC Chair (2-year term)
8:15 a.m.	QCS Program Update – *Steven Sievert, NDHIA/QCS*

- Field Services
- Meter Centers & Technicians
- Guidelines Changes
- Proficiency Test Programs
- Training Programs

9:00 a.m.	Recording & Sampling Device Update – *Steven Sievert, NDHIA/QCS*
9:45 a.m.	NAHMS Report – *Jason Lombard, USDA-APHIS-VS*
10:00 a.m.	Health Break
10:30 a.m.	Election of FSAC Chair (2-year term)
10:40 a.m.	Data Access & Use – *Jay Mattison, NDHIA/QCS*
11:10 a.m.	QC Codes, Herd Descriptive Characteristics – *Steven Sievert, NDHIA/QCS*
11:30 a.m.	CDCB Update – *Joao Durr, CEO, CDCB & Javier Burchard, Innovation Director, CDCB*
12:00-1:00 p.m.	Lunch

12:00-1:00 p.m.	Lunch
1:00 p.m.	Ori-Collector Update • Current and Future Needs/Positioning – *Jay Mattison, NDHIA/QCS* • Current Certifications and Planned Testing – *Steven Sievert*
1:25 p.m.	International Group (IG) for Sampling and Recording Devices Report • Management and Market Considerations – *Jay Mattison & Neil Petreny, CanWest DHIA* • Technical Group Report – *Steven Sievert & Uffe Lauritsen, RYK*
1:50 p.m.	Challenges & Opportunities in DHI in Denmark– *Uffe Lauritsen, RYK*
2:15 p.m.	Health Break
2:45 p.m.	Lely AMS Update – *Adam Griffith, Lely North America*
3:05 p.m.	What's Happening with VAS & DC305 – *Sue Hart, Valley Ag Software*
3:25 p.m.	Panel Discussion - Dairy Management Research and the DHI System - Building a Plan for the Future – *Steven Sievert, Moderator*
4:25 p.m.	Wrap-Up & Adjourn

Field Service Advisory Committee (FSAC) Meeting
March 6, 2018
Embassy Suites Riverwalk – San Antonio, TX

Attendees
Anita Quesenberry, United DHIA & Chair, FSAC
Bill VerBoort, AgriTech Analytics
Erin Berger, AgSource Cooperative Services
Angie Coburn, AgSource Cooperative Services
Glenn Schmahl, Eastern Wisconsin DHIC
Lucia Aguiar, Aguiar Milk Testing Inc.
Cathy Myers, Amelicor
Steven Smith, Amelicor
Tom Blevins, Arizona DHIA
Neil Petreny, CanWest DHI
Jeff Parker, CanWest DHI
Terry Hopper, Dairy Lab Services
Lexie Sander, Dairy Lab Services
George Cudoc, Dairy One Cooperative, Inc. & Chair, QCS Advisory Committee
John Tauzel, Dairy One Cooperative, Inc.
Carol Benway, Dairy One Cooperative, Inc.
Tammie Guyer, Dairy Records Management Systems
John Clay, Dairy Records Management Systems
Greg Palas, Dairy Records Management Systems
Brian Winters, DHI Cooperative Inc.
Julee O'Reilly, DHI Cooperative Inc.
Alfred Duran, DHIA West
John Rhoads, Eastern Lab Services
Michael Gallenberger, Gallenberger Dairy Records
Dennis Drudik, Heart of America DHIA
Susan Lee, Idaho DHIA
Elizabeth Farrow, Indiana State Dairy Association
Brett Denny, Lancaster DHIA
David Bigelow, Sr., Lancaster DHIA
Mark Witherspoon, Mid-South Dairy Records
Bruce Dokkebakken, Minnesota DHIA
Steven Sievert, National DHIA/QCS
Jay Mattison, National DHIA/QCS
Doug Moyer, NorthStar Cooperative Services
Kassy Fry, NorthStar Cooperative Services
Gary Holterman, NorthStar Cooperative Services
Kevin Haase, NorthStar Cooperative Services
Chris Tucker, Rocky Mountain DHIA
Dennis Edlund, San Joaquin DHIA
Tony Nunes, Tulare DHIA
Daniel Lefebvre, Valacta

Invited Guests
John Cole, USDA-ARS-AGIL
João Dürr, Council on Dairy Cattle Breeding
Uffe Lauritsen, RYK, Denmark
David Saunier, FCEL, France
Juan Carlos Carnero, SAYCA, Spain
Jay Weiker, NAAB
Martin Burke, ICAR
Roman Kwasiborski, FOSS North America

The 2018 FSAC meeting called to order at 8:32 a.m. by Anita Quesenberry, United DHIA and Chair. Quesenberry asked for introductions of attendees and invited guests.

The agenda was reviewed and offered for additions. There were no additional topics brought forth for discussion.

Steven Sievert, QCS, distributed the minutes from the March 7, 2017 FSAC meeting as part of the FSAC meeting materials. It was moved, seconded, and passed to approve the minutes as printed.

Steven Sievert was appointed as recording secretary for the 2018 FSAC meeting.

Steven Sievert, Quality Certification Services, presented the following:

1. Field Service Report (attached to the minutes). There were no proposed changes from QCS to the *Auditing Procedures for Field Services.*

2. Meter Center and Technician Report (attached to the minutes). There were no proposed changes from QCS to the *Auditing Procedures for Meter Centers and Technicians*.

3. Accurately Describing the Test Day (attached to the minutes).

4. Update on the QCS Proficiency Testing (PT) program (attached to the minutes).

Jeff Parker, Robot Specialist, CanWest DHI shared the CanWest DHI approach to service those dairy farms with AMS in Canada with a focus on training, personnel and equipment.

David Saunier, FCEL, France, and Juan Carlos Carnero, SAYCA, Spain, provided an overview of the Ori-Collector semi-universal AMS sampling shuttle to the attendees. A copy of the presentation is attached to the minutes.

Chair Anita Quesenberry called for proposed changes to the guidelines from the floor three times. There were no changes brought forth from the meeting attendees.

The meeting was recessed for lunch at 12:04 p.m.

The meeting was reconvened at 1:00 p.m.

Steven Sievert, who also serves as Chair of the ICAR Subcommittee for Recording and Sampling Devices, provided an update of both approved and non-approved ICAR recording devices and associated samplers. Comments specific to ICAR-approved combinations of AMS and sampling shuttles along with device-specific issues were highlights of the presentation. A copy of the presentation is attached to the minutes.

Jay Mattison, CEO, National DHIA/Quality Certification Services provided a frontline update on critical issues to the DHI industry. Mattison provided comments on discussions surrounding Data Access and Use, the USAHA resolution on animal identification, and a business operations update. A copy of the presentation is attached to the minutes.

João Dürr, CEO, Council on Dairy Cattle Breeding provided an update on CDCB activities, goals, and staffing. A copy of the presentation is attached to the minutes.

The FSAC welcomed Dr. Daniel Lefebrve, Valacta to share perspectives on innovation and adding value to recording services as part of the strategic plan at Valacta in Quebec and the Maritimes. A copy of the presentation is attached to the minutes.

John Rhoads, Eastern Lab Services provided an update on the activities of the ICAR Milk Analysis Subcommittee (MASC) and initial plans for the 2018 Laboratory Advisory Meeting (LAC) meeting. Rhoads serves as LAC Chair and is a member of the ICAR MASC.

The FSAC meeting adjourned at 4:23 p.m.

Respectfully recorded,

Steven Sievert
QC Program Manager/Field Service and Meter Center Auditor
Quality Certification Services Inc.

Field Service Advisory Committee (FSAC) Meeting
March 5, 2019
Town and Country Hotel, San Diego, CA

Attendees
Denise Athy, AgriTech Analytics
Erin Berger, AgSource Cooperative Services
Angie Coburn, AgSource Cooperative Services
Glenn Schmahl, Eastern Wisconsin DHIC
Lucia Aguiar, Aguiar Milk Testing Inc.
Cathy Myers, Amelicor
Steven Smith, Amelicor
Tom Blevins, Arizona DHIA
Neil Petreny, CanWest DHI
Skip Vierra, Central Counties DHIA
Frank Azevedo, Central Counties DHIA
Terry Hopper, Dairy Lab Services
Lexie Sander, Dairy Lab Services
George Cudoc, Dairy One Cooperative, Inc.
Jamie Zimmerman, Dairy One Cooperative, Inc.
John Tauzel, Dairy One Cooperative, Inc.
Carol Benway, Dairy One Cooperative, Inc.
John Clay, Dairy Records Management Systems
Erin Evangelista, Dairy Records Management Systems
Greg Palas, Dairy Records Management Systems
Brian Winters, DHI Cooperative Inc.
Julee O'Reilly, DHI Cooperative Inc.
Alfred Duran, DHIA West
John Rhoads, Eastern Lab Services
Michael Gallenberger, Gallenberger Dairy Records
Dennis Drudik, Heart of America DHIA
Susan Lee, Idaho DHIA
Elizabeth Straw, Indiana State Dairy Association
Jere High, Lancaster DHIA
David Bigelow, Sr., Lancaster DHIA
Bruce Dokkebakken, Minnesota DHIA
Steven Sievert, National DHIA/QCS
Jay Mattison, National DHIA/QCS
Doug Moyer, NorthStar Cooperative Services
Gary Holterman, NorthStar Cooperative Services
Kevin Haase, NorthStar Cooperative Services
Chris Tucker, Rocky Mountain DHIA
Dennis Edlund, San Joaquin DHIA
Beth Bonjour, Texas DHIA
Daniel Lefebvre, Valacta

Invited Guests
John Cole, USDA-ARS-AGIL
Jason Lombard, USDA-APHIS-VS-CEAH
João Dürr, Council on Dairy Cattle Breeding
Javier Burchard, Council on Dairy Cattle Breeding
Duane Norman, Council on Dairy Cattle Breeding
Uffe Lauritsen, RYK, Denmark
Martin Burke, ICAR
Sue Hart, VAS
Adam Griffin, Lely North America

The 2019 FSAC meeting called to order at 8:07 a.m. by Kevin Haase, Acting Chair, FSAC. Haase asked for introductions of attendees and invited guests.

The agenda was reviewed and offered for additions. There were no additional topics brought forth for discussion.

Steven Sievert, QCS, previously distributed the minutes by email and provided printed copies from the March 6, 2018 FSAC meeting as part of the FSAC meeting materials. Sievert noted that it should be Lexie Sander, not Lexie Parker as attending the 2018 FSAC meeting. It was moved, seconded, and passed to approve the minutes as corrected.

Steven Sievert was appointed as recording secretary for the 2019 FSAC meeting.

Chair Haase called for nominations for Chair of the FSAC, noted the term was two years. Kevin Haase was nominated as Chair. It was moved and seconded to close nominations and cast a unanimous ballot for Kevin Haase as Chair of the Field Service Advisory Committee. The motion carried.

Steven Sievert, Quality Certification Services, presented the following:

1. Field Service Report (attached to the minutes). There were no proposed changes from QCS to the *Auditing Procedures for Field Services.*

2. Meter Center and Technician Report (attached to the minutes). Sievert presented a complete rewrite of the *Auditing Procedures for Meter Centers and Technicians*. This rewrite was requested in 2018 and as noted in the minutes of the 2018 FSAC Meeting, to be presented and reviewed at this meeting. There were no changes to specific guidelines, rather removal of redundant language, replacement of device listings in the document with a reference to an external table of ICAR-certified and National DHIA-accepted devices, and removal of outdated schematics related to meter test procedure design. Chair Haase asked for questions of QCS staff on the proposed changes. It was moved and seconded that the FSAC approves the changes in the *Auditing Procedures for Meter Centers and Technicians* as presented and that these changes be forwarded to the Audit Review Committee for review and adoption.

3. Recording and Sampling Device Update (attached to the minutes). Martin Burke, CE, ICAR asked that the good work of Steven Sievert as Chair, ICAR Recording and Sampling Devices Subcommittee be recognized and included in the meeting minutes.

Jason Lombard, USDA-APHIS-VS-CEAH presented an update on NAHMS survey activities and a preliminary data summary from data provided by select DHI providers. Lombard noted that there would be a meeting at lunch on Thursday, March 7, 2019 to discuss future steps.

Jay Mattison, CEO, National DHIA, provided an updated on proposed changes in the National DHIA Data Access and Use policies. A copy of the presentation is attached to the minutes.

Steven Sievert presented an update on proper use of herd codes, provider codes supervision codes, and QC codes, noting that National DHIA and CDCB were in the middle of a validation process to ensure proper usage. Sievert also presented preliminary ideas for collecting primary herd descriptors to better characterize data collected by the DHI system. A copy of the presentation is attached to the minutes.

João Dürr, CEO, CDCB and Javier Burchard, Innovation Director, CDCB provided an update on CDCB activities, goals, and priorities for 2019 and moving forward. A copy of the presentation is attached to the minutes.

The meeting was recessed for lunch at 12:09 p.m.

The meeting was reconvened at 1:10 p.m.

Jay Mattison provided an update on the acquisition of Ori-Collectors from FCEL/SAYCA, noting changes in pricing and volume discounts, on-demand manufacturing and limitations of the current manufacturers.

Steven Sievert provided an update on current certified combinations with the Ori-Collector and planned testing in 2019 and 2020. A copy of a matrix of certified combinations was reviewed and provided to all FSAC meeting attendees. This matrix is also available on the QCS website for download and distribution.

Jay Mattison shared a progress report in the International Group (IG) related to development of both a new integrated electronic meter and sampler as well as a Universal Sampling Device. Steven Sievert and Uffe Lauritsen, RYK, Denmark, provided comments from the technical committee that is working with potential manufacturers of these devices.

The FSAC welcomed Adam Griffin, Lely North America, to provide an update to the FSAC on North American AMS trends and Lely data exchange.

Sue Hart, VAS, provided an update to the FSAC on changes in VAS and DairyComp 305.

The FSAC welcomed a panel discussion on Dairy Management Research and the DHI System. Panelists included Jay Mattison, National DHIA; John Clay, DRMS; John Cole, USDA-ARS-AGIL, João Dürr, CDCB; Martin Burke, ICAR; Uffe Lauritsen, RYK; Adam Griffin, Lely NA; and Sue Hart, VAS.

The FSAC meeting adjourned at 4:43 p.m.

Respectfully recorded,

Steven Sievert
QC Program Manager/Field Service and Meter Center Auditor
Quality Certification Services Inc.

Field Service Update

Field Service Advisory Committee
March 5, 2019

Steven Sievert
Manager, Quality Certification Services Inc.
Technical Director, National DHIA
Chair, ICAR Subcommittee for Recording and Sampling Devices

NATIONAL DHIA
Quality Certification Services Inc.

DHIA-3
(8-54)

RULES GOVERNING TESTING IN DAIRY HERD IMPROVEMENT ASSOCIATIONS

(Revised and Approved by the American Dairy Science Association in June 1954)

1. Standard Testing Equipment

Testing equipment shall conform to the standard set by the American Dairy Science Association. (Complete list of testing equipment in DHIA Supervisor's Manual.)

2. Identification, Feed and Production Data

Owners must make available all registration certificates and other information for proper identification of animals on test and their offspring. They must cooperate and assist the supervisor in obtaining feed weight, roughage quality, freshening and dry dates, purchase and sale dates and any other information needed for calculating complete DHIA records.

3. Identification of Animals

Every dairy animal in DHIA herds must be positively identified and recorded on registry page DHIA–16 of the owner's herd record book within 60 days after entering the herd by birth or purchase. Acceptable identification shall be registration numbers, DHIA, Bangs or vaccination eartag numbers. Tattoo numbers shall be acceptable on purebred animals as temporary identification until the animal enters the milking herd.

4. Lactation Record Reports

DHIA Lactation Record report, DHIA–718, shall be completed and filed for every cow on test for each lactation regardless of whether or not the record is completed. Each lactation record shall be recorded on the respective individual cow record page DHIA–22, in the lactation production summary.

5. Monthly and Yearly Reports

The supervisor shall make monthly and yearly reports as required by the State agricultural college. Yearly feed and production records for each herd shall be reported at the close of the testing year for each herd on Form DHIA–780.

6. Cows To Be Tested

Records shall be kept on all dairy cows that are in the herd on the day the supervisor visits the farm. Every cow that has ever freshened must be included regardless of stage of lactation or ownership. Herds (for listing or publicity purposes) shall consist of five or more cows located on one or more farm units under one management. In case there is more than one farm unit, a composite average for all the units of the herd shall be computed and published as the herd average. Herds not including all cows shall not be considered standard or regular DHIA herds and all monthly and yearly publicity shall be withheld.

7. Monthly and Bimonthly Testing

Associations may operate on the monthly or bimonthly basis, or on both.

8. Number of Cows Tested Daily

The supervisor shall take sufficient time at each milking to properly comply with the following rules: identification of all animals in the DHIA herd including eartagging, cows to be tested, supervision of milking, identification of cows being milked, supervisors use own data, lock sample cases and method of sampling. In addition sufficient time shall be allotted to each herd to complete the herd record book, check it for accuracy and make all required monthly, yearly, and lactation reports. The average number of cows tested per day during the month shall not exceed 35 unless special approval is given by the board of directors.

9. Doubling Herds

It is recommended that as a general rule only one herd be tested in one day.

10. Supervision of Milking

The location of the cows being milked should be such that the supervisor can effectively observe the milking at all times.

11. Identification of Cows Being Milked

The supervisor shall verify the identity of each cow when entered on test by comparing color markings, eartags, and registration certificates, and by recording the information on the individual cow record page DHIA–22. Thereafter at each milking the supervisor must assure himself of the correct identity of each cow as she is milked.

12. Supervisor Uses Own Data

The supervisor shall compute the production records for a testing period from the data obtained on the testing day by a person authorized and approved by the State Extension Dairyman and the responsible organization.

13. Centering the Testing Day

Production records shall be calculated by centering the testing day according to the method outlined in the DHIA Supervisor's Manual.

14. Supervisor's Route

In order that the herd owner may not know the exact day the supervisor will visit a farm, the supervisor shall from time to time vary his visits to each farm as much as 3 days ahead of, or 3 days after, the regular testing day. (Regardless of such variation, however, all calculations should be made on the basis of the regular centering day established for the herd.)

15. Lock Sample Cases

All milk samples and glassware and unrecorded barn book pages shall be kept under lock and key when not under the immediate observation of the supervisor.

16. Method of Sampling

All weighing, sampling, and recording of each milking of each cow for the 24-hour period shall be done by the supervisor. Each cow's milk must be thoroughly mixed immediately before sampling.

17. Lost Samples

If for any reason the sample is spilled or lost and another sample cannot be obtained, the records shall be held open until the following month when the average of the production for the following testing period should be taken as the production for the current testing period.

18. Butterfat Test

The Babcock test is to be used in all dairy herd improvement associations. In applying the Babcock test the official rules adopted by the American Dairy Science Association shall be followed. (Detailed rules in DHIA Supervisor's Manual.)

U. S. GOVERNMENT PRINTING OFFICE 16—60597-3

19. Abnormal Tests

Abnormal high or low records due to causes such as sickness, severe injury, off feed, etc., shall be handled similarly to lost samples. In cases of severe sickness or injury, it is suggested that except for the first month of the lactation a 40 percent change in total fat from the preceding tests shall be considered abnormal.

20. Retests

Owner's Request

If for any reason a herd owner is not satisfied with the test on his herd, he may call for a retest if he is willing to pay for the cost of the retest. (Details on retests in DHIA Supervisor's Manual.)

Automatic and Surprise Retests

Automatic retests and surprise tests may be ordered by the local association board and/or the State official in charge of the Dairy Herd Improvement Association program. Automatic retest and surprise test requirements and procedures established for Herd Improvement Registry (HIR) tests by the Purebred Dairy Cattle Association shall be followed. All costs of the retest or surprise test must be paid by the owner of the cow or herd retested. The cost is to be not more than the prevailing rate schedule in use in the Association.

21. Fresh Cows—Dry Cows

A cow should not be tested until the 7th day after she calves, counting the day of calving as the first day. The first milk weight and sample can be taken on the evening of the 6th day. The record, however, is started on the 4th day after calving, counting the calving day as the first day. Cows freshening after the supervisor's regular visit and before the end of the testing period should be given credit for their production during that period, as calculated on the basis of the results of the next test. Dry cows—the dry date is the first day the cow is not milked.

22. Cows With Mastitis

Cows with garget (mastitis) in one or more quarters shall receive credit for only the production from the good quarters.

23. Aborting Cows or Cows Freshening Without Going Dry

In case a cow aborts while dry, her record shall be figured the same as for a fresh cow. If she aborts while in milk and has carried a calf less than 152 days, her current record shall continue without interruption.

24. Cows Nursing Calves

Cows nursing calves on the testing day should be considered for the time being as dry cows. Feed records are taken as usual and recorded in the herd-record book. No milk samples are to be taken. Milk weights and tests obtained on the first testing day after calves have been removed or the last testing day before calves are put on cows should be used in computing production for the testing periods in which calves were nursed.

Cows nursing calves throughout the year shall be recorded each month as dry cows and shall be included in the monthly and yearly herd averages. They shall be given production credit in the yearly herd average for one-half the average of all their production records made in previous testing years.

General Housekeeping

- **Audit submission options**
  - **QCS FTP site – each organization has a designated folder**
  - **Dropbox – contact QCS for instructions**
  - **Upload all files – Excel, PowerPoint, PDF, Access, Word, etc.**
  - **Two way street – QCS can upload reports, field training presentations, other supporting documentation**

- **On-site audits continue to be more efficient**
  - **Presence of auditor elevates priority to complete audit**
  - **Higher percentage of on-time submissions**
  - **Less follow-up materials and quicker turn around**
  - **Auditor can offer other support – technician or field manager training, local board meetings, milk meter dealer support, etc.**

- **Common 'occurrences' with missing documentation**
  - **Computer theft, damage, or other issues**
  - **Lost forms/documents that were never filed or scanned**

National DHIA - Uniform Operating Procedures

- **Last revision was June 28, 2017**
  - **Some affiliates are using older version**
  - **UOP should be provided to all herds – requirement with new or restarted herds as outlined in the auditing guidelines**
  - **PDF of UOP is available on National DHIA and QCS websites**

NATIONAL DAIRY HERD IMPROVEMENT PROGRAM
UNIFORM OPERATING PROCEDURES

Effective June 28, 2017

CODE OF ETHICS

PURPOSE

This *Code of Ethics* provides guidelines for appropriate conduct in the production, collection, and distribution of DHI information for all individuals and organizations involved with these data.

UNETHICAL PRACTICES

A. Impairing the reliability of DHI data.
B. Not cooperating or interfering in the use of the *Uniform Data Collection Procedures* to record DHI data.
C. Intentionally providing inaccurate data or withholding necessary data resulting in misrepresentation of DHI information.
D. Engaging in management practices with the intent of misrepresenting the performance of individual animals and/or the herd. Among these practices, but not limited to, are the movement of animals between herds, influencing the relative performance of herd mates, and/or the selective use of management techniques in an effort to bias DHI data. Management practices on test day should be representative of normal practices used on other days.
E. Permitting the collection of supervised data by a technician with a direct financial or family interest in the herd being tested without notification to and consultation with the field service auditor.
F. Any practice defined as fraudulent or unethical by the Board of Directors of National DHIA.

REMEDY

Any person, corporation, or other entity violating this *Code of Ethics* may be subject to action by an injured party.

NATIONAL DHIA Quality Certification Services Inc.

Initial & Follow-Up Training of Field Technicians

- Most field service affiliates meet the minimum

- Training documentation is dated for many organizations
  - No updates to training programs for over a decade
  - Failure to complete follow-up training as outlined in guidelines
  - Need to provide the tools for new field technicians to succeed in their role
  - QCS recognizes variances between affiliates – just document what training you provided

- What support is needed?
  - On-line training modules?
  - Customizable/fillable templates?
  - Other?

Continuing Education for Managers

- Certain field service affiliate managers do not attend any organized training meetings
- Added *Guidelines for Continuing Education of Field Service Managers* - effective January 1, 2016
  - 4 of 24 affiliates failed to meet this requirement in 2016
  - 2 of 23 affiliates failed to meet this requirement in 2017
  - 3 of 25 affiliates failed to meet this requirement in 2018
  - Certification status is conditional or provisional based on other compliance issues associated with the audit
- These issues create increased challenged and increase costs of support
  - Not aware of industry changes (UOP, test plans, calibration procedures)
  - Higher non-compliance issues during field service and meter center audits

Portable Meter Calibration Performance in 2018

** Meters are required to be calibrated at least once every 365 days*

** There were 3 field service providers with 100% of meters with calibration intervals <365d in 2018*

	Best Service Provider	Poorest Service Provider	2017 Weighted Mean	2018 Weighted Mean
Not Calibrated	0%	38.1%	1.1%	2.3%
% <365 days	100%*	0%	54.1%	49.6%
% between 365-425 days	0%	0%	36.7%	33.9%
>425 days	0%	100%	8.1%	14.2%

NATIONAL DHIA

Quality Certification Services Inc.

Electronic Meter Reporting

- **Don't forget to update make, model and number of meters as parlors expand or are remodeled**

- **Common incorrect statements regarding electronic meters**
  - **Set it and forget it attitude regarding meter calibration**
  - **A 10-day average takes care of all individual cow errors**
  - **Parlor report is enough – routine maintenance is not needed or follow-up on deviating meters not required**

- **All test plans are included – even 40's and 70's – just because a herd is on a commercial or unsupervised test plan does not waive electronic meter reporting and calibration requirements**

Calibration of Electronic Meters

- Guidelines require that herds using in-place electronic meters need to have them calibrated at least once every 12 months

- Guidelines offer options for compliance
  - Water Test Calibration
  - Parlor Report/EMMR/Manufacturer's Software Report demonstrating that meters are accurately weighing milk
  - Other procedure approved by the auditor

- Confusion over what is acceptable for AMS (robotic) herds

- New electronic calibration procedures from manufacturers that are not covered in the current guidelines

- This is a growing area for support, compliance and service

Electronic Meter Documentation

New Parlor Performance Report for Bovisync Users

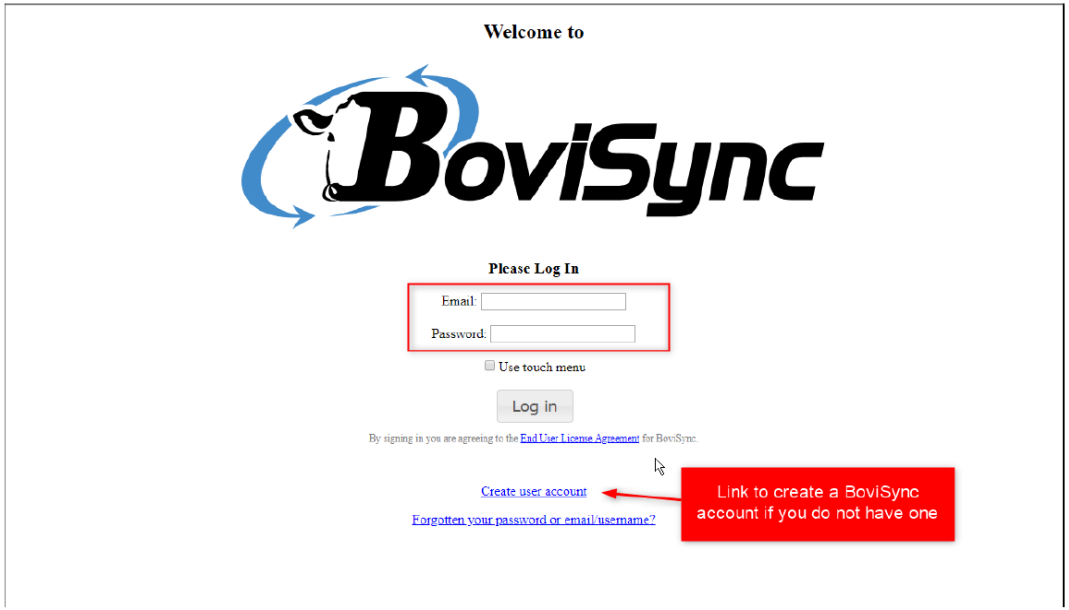
DHIA Compliance Report and Milk Monitoring Report

This KB article will walk through the process of logging into a BoviSync herd, Running the DHIA Compliance and Milk Monitoring Report, exporting the reports, and links for shift specific deviation reports. This report will allow you to calibrate the parlor for compliance.

Logging into a Bovisync herd

First go to Bovisync (click this link).

Once you arrive, enter your user name and password. (If you do not have a BoviSync account, follow the link below the username and password).



Once you are logged in, open the herd that you would like to see the deviations for. Upon your first login to BoviSync you will see the screen below. Select **Open Herd(s)**.

NATIONAL DHIA Quality Certification Services Inc.

Electronic Meter Documentation

New Parlor Performance Report from Uniform Agri

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Milking System Monitor

Milking: 31-5-2018 1/1

Milking

Group	#Cows	Milk Total	Total	Time Start	End
1	25	320	2:56	6:06	9:02
2	142	2344	3:37	5:24	9:01
3	139	1843	2:34	6:24	8:58
4	151	1864	3:16	5:54	9:10
5	5	62	1:01	7:36	8:37
8	1	9	0:04	8:30	8:34
Total	463	6442	3:46	5:24	9:10

Look Back

Date	Milking	Time Start	Time Total	Average per Cow Milk	Milk/min	Dur
31-5-2018	1/1	5:24	3:46	13,9	2,9	4,8
30-5-2018	3/3	21:00	2:47	11,4	2,6	4,4
30-5-2018	2/3	13:18	3:23	11,8	2,7	4,4
30-5-2018	1/3	5:24	3:12	13,1	2,8	4,7
29-5-2018	3/3	20:54	3:08	10,4	2,4	4,4
29-5-2018	2/3	13:24	3:22	11,7	2,7	4,4
29-5-2018	1/3	5:24	3:54	14,1	2,9	4,8
28-5-2018	3/3	20:48	3:02	11,4	2,6	4,3
28-5-2018	2/3	13:18	3:28	11,8	2,6	4,5

Cows

Group	#Cows	Milk /Cow	Milk /Hour	Milk /Stall/h	Cows /Hour	Cows /Stall/h	Avg Dur	SPP	DIM
1	25	12,8	160	65,8	9	0,4	4,8	42	30
2	142	16,5	203	54,5	39	1,0	4,9	60	141
3	139	13,3	153	46,3	54	1,3	5,2	54	111
4	151	12,3	172	51,2	46	1,2	4,3	59	264
5	5	12,4	159	41,3	5	1,2	4,7	58	320
8	1	8,9	124	22,2	14	13,9	4,3	0	0
Mean		13.9	175	42,6	122	3.1	4,8	57	168
Total	463								

Stalls

Stall	#Cows	Total	#/Min	/Cow	Mean P/E	Mean Dur
1	11	143	2,8	13,0	99	4,7
2	11	138	2,6	12,5	101	4,8
3	12	171	3,0	14,2	98	4,7
4	12	151	2,8	12,6	95	4,5
5	11	141	2,4	12,8	98	5,4
6	12	165	2,8	13,7	97	4,8
7	12	170	2,8	14,2	101	5,0
8	12	173	2,9	14,4	102	5,1
9	10	129	2,4	12,9	97	5,3
10	12	176	3,3	14,6	101	4,4
11	12	168	3,4	14,0	98	4,2
12	12	166	3,1	13,8	100	4,5
13	11	162	2,7	14,7	100	5,4
14	10	148	3,0	14,8	102	4,9
15	10	147	3,1	14,7	99	4,8
16	10	131	2,8	13,1	104	4,6
17	10	152	3,4	15,2	106	4,5
18	10	139	2,6	13,9	100	5,4
19	10	142	3,0	14,2	100	4,8
20	10	129	2,8	12,9	97	4,6
21	12	158	2,8	13,2	103	4,8
22	13	175	2,8	13,5	99	4,9
23	13	194	3,3	14,9	101	4,5
24	13	194	3,3	14,9	102	4,6
25	13	184	3,0	14,1	97	4,7
26	13	174	3,2	13,4	97	4,2
27	13	172	2,3	13,3	96	5,7
28	13	198	3,3	15,2	107	4,7
29	13	183	2,9	14,0	103	4,9
30	13	194	3,3	14,9	104	4,5
31	12	175	3,1	14,6	103	4,8
32	12	170	3,4	14,1	105	4,1
33	12	159	2,9	13,2	99	4,6
34	11	152	3,2	13,8	104	4,3
35	12	162	2,7	13,5	98	5,0
36	12	158	2,5	13,2	98	5,3
37	12	173	2,6	14,4	104	5,4
38	11	162	3,7	14,7	102	4,0
39	10	137	2,5	13,7	105	5,5
40	10	129	2,7	12,9	100	4,7
Mean	463	6442	2,9	13,9	101	4,8

[P/E = Actual production divided by expected production]

NATIONAL DHIA — Quality Certification Services Inc.

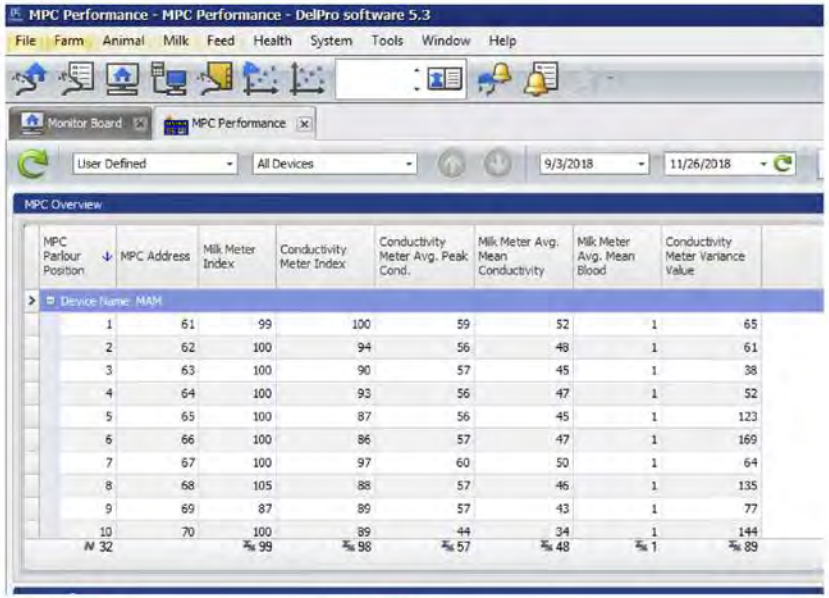
Instructions on Calibrating DeLaval Meters in Delpro

DeLaval

DeLaval MM25, MM27, MM27BC, MM27BC2

Function- Accuracy Check

- System- Service- MPC Performance

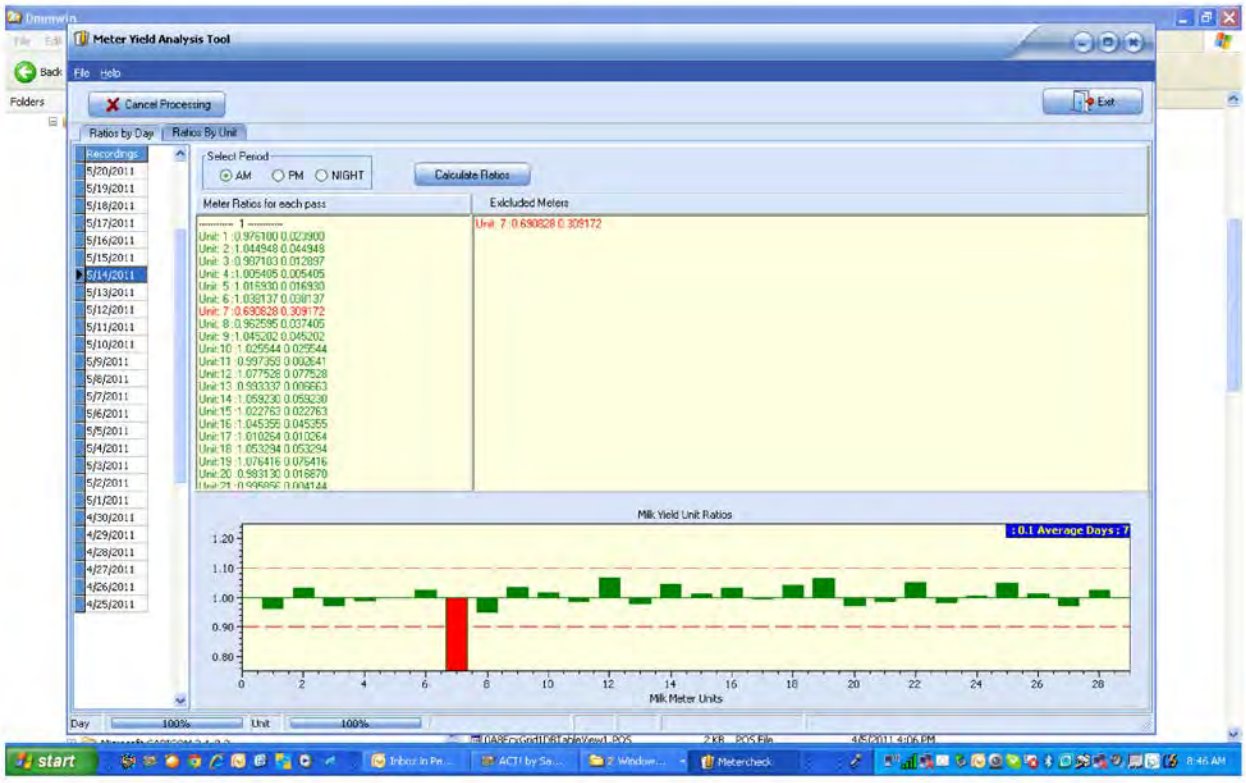


NATIONAL DHIA

Quality Certification Services Inc.

Electronic Meter Documentation

New Parlor Performance Report from Dairymaster



NATIONAL DHIA

Quality Certification Services Inc.

Annual AMS Calibration Report

Minnesota DHIA

Minnesota Dairy Herd Improvement Association
307 Brighton Avenue South • Buffalo, MN 55313
(763) 682-1091 • Fax (763) 682-1117 • www.mndhia.org

IN-PLACE ELECTRONIC CALIBRATION REPORT—ROBOTIC SYSTEM

According to the National Dairy Herd Improvement Program, Uniform Operating Procedures, producer-owned electronic meters used for DHIA testing must be checked for accuracy by a qualified technician with the same standards used for DHIA meters if the producer wants information to go to USDA. DHIA information is used by USDA for Sire proofs and other genetic evaluations and is required if the dairy is on a young sire program.

- Calibration reports are required on an annual basis with a maximum interval of 14 months.
- Meters must be within 5% of the Expected reading.

Herd Owner_____ Herd Code_____Date_____

Farm Name_____Field Rep Name_____

Address_____Field Rep Number (We will add)_____

City_____ State_____ Zip_____

Robotic Make (Ex Lely)_____ Model (Ex A3)_____

Install Date (if new install) _____ Number of Units_____

Robot Serial #_____
This Robotic Meter has been calibrated as per dealer instructions and is within certified tolerance: _____

Robot Serial #_____
This Robotic Meter has been calibrated as per dealer instructions and is within certified tolerance: _____

Robot Serial #_____
This Robotic Meter has been calibrated as per dealer instructions and is within certified tolerance: _____

Robot Serial #_____
This Robotic Meter has been calibrated as per dealer instructions and is within certified tolerance: _____

Robot Serial #_____
This Robotic Meter has been calibrated as per dealer instructions and is within certified tolerance: _____

Robot Serial #_____
This Robotic Meter has been calibrated as per dealer instructions and is within certified tolerance: _____

Signature of person performing test _____

Position _____

Dealership Name_____ City_____

Dealership State _____ Phone _____

Notes or Comments _____

_____

PLEASE MAIL TO: MINNESOTA DHIA, 307 BRIGHTON AVE S, BUFFALO MN 55313
or FAX TO MINNESOTA DHIA: (763) 682-1117 attention Gabe.

ARENTSEN FARM SALES & SERVICE INC

6875 Albers Road, Albers, IL 62215
618-248-5005 618-248-5002 fax

September 10, 2014

To Whom It May Concern:

The Lely A4 Robots at Arentsen Dairy, Serial # 5000613 and Serial # 5000614 were calibrated on September 10, 2014 by our Lely Technician, Patrick Bach.

Sincerely,

Gary Arentsen
President
Arentsen Farm Sales & Service Inc

NATIONAL DHIA

Quality Certification Services Inc.

Alternative to Calibration Report for AMS Herds

Robotic Meter Test Day Bulk Tank Differences

brezzy hill [redacted] 14-May 2014

Collection Date	Number of Robots	Collection Time	Actual tank	Tank Volumn	Milk Weight into Tank robot #1	Milk Weight into Tank robot #2	Milk Weight into Tank robot #3	Milk Weight into Tank robot #4	Sum of Daily Milk Weights Measured by the Milk Meter	Deviation %
05/04/14	2			3305	1428	1903			3331	100.79
05/05/14	2			3549	1701	2052			3753	105.75
05/06/14	2			3549	1872	2084			3956	111.47
05/07/14	2			3946	1889	2225			4114	104.26
05/08/14	2			3946	2006	2072			4078	103.35
05/09/14	2			3876	1919	1961			3880	100.10

Measured Yield/Milk Shipped Comparison

- Minimum of 3 consecutive days, 5 days give better results
- Deviation must be ±3% average over evaluation period
- Spreadsheet template available from QCS
- Cannot use EMMR or parlor performance report like PCDART or DC305

NATIONAL DHIA Quality Certification Services Inc.

Test Day/Milk Shipped Deviations > 110%

- **Many possibilities for high TD/MS deviations – milking times, meter recording accuracy, group order, equipment modification, etc.**
- **Use of Milkrite impulseAir, Lauren, or Conewango vented inflations is one concern**
- **Changes the milk-air ratio in the cluster/milk line – exceeds the ISO standard for air flow of 30 liters per minute**
- **Tru-Test meters (actually all ICAR-certified meters) are tested and approved to operate within ISO tolerances for air admission**

Preliminary Vented Liner Test Results

- Each brand of vented inflation has different air admission levels but all above ISO specifications
- Lack of consistency (QC) in air admission level within a brand of vented inflation
- Air admission level can be affected by stall location and system vacuum level

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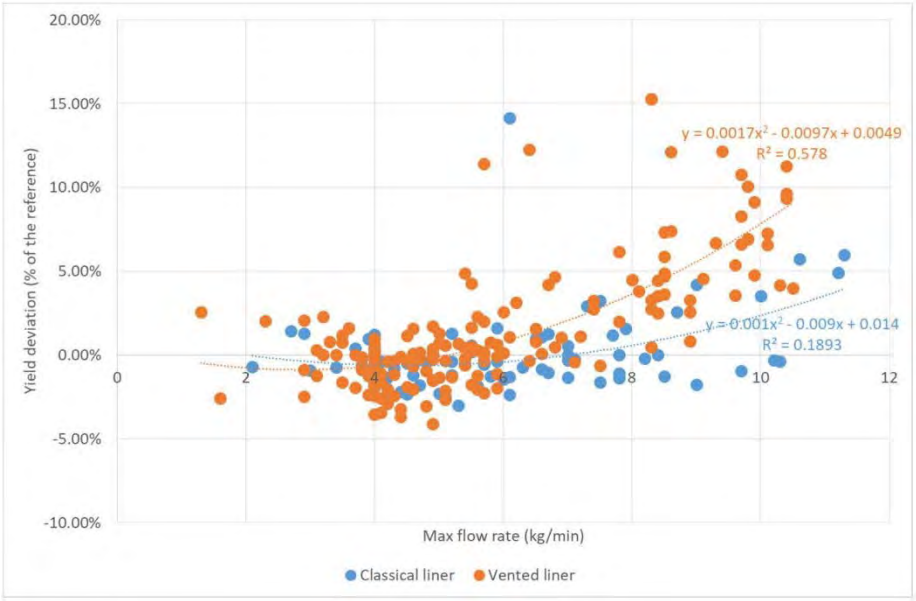
Preliminary Air Admission Test Results

- Increasing air admission causes over estimation of milk yield in meters tested and certified within ISO levels
- The higher the milk flow rate, the greater the overestimation of milk yield
- Different devices are affected to different degrees
- Concern for management data more than genetic evaluations – decisions on cow management are made in the first 120-150 days of lactation when milk flow is highest



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Quality Certification Services Inc.

Discussion Points on DHI and Vented Inflations

- Adjustment of milk weights at the whole herd level is NOT an option
  - Accuracy is only affected at higher flow levels
  - Low producing cows or slow milking cows are affected at a lesser rate

- Certain systems – DeLaval MM27BC, Afilite MPC, Interpuls MMV – have procedures to compensate for change in air admission
  - Use of these on-farm meters is better choice than using DHI portable meters for milk weight recording

- In addition to overestimating of milk yields, milk samples in some systems are not representative
  - Oversampling of milk at peak flow rates (usually lower in fat & SCC)
  - Foaming of milk due to increased air admission
  - Flooding of subsampler resulting in milk from last portion of milk letdown is not being sampled

- This challenge is across borders and ICAR research continues - National DHIA is engaged in understanding of issue and working together with Canada & Europe to solve these challenges and deliver direction and/or policy.

Testing for Carryover in Recording & Sampling Devices

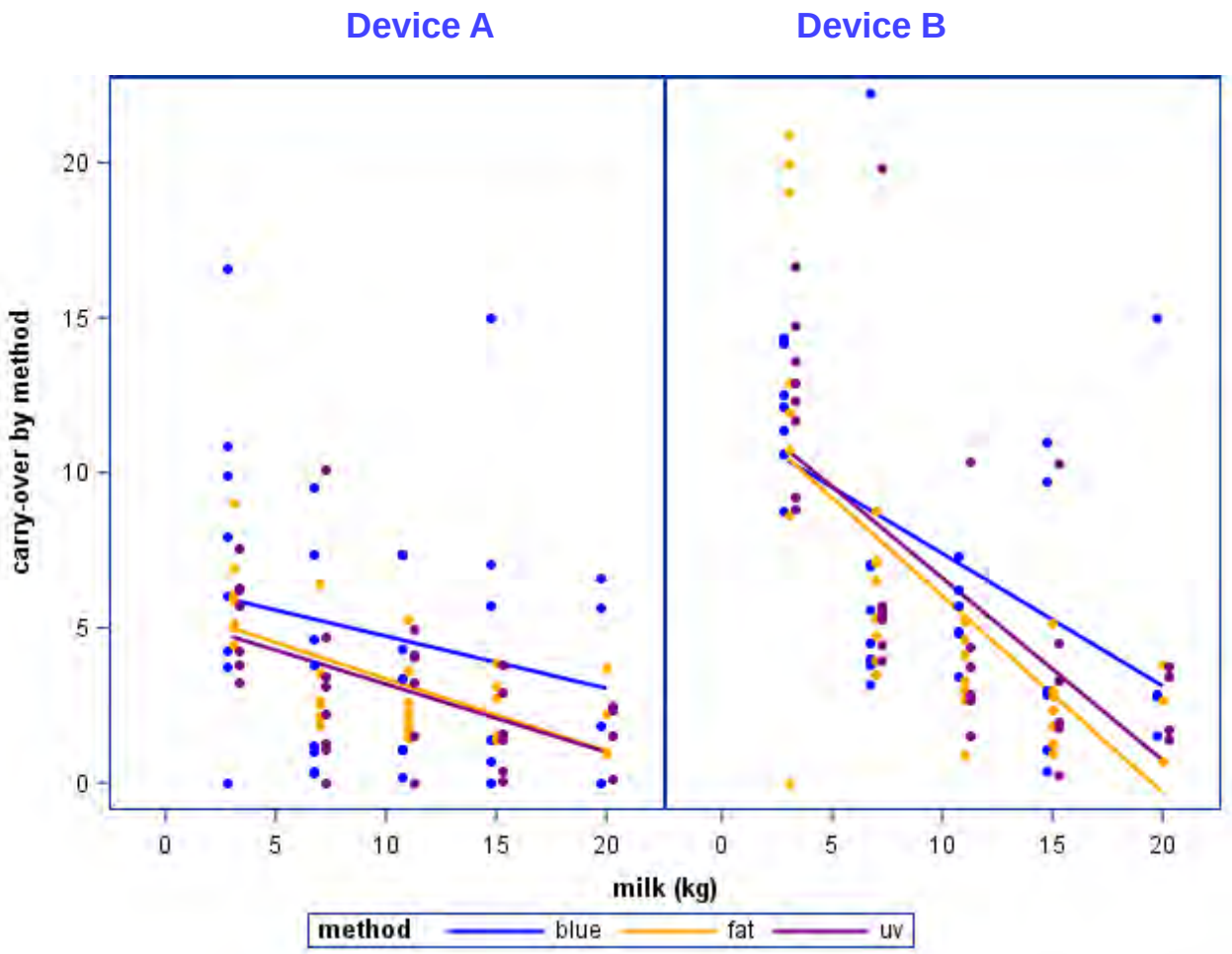
- Recording & Sampling Devices SC commissioned study to develop a ‘standard’ and ‘reproducible’ method
- Comparison of alternative methods for determination
- Experimentation and procedure validation under way

NATIONAL DHIA Quality Certification Services Inc.

Initial Results from Comparison of Carry-Over Determination Methods

- Carry-over varies between type of device and within a specific devices
- Operational techniques vary between milk recording technicians
- Carry-over is dependent on milk volume but not uniform in its dependency
- Carry-over in AMS more variable due to design, maintenance, and sampling tray

Initial Results from Comparison of Carry-Over Determination Methods



Goals and Next Steps of the RSD-SC on Carry-Over Testing

- ICAR Test Centre workshop to review procedures and determine a standard protocol for carry-over determination
- There would not be specific ICAR guidelines for carry-over level in devices but levels will be reported
- Development of best practices for device usability for milk sampling for specific tests
- DHI organizations must reinforce proper sampling procedures as these are only minimal estimates of carry-over

NATIONAL DHIA | Quality Certification Services Inc.

Meter Center & Technician Update

Field Service Advisory Committee
March 5, 2019

Steven Sievert
Manager, Quality Certification Services Inc.
Technical Director, National DHIA
Chair, ICAR Subcommittee for Recording and Sampling Devices

NATIONAL DHIA
Quality Certification Services Inc.

Audit Definitions

Mandatory

- Regularly scheduled audit conducted during the centering month
- Current audit schedules are included in your folder

Discretionary

- Deemed necessary by either the auditor or provider when
  - New location for meter center
  - Reconstruction or redesign of meter center
  - New meter technician(s)
  - New procedure(s)
  - New calibration wand (if moving from closed jar-to-jar system)
  - Change in vacuum pump/source
  - Change in receiving jar/vessel

Meter centers are responsible for all costs with discretionary audits.

Centering Period Months for Meter Centers – Even Years

Meter Centers are subject to mandatory biennial, on-site audits. Below is a schedule of target months for the on-site audits scheduled to occur during even numbered years.

January

February

March — Texas DHIA – Stephenville

April

May — San Joaquin DHIA

June

July — Mini-Cassia Calibration Center
Vanden Bosch Calibration Center

August

September — Dairy One Cooperative Inc. – Portable
Dairy One Cooperative Inc. – Stationary

October

November — Heart of America DHIA - Portable
Mid-South Dairy Records - Portable
Rocky Mountain DHIA
Tillamook DHIA
Washington State DHIA
Willamette DHIA

December — Asociación Holstein de México

Centering Period Months for Meter Centers – Odd Years

Meter Centers are subject to mandatory biennial, on-site audits. Below is a schedule of target months for the on-site audits scheduled to occur during odd numbered years.

January — Minnesota DHIA

February — Arizona DHIA
The Udder Tester, LLC

March

April — DHI Cooperative Inc. – Stationary
DHI Cooperative Inc. – Portable

May — Eastern New Mexico DHIA – Roswell
Eastern New Mexico DHIA – Clovis
Integrated Milk Testing Services
Texas DHIA – Canyon
Circle H Headquarters, LLC

June — NorthStar Cooperative Inc.– Michigan

July

August — Lancaster DHIA
DHIA West – Portable
Kings County DHIA
Central Counties DHIA
Southern Counties DHIA
Fresno DHIA
Tulare DHIA
Dairy Lab Services

September

October — AgSource Cooperative Services/CRI – Portable - Dorchester
AgSource Cooperative Services/CRI – Mega Test Rig and Calibration Rig - Menomonie

November — NorthStar Cooperative Inc.– Wisconsin

December — United Federation of DHIAs – Portable

Auditing Guidelines for Meter Centers & Techs

- Certification for meter centers is procedure specific
  - Standard Flow Test Method
  - Fast Flow Test Method
  - Dual Meter Test Method
  - Weight Test Method (Portable Scales)
- Certification for meter technicians is model specific

Changes in Auditing Guidelines

- **No proposed changes in guidelines from the field.**

- **There is one new ICAR-certified portable meters to add to list of approved models for cows.**

  - **Lactocorder LC-S (also sold by Tru-Test as Lactocorder T-T)**
  - **Will need additional development time before actively sold in USA**
  - **Calibration will require a new wand with new flow reducer**

- **Guidelines for Meter Centers and Technicians need to be refreshed and restructured – proposed review in 2018 and to be presented at 2019 FSAC (today).**

- **Still significant number of older Tru-Test standard bore (yellow) & FOSS Milko-Scope meters in service – need to have a business plan to retire these meters.**

Certified DHI Portable Meters – 2018

Model	Model	2013	2014	2015	2016	2018
FOSS	Milko-Scope	31	31	33	32	31
Tru-Test	Auto Sampler (SB & WB Models)	17,558	16,884	16,903	15,784	16,186
Tru-Test	Economy (SB)	1,742	1,313	1,097	643	612
Tru-Test	Electronic Milk Meter	405	450	550	542	537
Tru-Test	Ezi-Test (SB & WB Models)	8,624	8,917	8,648	7,748	7,512
Tru-Test	Farmer (SB)	3,278	2,993	2,793	1,835	1,415
Tru-Test	Pullout (SB & WB Models)	39,873	39,105	39,174	36,784	34,598
Waikato	MK V (includes farmer-owned)	8,745	8,846	8,817	8,716	8,904
Waikato	SpeedSampler	179	168	132	109	101
Total		80,256	78,539	78,015	72,084	69,795

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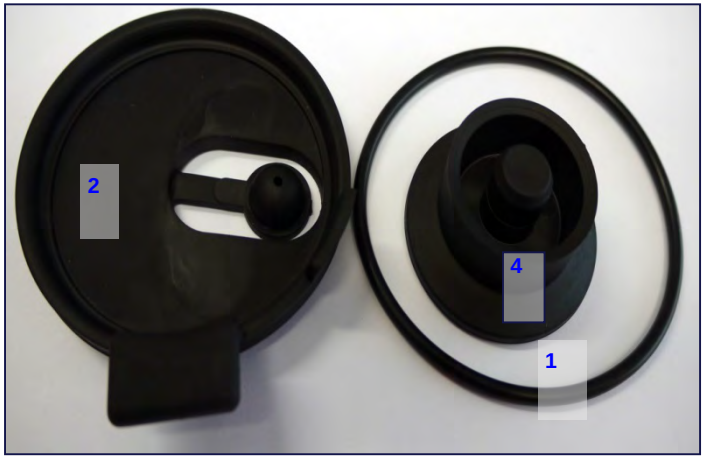
QCS Quality Certification Services Inc.

Yearly Service Kits Are Required



QC Issues on Meters and Parts

Reporting and Discussions with Datamars

- QCS shared pictures and documented concerns with Datamars
- Some of these parts still remain in meter centers
- Encourage inspection and calibration prior to placing meter in service

Assembly

- Wrong nozzle and flask combinations on Auto Sampler meters (clear nozzle with 110# flask and the opposite)
- Wrong cap on Auto Sampler meters
- Missing nozzles on EZ Test and Auto Sampler meters
- Missing lift wire on EZ Test meters
- Missing stainless steel ball in EZ Test valve
- EZ Test valve on Auto Sampler meter
- Missing jaw pads on super clamps
- Missing spring on Auto Sampler button
- EZ Test bodies without holes drilled in them

QC Issues on Meters and Parts

Packaging of Caps

- Caps used to be packaged in box as single item
- Now two caps with points inward wrapped in tissue paper
- Concern is damage to the point on cap – critical for milk dispersion and accurate estimates of milk yield and for proper subsampling

QC Issues on Meters and Parts

Trigger Screws for Super Clamps

QC Issues on Meters and Parts

Burrs on Bottom of Flasks

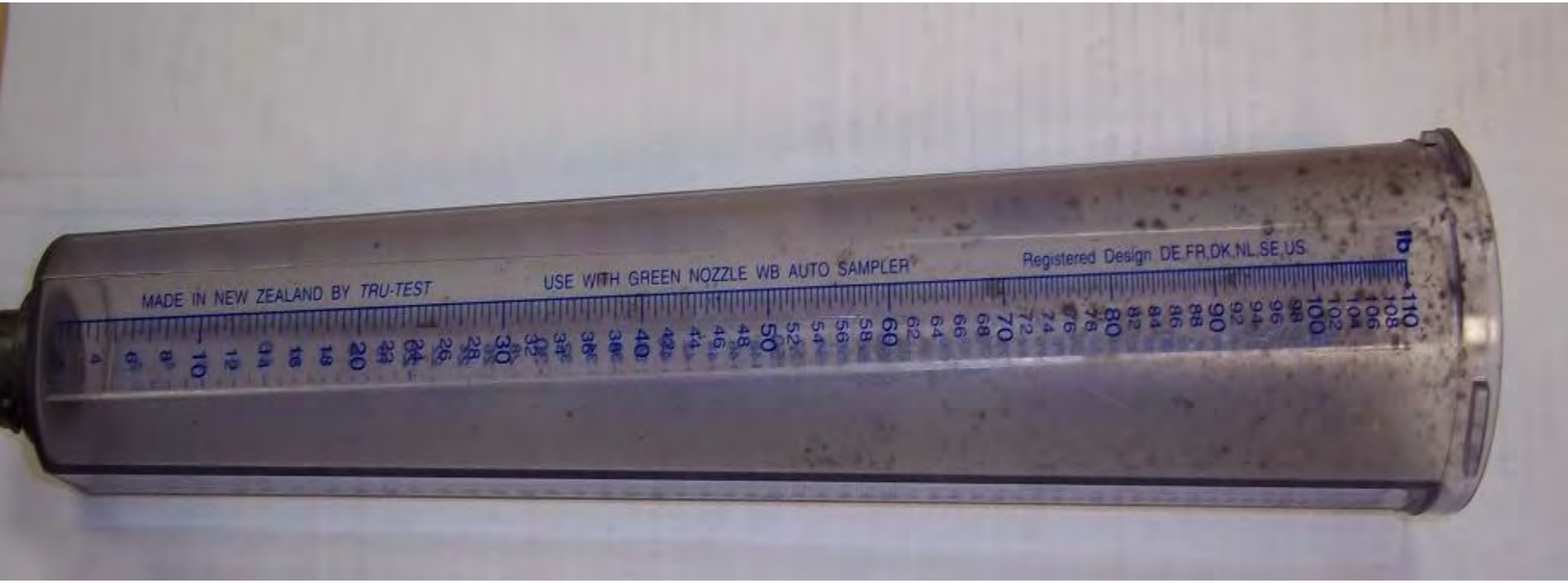
QC Issues on Meters and Parts

Wings on Wash Baffle Broken

QC Issues on Meters and Parts

Lock Plate Material

Dirty Flasks on Meters



CIP is not effective for meter cleaning in many modern parlors

- **need to add 1 gallon of water plus detergent/acid for each meter**
- **Cannot adjust cleaning cycle – DHI is locked out of system**
- **Entire flask does not clean or sanitize**

NATIONAL DHIA Quality Certification Services Inc.

Dirty Valves on Meters

FDA/PMO Non-Compliant Connectors

FDA/PMO Compliant Options

Vanden Bosch Testing (ID)

5/8 to 5/8 is $5.25
5/8 to 3/4 is $14.50

Mini-Cassia Dairy Testing (ID)

5/8 to 5/8 is $9.00
5/8 to 3/4 is $9.00

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Quality Certification Services Inc.

American Weigh Scales – PK Series

- Digital scale with low purchase price ($22-26 each)
- 66 lb..... and 110 lb..... models available
- Easy to carry in computer bag
- Accurate but not legal for trade
- Can be easily calibrated
- Modern image for DHI providing accurate results
- 10-year warranty

Meter Technician Training School - 2018

Thank you to Tennessee DHIA & DHI Cooperative Inc. for hosting the 2018 MTTS

DHI COOPERATIVE, INC

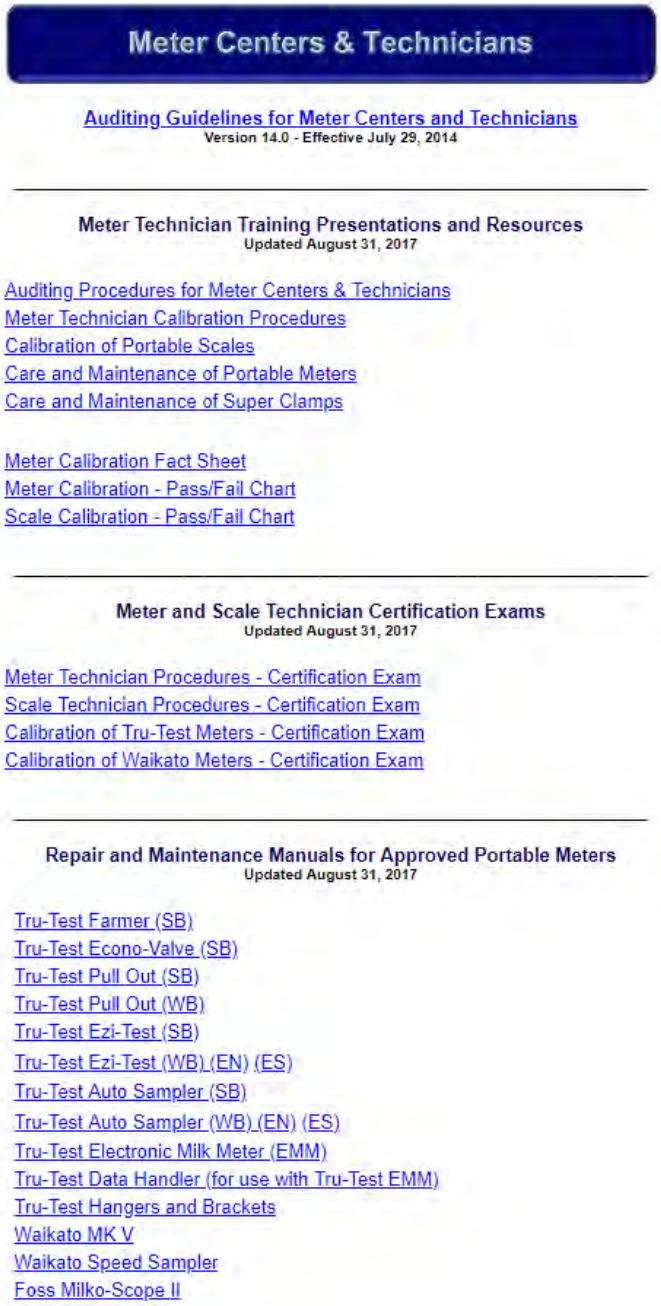
TENNESSEE Dairy Herd Improvement Association, Inc.

On-Line Resources

QCS resources on-line:

- **Presentations from MTTS**
- **Fact sheets/pass fail charts**
- **Manuals for each meter model**
- **Certification exams for meter technicians (no charge)**

- **What other resources are needed?**



Meter Centers & Technicians

Auditing Guidelines for Meter Centers and Technicians
Version 14.0 - Effective July 29, 2014

Meter Technician Training Presentations and Resources
Updated August 31, 2017

Auditing Procedures for Meter Centers & Technicians
Meter Technician Calibration Procedures
Calibration of Portable Scales
Care and Maintenance of Portable Meters
Care and Maintenance of Super Clamps

Meter Calibration Fact Sheet
Meter Calibration - Pass/Fail Chart
Scale Calibration - Pass/Fail Chart

Meter and Scale Technician Certification Exams
Updated August 31, 2017

Meter Technician Procedures - Certification Exam
Scale Technician Procedures - Certification Exam
Calibration of Tru-Test Meters - Certification Exam
Calibration of Waikato Meters - Certification Exam

Repair and Maintenance Manuals for Approved Portable Meters
Updated August 31, 2017

Tru-Test Farmer (SB)
Tru-Test Econo-Valve (SB)
Tru-Test Pull Out (SB)
Tru-Test Pull Out (WB)
Tru-Test Ezi-Test (SB)
Tru-Test Ezi-Test (WB) (EN) (ES)
Tru-Test Auto Sampler (SB)
Tru-Test Auto Sampler (WB) (EN) (ES)
Tru-Test Electronic Milk Meter (EMM)
Tru-Test Data Handler (for use with Tru-Test EMM)
Tru-Test Hangers and Brackets
Waikato MK V
Waikato Speed Sampler
Foss Milko-Scope II

Meter Technician Training Schools – 2019

- October 2019 in Turlock, CA
  - Either week of October 7th or October 14th
  - Combination of classroom and hands-on training

- Robotic (VMS) workshop to be held adjacent to meeting
  - Shuttle set-up, operation, maintenance
  - Data transfer
  - Strategies for testing robotic herds

DHIA West

CENTRAL COUNTIES DAIRY HERD IMPROVEMENT ASSOC.

San Joaquin D.H.I.A.
TO GET THE BEST, YOU'VE GOT TO TEST!

NATIONAL DHIA

QSC Quality Certification Services Inc.

Council on Dairy Cattle Breeding

Auditing Procedures for Meter Centers and Technicians

Effective January 1, 2020
Version 20.0

The purpose of this manual is to ensure the accuracy and uniformity of all records included in the national *Genetic Evaluation Program*.

Meter Center Audits and Certification

Meter Center Setup and Conditional Certification

To ensure that meter center equipment is properly installed and configured, the auditor may authorize qualified persons to assist in the design and construction of meter centers and allow them to issue a conditional certification. If applicable, a list of those persons will be available from the auditor.

Initial Certification Audits

Before achieving initial certification, meter centers must submit to an on-site audit and demonstrate compliance with all aspects of this manual, the *General Auditing Guidelines*, and with the National DHIA *Uniform Operating Procedures - Code of Ethics* and *Uniform Data Collection Procedures*.

Meter Center Audits

Once certification has been established, meter centers will be subject to a biennial, on-site audit in order to renew their certification. Meter center audits are test procedure specific and each procedure must be adequately demonstrated during the on-site audit. **At any time, additional audits may be called at auditor's discretion, or may be requested by the cooperating organization.**

Scheduling of Audits

Each meter center will be assigned a centering period month for on-site audits. Audits must be performed within 60 days of the centering period month.

Portable Meter Centers

In cases where service providers have a stationary meter center for meter repair and calibration checks, but also use a portable meter center for calibration checks, the portable meter center is also be subject to separate, but concurrent on-site audit.

Period of Certification

The certification period will begin on the day of the on-site audit and extend through the last day of the 26th month following the centering period month. Meter centers failing to achieve certification renewal by the end of the 26th month will be classified as decertified.

If failure to maintain standards is determined to have occurred by the auditor during the certification period, the service provider can be decertified prior to the end of the current certification period.

Decertification Procedures

Decertification will only be considered when the performance of a meter center has fallen below the minimum standards and the organization does not take prompt action to return to compliance within the time period specified by the auditor.

Decertification Appeals

For policies and procedures on decertification appeals, please refer to the *General Auditing Guidelines* for a detailed protocol.

Meter Technician Audits and Certification

Meter Technician Training and Conditional Certification

To ensure that meter technicians are properly trained in the repair and calibration check techniques of portable meters, the auditor may authorize qualified persons as meter technician trainers and allow them to issue a conditional certification. If applicable, a list of those persons will be available from the auditor.

Initial Certification Audits

Before achieving initial certification, meter technicians must submit to an on-site audit and demonstrate compliance with all aspects of this manual, the *General Auditing Guidelines*, and with the National DHIA *Uniform Operating Procedures - Code of Ethics* and *Uniform Data Collection Procedures*.

Continuing Education of Meter Technicians

Each meter technician is required to attend a Meter Technician Training School approved by the auditor at least once every five years to retain certification.

Calibration Check Demonstrations

During an on-site audit, each meter technician will be expected to demonstrate proficiency with the meter calibration method(s) they use. The correct procedures are described within this manual.

Meter Model Certification

Certification for meter technicians will be meter model specific. When new meter models are introduced, it will be the responsibility of the meter technician to receive appropriate training for that model prior to checking the new model for calibration and to demonstrate proficiency during a meter technician audit.

Period of Certification

The certification period will begin on the day of the on-site audit and extend for 26 months. Meter technicians failing to achieve certification renewal by the end of the 26th month will be classified as decertified.

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April .....

May ..... San Joaquin DHIA

June .....

July ..... Mini-Cassia Calibration Center
..... Vanden Bosch Calibration Center

August .....

September ..... Dairy One Cooperative Inc. – Portable
..... Dairy One Cooperative Inc. – Stationary

October .....

November ..... Heart of America DHIA - Portable
..... Mid-South Dairy Records - Portable
..... Rocky Mountain DHIA
..... Tillamook DHIA
..... Washington State DHIA
..... Willamette DHIA

December ..... Asociación Holstein de México

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..... The Udder Tester, LLC

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April ..... DHI Cooperative Inc. – Stationary
..... DHI Cooperative Inc. – Portable

May ..... Eastern New Mexico DHIA – Roswell
..... Eastern New Mexico DHIA – Clovis
..... Integrated Milk Testing Services
..... Texas DHIA – Canyon
..... Circle H Headquarters, LLC

June ..... NorthStar Cooperative Inc.– Michigan

July .....

August ..... Lancaster DHIA
..... DHIA West – Portable
..... Kings County DHIA
..... Central Counties DHIA
..... Southern Counties DHIA
..... Fresno DHIA
..... Tulare DHIA
..... Dairy Lab Services

September .....

October ..... AgSource Cooperative Services/CRI – Portable - Dorchester
..... AgSource Cooperative Services/CRI – Mega Test Rig and Calibration Rig - Menomonie

November ..... NorthStar Cooperative Inc.– Wisconsin

December ..... United Federation of DHIAs – Portable

Auditing of Calibration Check Equipment

Equipment Responsibility

The meter center is responsible for acquiring and maintaining all equipment and parts necessary for the proper calibration and repair of all types of weighing and sampling devices being serviced.

Equipment Required for Water Testing Methods

In order to operate any of the water test methods, the meter center must have the following equipment:

- A manual from the manufacturer for each type of meter being checked for calibration,
- A volumetric flask or scale accurate to within 1%,
- A forty-pound capacity bucket or pail,
- A stable vacuum source capable of providing 15 inHg or 50 kPa,
- A vacuum trap such as a weigh jar or bucket milker with a vacuum shut-off valve,
- Two or three vacuum hoses, and
- A level and secure meter mounting bracket.
- All calibrations, regardless of test method used, must be performed using a manufacturer's approved calibration wand or a closed (jar-to-jar) system approved by the auditor.

Equipment Required for the Standard Water Test Method

In addition to the general equipment listed above, the meter center must have either a manufacturer's calibration wand or a meter inlet hose equipped with a restrictor orifice sized to produce a water flow of 8 pounds per minute and an air admission orifice admitting ½-cubic foot per minute (CFM) of air measured at atmospheric pressure. The air admission orifice is to be fitted 24-36 inches from the meter inlet. The correct airflow can usually be provided by a hole produced by a #60 drill or by a 16-gauge hypodermic needle inserted into the inlet hose.

Equipment Required for the Dual-Meter Test Method

In addition to the general equipment listed above and the equipment required for the standard water test method, the meter center must have an additional level and secure mounting bracket and an additional hose between 24 and 36 inches in length.

Equipment Required for the Fast-Flow Water Test Method

In addition to the general equipment listed above, the meter center must have a fast-flow rig capable of holding forty pounds of water and equipped with a manufacturer's calibration wand having an orifice sized to produce the proper flow rate per minute.

Equipment Required for the Weight Test Method for Scales

In order to check the calibration of scales, the meter center must have access to a set of weights accurate to within 1% in the following increments:

- If the weights are measured in pounds, they must be capable of determining increments of 10, 20, 30, 40, and 50 pounds.
- If the weights are measured in kilograms, they must be capable of determining increments of 5, 10, 15, 20, and 25 kilograms.

Auditing of Calibration Check Documentation

Calibration Check Documentation

The meter technician must provide complete documentation to the meter owner for each portable meter or scale checked for calibration. This documentation may be in the form of a computerized spreadsheet, manual listing, or other organized system and must include a report summarizing the number of meters checked and:

- The make, model, and unique identification number of the meter or scale,
- The owner of the meter or scale,
- The meter technician's name or initials,
- The date of calibration check(s),
- The preliminary calibration check reading, and
- The actual calibration check readings.

Calibration Check Readings

The meter technician must record the actual calibration check readings in the reported documentation. The readings must correspond to the flask or scale gradations or the digital display of the meter or scale.

Acceptable Readings and Minimum Number of Calibration Checks Required for Portable Meters

For all eligible meters, the following guidelines should be used for determining the relative accuracy and number of calibration checks required to meet the auditing specifications:

- Meter readings between 35.7 and 37.1 pounds are within the 2% tolerance range and are considered accurate. No additional calibration checks are required to meet the auditing guidelines.
- Meter readings between 35.3 – 35.6 pounds OR 37.2 – 37.5 pounds are within the 2-3% tolerance range. A second calibration check is required to confirm their accuracy and meet the auditing guidelines.
- Meter readings <35.3 pounds or >37.5 pounds are outside the 3% tolerance and are not considered accurate enough for collecting milk weights. Portable meters must be repaired and checked for calibration again or taken out of service if they cannot consistently read within the 3% tolerance range.

Acceptable Readings for Calibration Checks of Scales

A chart illustrating acceptable readings for calibration checks of scales is available from the auditor. All readings should fall within 3% of the known weight.

Calibration Check Tags or Markings

The meter technician must mark each portable meter or scale with a tag, sticker, band, engraving, or other identifier, indicating the calibration year and the meter center performing the calibration check prior to returning the meter or scale to the owner.

Calibration of Repaired Meters and Scales

The meter technician must check the calibration of all portable meters and scales receiving repairs that may have affected accuracy before returning them to active service. The meter technician must check the calibration of all new portable meters and scales with manufacturing dates older than 365 days from the date placed in service.

Auditing of the Water Test Procedures for Portable Meters

Eligible Portable Meters
The meter technician must demonstrate knowledge of each of the meter models eligible for each water test procedures. A list of meter models eligible for the standard flow, dual-meter and fast-flow water test procedures is available from the auditor.

Vacuum System and Equipment Configuration
The meter technician must demonstrate a working knowledge of the meter center setup and standard flow water test method equipment.

All calibrations must be performed using a manufacturer's approved wand or a closed (jar-to-jar) system approved by the auditor. Design specifications and flow schematics for each water test procedure are available from the auditor.

Initial Water Measurement
The meter technician must demonstrate that the initial water measurement has been attained through the use of a volumetric flask or digital scale capable of calibration to 1%. Weigh jars and float pails are not considered accurate enough to determine initial water measurement.

On-going Water Measurement
The meter technician must demonstrate an approved method of maintaining the water volume throughout a series of meter calibration checks. Approved methods include the use of a working float pail or a digital scale capable of calibration to 1%.

Flow Rates
The meter technician must demonstrate an understanding of the flow rates required for each water test procedure.

Acceptable Results
The meter technician must demonstrate an understanding of the acceptable calibration check results.

Auditing of the Weight Test Procedure for Scales

Weight Check Range
The meter technician must demonstrate an understanding of the range of weights required for scale calibration checks.

Scale Operation
The meter technician must demonstrate a working knowledge of the scale operation and adjustment procedures.

Acceptable Results
The meter technician must demonstrate an understanding of the acceptable calibration check results.

Calibration Check Procedure

In order to properly conduct a calibration check using the Standard Water Test Method, the following procedure must be performed:

1. Using a volumetric flask or accurate scale, exactly 16.0 liters, 16.0 kg, 4.23 gallons, or 35.3 pounds of water should be placed in the forty-pound capacity pail.

2. The portable meter to be tested should be placed in the leveled bracket.

3. The suction hose containing the restrictor and air admission orifices should be connected to the portable meter inlet with the air admission orifice at least 24 inches from the portable meter inlet. The other end of the suction hose should be placed in the forty-pound capacity pail.

4. The hose from the vacuum source should be connected to the vacuum trap and the hose from the vacuum trap should be connected to the portable meter outlet.

5. The vacuum source should be turned on and must provide 15 inHg of vacuum.

6. The vacuum trap valve should be opened and the water should be drawn into the portable meter inlet at a rate of 8-pounds per minute and air should be drawn into the air admission orifice at the rate of ½-CFM.

7. The water and air mixture should pass through the portable meter and the water should be captured in the vacuum trap.

8. The lower meniscus water level should be read on the portable meter and recorded as the calibration check reading.

9. The water remaining in the portable meter should be released into the vacuum trap and the vacuum trap valve should be turned off.

10. The water should be transferred from the vacuum trap into the forty-pound capacity pail and the steps 6-10 should be repeated as necessary.

Calibration Check Procedure

In order to properly conduct a calibration check using the Fast-Flow Water Test Method, the following procedure must be performed:

1. Using a volumetric flask or accurate scale, exactly 16.0 liters, 16.0 kg, 4.23 gallons, or 35.3 pounds of water should be placed in the fast-flow rig and the setting on the float indicator should be checked.

2. The portable meter to be tested should be placed in the leveled bracket. For Tru-Test meters, the flask to body seal ring should be 63 inches from the bottom opening of the water inlet tube.

3. A vacuum hose should be connected between the water inlet tube on the fast-flow rig and the portable meter inlet. This connection should be relatively straight.

4. The hose from the vacuum source should be connected to the vacuum trap and the hose from the vacuum trap should be connected to the portable meter outlet.

5. The vacuum source should be turned on and should provide 15 inHg of vacuum.

6. The valve on the water inlet tube of the fast-flow rig should be opened and the water should be drawn into the portable meter inlet. There should be no air inlet source.

7. For standard bore Tru-Test meters, the fast-flow rig should empty in 68 seconds.

8. For wide bore Tru-Test meters, the fast-flow rig should empty in 65 seconds.

9. The water should pass through the portable meter and should be captured in the vacuum trap.

10. The valve on the water inlet tube of the fast-flow rig should be closed.

11. The lower meniscus water level should be read on the portable meter and recorded as the calibration check reading.

12. The water remaining in the portable meter should be released into the vacuum trap.

13. The water should be transferred from the vacuum trap into the fast-flow rig and the steps 6-11 should be repeated as necessary.

Calibration Check Procedure

In order to properly conduct a calibration check using the Dual-Meter Water Test Method, the following procedure must be performed:

1. Using a volumetric flask or accurate scale, exactly 16.0 liters, 16.0 kg, 4.23 gallons, or 35.3 pounds of water should be placed in the forty-pound capacity pail.

2. The two portable meters to be tested should be placed in the leveled brackets. For this procedure, they will be referred to as meters X and Y.

3. The suction hose containing the restrictor and air admission orifices should be connected to the inlet of portable meter X with the air admission orifice approximately 24 inches from the portable meter inlet.

4. The other end of the suction hose should be placed in the forty-pound capacity pail.

5. A hose should be connected from the outlet of portable meter X to the inlet of portable meter Y.

6. The hose from the vacuum source should be connected to the vacuum trap.

7. The hose from the vacuum trap should be connected to the outlet of portable meter Y.

8. The vacuum source should be turned on and should provide 15 inHg of vacuum.

9. The vacuum trap valve should be opened and the water should be drawn into the inlet of portable meter X at a rate of 8-pounds per minute and air should be drawn into the air admission orifice at the rate of ½-CFM.

10. The water and air mixture should pass through portable meter X and continue through portable meter Y.

11. After passing through portable meter Y, the water should be captured in the vacuum trap. The lower meniscus water level should be read on portable meter X and recorded as the calibration check reading.

12. The water remaining in portable meter X should be released into portable meter Y, including any water captured in the sampler. The lower meniscus water level should be read on portable meter Y and recorded as the preliminary calibration check reading.

13. The water remaining in portable meter Y should be released into the vacuum trap and the vacuum trap valve should be turned off.

14. The water should be transferred from the vacuum trap into the forty-pound capacity pail and the steps 9-16 should be repeated as necessary.

Calibration Check Procedure

In order to properly conduct a calibration check using the Weight Test Method, the following procedure must be performed:

1. With the hanging scale hooked on a secure structure, a bucket or pail should be hung or placed on the scale and the pointer should be set to zero.

2. The check weights should be added to the bucket or pail incrementally.

3. The readings on the scale should be recorded at each weight increment and compared to the scale calibration chart.

    - If the readings fall within the expected ranges at each weight increment, the scale calibration should be considered within acceptable tolerances.
    - If the readings are outside of the expected ranges at any of the weight increments, the scale calibration should be considered out of tolerance and the scale should be taken out of service, repaired, or replaced.

Provider, Supervision & QC Codes

Field Service Advisory Committee Meeting
March 5, 2019

Steven Sievert
Technical Director, National DHIA

Important Variables to Describe

Current Coding

- Herd Code
- Field Service, Meter Center and Laboratory Codes
- Supervision Code
- QC Code
- Work Completed – Weighed, Sampled, MRD

Future Needs

- Coding by Strings or Pens
- Equipment Type or Code (Meter, Sensor Name)
- Milking System Description
- Herd Management Descriptors

Herd Code Assignment

Herd Code Blocks Assigned by National DHIA Office

- Blocks assigned to field service affiliates
- Third parties (VAS) have been assigned blocks of herd codes
- Heifer growers may be using specific herd codes for record keeping
- Non-processed herds at each affiliate that may be using a specific herd code
- Auto incrementing of herd codes is not an option

Herd Code Assignment

A new herd assigned when…

- New ownership of herd but at same location
- The herd moves to a new location (state, county, etc.)

Do not assign a new herd code when…

- Herd transfers from one affiliate to another and/or another DRPC
- It may be quicker than obtaining intent to transfer and release for the herd but is not in compliance with UOP

Provider Codes

References

Field Service 021
Meter Centers 921
Labs 821

Field Service	Code is associated with the state where your office is located
Meter Centers	Meter center codes range from 900-999 Independent goat meters/scales: 998 EMM calibrated by third party: 999
Labs	Lab codes range from 800-899

- Codes assigned by National DHIA
- Listed on QCS website for certified providers
- Allows for data exclusion from provider not certified for a specific period

DHI Supervision Codes

Reference 108

Code	Description
0	Not used
1	Supervisor conducted test
2	Owner conducted test
3	Both supervisor and owner conducted test
4	Automated Milking System
5	Supervisor conducted test using electronic recording
6	Owner conducted test using electronic recording
7	Both supervisor and owner conducted test using electronic recording
8	Verification test not using electronic recording
9	Verification test using electronic recording

DHI Supervision Codes
Herds with Manual Yield Recording

SUPERVISED TEST: All test day production data and cow identification has been recorded by the DHI technician who is expected to collect data as accurately as possible and to use approved procedures when taking milk samples. The DHI technician may employ assistants to perform these tasks when the facilities or milking processes do not permit a single DHI technician to observe identification, milk weights, and sample collection as they occur. **(*Supervision Code 1*)**

UNSUPERVISED TEST: Test day production data and/or cow identification has been recorded by someone other than the DHI technician. **(*Supervision Code 2*)**

PARTIALLY SUPERVISED TEST: The DHI technician collected production data and/or cow identification information for at least one milking on test day and someone else collected production information and cow identification for other milking(s) on test day. The DHI technician certifies that the test day information is believed to be correct and accurate. **(*Supervision Code 3*)**

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DHI Supervision Codes
Robotic Herds

AUTOMATIC MILKING SYSTEM TEST: Test day production data and/or cow identification has been recorded by an automatic/robotic milking system. Milk has been sampled using an automatic sampling device approved to provide representative samples when used with the automatic milking system. (***Supervision Code 4***)

DHI Supervision Codes
Herds with Electronic Yield Recording

SUPERVISED ELECTRONIC TEST: The DHI technician performed a supervised test using the electronic recording of production data and cow identification together with appropriate verification that equipment for cow identification, weighing milk, and obtaining milk samples is in proper operating condition and is accurate. **(*Supervision Code 5*)**

UNSUPERVISED ELECTRONIC TEST: Test day production and cow identification has been collected using electronic recording and is submitted for processing without verification by a DHI technician. **(*Supervision Code 6*)**

PARTIALLY SUPERVISED ELECTRONIC TEST: The DHI technician performed a Supervised Electronic Test, but cow identification was manually entered by farm employees. **(*Supervision Code 7*)**

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Quality Certification Codes

Reference 118

Code	Description
1	All data (event, yield, components) are used MEETS ALL QC
2	Event data and yield are used but components are not used METERS ARE CERTIFIED, LAB IS NOT
3	Event data is used but yield and components are not used METERS DO NOT MEET QC
4	The data (event, yield, components) do not meet QC and are not used DOES NOT MEET QC

Quality Certification Codes

Reference 118

QC Codes are currently applied to the herd (all cows under herd code)

- Allow for usable data to be used for management and genetic purposes
- Field Service Provider indicates the effective date(s) of the proper QC Code to DRPC – this includes changing back to QC Code = 1
- During audit, QCS may indicate the proper code should be applied to a herd for all or specific test days but communication responsibility falls with field services.
- QCS is working with CDCB to validate proper application and use
- Application to data from sensor devices is possible in future

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Future Herd Descriptors Needed

Coding by Strings or Pens

- **Different milking frequencies, supervision, etc. for different pens, parlors, sites**

Equipment Type or Code (Meter, Sensor Name)

- **Need to know source of data as we may have the same data (i.e. SCC) coming from different equipment**

Milking System Description

- **Rotary, Parallel, Stall Barn, etc.**
- **In-Line Sensors**

Herd Management Description

- **Seasonal calving, grazing, confinement, etc.**
- **Others?**

Primary Herd Characteristics

Characterize Data by Strings or Pens

Possible Option of Secondary Characteristics such as Robot Model or Sensor Name

Housing System	Milking System	Feeding System
☐ Tie Stall ☐ Pasture ☐ Free Stall ☐ Dry Lot ☐ Compost Barn ☐ Hybrid	☐ Tie Stall ☐ Flat Barn ☐ Parallel/Herringbone ☐ Rotary ☐ Robotic (AMS)	☐ TMR ☐ PMR + Topdress ☐ Forage + Topdress ☐ Grazing ☐ Grazing + Topdress
Transition Program	**Milk Yield Source**	**Milk Marketing**
☐ None ☐ Prefresh ☐ Postfresh ☐ Prefresh + Postfresh	☐ DHI Meters ☐ On Farm Meters ☐ Robotic (AMS) ☐ In Line Sensor ☐ Bucket	☐ Conventional ☐ Organic ☐ Home Manufacturing & Direct Sales
Repro/Breeding Program	**Pregnancy Confirmation**	**Heat Abatement System**
☐ Visual Observation ☐ Sensor Based ☐ Timed/Synch Program ☐ Natural Service	☐ Palpation ☐ Ultrasound ☐ Milk ELISA ☐ Blood ELISA ☐ In Line Sensor ☐ None/Non-Return	☐ None ☐ Fans ☐ Misters ☐ Fans + Misters ☐ Cooling Ponds

Coding System for Recording Devices

ICAR Sensor Devices Task Force

- Working on a uniform coding system for recording and sampling devices
  - Would include current meters – both portable and fixed/in-place
  - Sensor devices/systems would have codes that are unique to system, software version, and measurements collected
  - Includes devices for measuring milk yield & estimating milk composition but also devices that measure activity, BCS, feed efficiency metrics, and other live animal measurements
  - One system that databases and DRPCs could reference

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Take Home Points

- **Need to accurately describe/code test day and data sources**
- **Has to be a cooperative effort with field service, DRPC and National DHIA**
- **National DHIA is working with CDCB to ensure proper data handling and usage based on descriptive coding**
- **We will need to expand the capture of herd descriptive information to meet future needs**
  - **Multi-site dairies**
  - **Sensor devices**
  - **Provide qualified data for management and genetic research and reporting**

Access and Use of Data

Field Service Advisory Committee Meeting
Tuesday, March 5, 2019
San Diego CA

Jay Mattison
CEO National DHIA/QCS

NATIONAL DHIA
QCS Quality Certification Services Inc.

Data Access and Use and Publication

Updating Release and Use of Records in UoP

Food Pantry Model

- Provide food (*data)* for a benefit

- Herd Data is to "*feed*" data access and benefit to herds, owners and operators

Data Access and Use and Publication

Updating Release and Use of Records in UoP

Food Pantry Model

- Food (data) from pantry is accessed and used for a benefit to contributors and feed a group by making a meal

- Not to distribute or sell the food before feeding the group

Data Access and Use and Publication

- Access and Use
- Know where and how data are being used
- Regulatory and administrative and legal points as solid as possible
- Topic is complicated by on-farm software and equipment manufacturers and data agreements, VULAs, EULAs…..

Data Access and Use and Publication

- **Herd codes** as important
  - Everybody and every little yellow dog assigning
  - Bring back to NDHIA managing database for validation and assignment

Data Access and Use and Publication

Portals for Herd Code plus

Use Code and Publication

- Call with CDCB staff week of March 20th
- Meet with DRPCs April 9th
- Programming and testing in place for both Herd Code management and Access and Use portal by May 1st
- June 1st ready to use in normal process

Data Access and Use and Publication

- Probably some concerns in the industry
- DHI population (quantity) compared to other populations or sub-populations

90% plus compared to 10%

Collaborate

Credibility

Connectivity

Access and Use – Publication

Yes	No
Selecting YES as the Publication option *would allow publication of data* on a local, state, regional and national level. Herd data will be available for newsletters, awards and other types of recognition lists and programs. Herd data will be contributed and flow based on the herd selection for Data Access and Use (codes 1, 2, 3) The YES Publication (and Data Access and Use Code 2 or 3) would be selected by herds desiring animal's genetic results to be included in files and lists distributed within the industry. This would include breed associations, AI organizations and Embryo Transfer organizations. The YES Publication is recommended as the default.	Selecting NO as the Publication option *would not allow publication of data* on a local, state, regional and national level. Herd data will be contributed and flow based on the herd selection for Data Access and Use (codes 1, 2, 3) The NO Publication (and Data Access and Use Code 2 or 3) would be selected by herds desiring an animal's genetic results only available to DHI, CDCB and USDA-ARS-AGIL. This distribution would be only in the DHI system to the herd and not to or by other allied industry cooperators. The NO Publication is for herds with objection to publication of farm or animal information due to social and personal concerns.

Access and Use

Access Level	Organizations	Uses	Access
NCDB and Industry Research **Code = 3**	Industry and Research	National Genetic Evaluations National DHI Management Summaries and Benchmarks	Data are available for qualified industry research. Data are included in automated transfers between industry partners.
NCDB and CDCB ***Recommended Default*** **Code = 2**	CDCB and Approved Parties	National Genetic Evaluations National DHI Management Summaries and Benchmarks	Internal CDCB research. External data requests are excluded unless covered by Material License Agreement.
Management **Code = 1**	DHI system only • Field Service • Lab • DRPC • On-farm software	DHI system only	Data resides in DHI system only and can be used to create new management tools. Herds can grant consultant access with written release.

Access and Use

Access Level	Organizations	Publication – YES [Recommended Default]	Publication – NO
NCDB and Industry Research **Code = 3**	Industry and Research		
NCDB and CDCB ***[Recommended Default]*** **Code = 2**	CDCB and Approved Parties		
Management **Code = 1**	DHI system only • Field Service • Lab • DRPC • On-farm software		

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Access and Use

Access Level	Organizations	Publication – YES [Recommended Default]	Publication – NO
NCDB and Industry Research **Code = 3**	Industry and Research		
NCDB and CDCB ***[Recommended Default]*** **Code = 2**	CDCB and Approved Parties	✓	
Management **Code = 1**	DHI system only • Field Service • Lab • DRPC • On-farm software		

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Access and Use

Access Level	Organizations	Publication – YES [Recommended Default]	Publication – NO
NCDB and Industry Research **Code = 3**	Industry and Research		
NCDB and CDCB ***[Recommended Default]*** **Code = 2**	CDCB and Approved Parties		✓
Management **Code = 1**	DHI system only • Field Service • Lab • DRPC • On-farm software		

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3. Access and Use

Access Level	Organizations	Publication – YES [Recommended Default]	Publication – NO
NCDB and Industry Research **Code = 3**	Industry and Research		
NCDB and CDCB ***[Recommended Default]*** **Code = 2**	CDCB and Approved Parties		
Management **Code = 1**	DHI system only • Field Service • Lab • DRPC • On-farm software	✓	

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Data Access and Use-In Process

- Area and topic is complicated by on-farm software and equipment manufacturers and data agreements, EULAs, charters etc, but keep it focused and simple

- Agree and have indication of Access and Use, Publication from herd by DHI Service Providers with distribution of updated Uniform Operating Agreements

Cooperative effort for the benefit of dairy herds and their data

NATIONAL DHIA Quality Certification Services Inc.

The Challenge for DHI

Adapting and positioning for the future

- *Need to start (and have) **NOW** on opportunities*
- ***Key part** of the service and delivery of DHI*
- *Challenges are global so **solutions for investment** are global*
- ***Complex but take one or two items** to solve at a time*
- ***Key** in the efforts for*

  DHI and dairy herds

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Questions?

Ori-Collector in USA

Field Service Advisory Committee Meeting

Tuesday, March 5, 2019

San Diego CA

NATIONAL DHIA

Quality Certification Services Inc.

Technology

Decomplexify

It's a great concept communicated in a single, gangly word!

And in our business world, what doesn't need some decomplexifying?

Cost o vation

- / innovation that gives your customers exactly what they want-and nothing more /

- Cost-cutting and innovation often end up on opposite ends of the corporate seesaw; when one goes up, the other goes down. But it doesn't have to be that way.

- Costovation is a type of innovation that wows while significantly compressing

Ori-Collector Update

Meeting held with **Conseil Élevage** and **NDHIA** the last week of August to cover the issues

- Have a parts list and pricing grid (make available on web) – still waiting and how long is turnaround?
- Proposed agreement raised number of units for discount to 20 from 15 and discount % is less but tiered levels
- Sayca SL in Spain produces maximum of 60 units per month as orders and deposits are received
- Working on a set number of units per year (delivered by quarter) with discount applied on basis of 20 per order (4x year – commitment)

- Establish pricing and collecting firm orders and preparing to carry an “Inventory”

Ori-Collector Update

- Have some parts kits – individual parts are not specifically or individually priced in all cases

- Continue on working to have better turn around and communications with **Conseil Élevage** (France-marketing) and **Sayca SL** (Spain-manufacturer)

Need to asses the market

One Ori to every three robot stalls

Compatibility Ori-Collector®

ORI-COLLECTOR®

Kit DeLaval

DeLaval VMS
Under Delpro 4.00
Without HN

Standard Version

- Lely A3, A3next, A4
- Fullwood : Merlin
- BoumaticRobotics: Mrs1, Mrd1
- SAC: FuturLine

Kit GEA

GEA MIOne

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THE GLOBAL STANDARD FOR LIVESTOCK DATA

Network. Guidelines. Certification.

ICAR Recording & Sampling Devices Subcommittee (RSD-SC) Update

Field Services Advisory Committee

March 5, 2019

Steven Sievert

Technical Director, National DHIA/Quality Certification Services. Inc.
Chair, ICAR Subcommittee for Recording and Sampling Devices
Chair, ICAR Sensor Devices Task Force

NATIONAL DHIA Quality Certification Services Inc.

Recent ICAR Device Tests – Data Can be Sent to CDCB

Manufacturer	Device	Mounting	Resources Available from National DHIA
Afimilk	MPC	High Line Swing-Over	• New Calibration Procedure • New Operator Manual
DeLaval	VMS 300 with DeLaval VMS Sampler	AMS	• Operator Manual for VMS and Sampler
Galaxy (Hokofarm)	Galaxy Astrea 20.20 Premium with Ori-Collector	AMS	• Calibration Instructions • Operator Manual for Ori-Collector
Lely	A5 with Ori-Collector	AMS	• Operator Manual for A5

Planned ICAR Testing – Data Cannot be Sent to CDCB

Manufacturer	Device	Mounting	Anticipated Timeframe * Subject to change based on manufacturer activity
Nedap	Smart Flow with SAC Manual Sampler	Low Line	March 2019
Waikato	EMM with Manual Sampler	Low Line	Summer 2019 (delayed twice)
GEA	Monobox	AMS	Delayed for poor results – restart planned June 2019
SAC	IDC 3 IDC 3b	High Line Low Line	Spring 2019 – delayed due to redesign of controller
Boumatic	Smart Flo with Perfection Sampler	High Line Low Line Goats/Sheep Swing-Over	Summer 2019 – concern over stability of components and changes in algorithms in software
Elcabe	ARGI	Sheep	February 2019
DeLaval	VMS 300 with Ori-Collector	AMS	Q2 2019 – may be delayed due to issues in mixing of milk when in combination with Ori-Collector. Also want to make sure test includes V300 with Herd Navigator
GEA	Dairy Pro Q with Turn & Mix Sampler	Rotary Robot	Q2 2019 – Issues remain with carryover and quarter flow of milk

Planned ICAR Testing – Data Cannot be Sent to CDCB

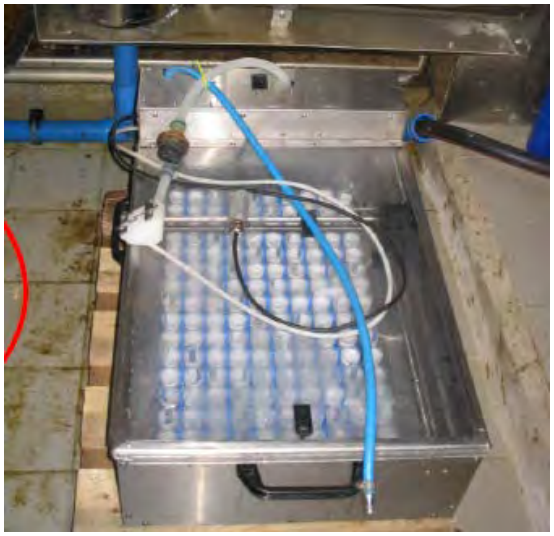
Manufacturer	Device	Mounting	Anticipated Timeframe * Subject to change based on manufacturer activity
Boumatic	SR1 & DR1with Ori-Collector	AMS	Target is Late Fall 2019 – which AMS version
DeLaval	*New Goat & Sheep Meter – Unnamed Model*	High Line	Summer 2019
Fullwood	Merlin M2 with Ori-Collector	AMS	Q3/Q4 2019
Afimilk	Afilite with new MPC-N Controller	Low Line High Line	Components for old controller for Afilite meter no longer available – Afimilk is building a new controller based on MPC to communicate with Afilite meters
Waikato	*New Mechanical Meter*	Low Line High Line Goats Sheep	Delayed – looks promising but zero-tests (internal) do not meet ICAR guidelines

AMS (Robotic) & Sampling Shuttles

- MR-S1, MR-S2
- MR-D1, MR-D2

- There is no ICAR-certified shuttle with Boumatic robots including the Ori-Collector

- Met with Boumatic multiple times on testing – mixed signals on next steps from Boumatic



DeLaval

- DeLaval VMS (original)
- DeLaval VMS 2007
- DeLaval VMS 2010
- DeLaval VMS 2012
- DeLaval V300

- DeLaval VMS Sampler with all models

- Ori-Collector with all but V300 – test planned in 2019 but delayed due to milk mixing when connected to Ori-Collector

- Changes in VMS in US (DeLaval response to FDA) have raised concerns – ICAR and NDHIA are reviewing at present time

NATIONAL DHIA

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- **Modification of Mix-Pipe by DeLaval**
- **Changes meet FDA and PMO**
- **Certified by ICAR RSD-SC in November 2018**

VMS Mix Pipe Comparison

On the left with the poly cover is the original and on the right is the redesign

- **Galaxy Astrea 20.20 Premium marketed by Galaxy USA**
- **Similar to other models from Hokofarm Group**
  - **SAC Futureline Max**
  - **System Happel TIM**

- **ICAR-Certified with Ori-Collector**

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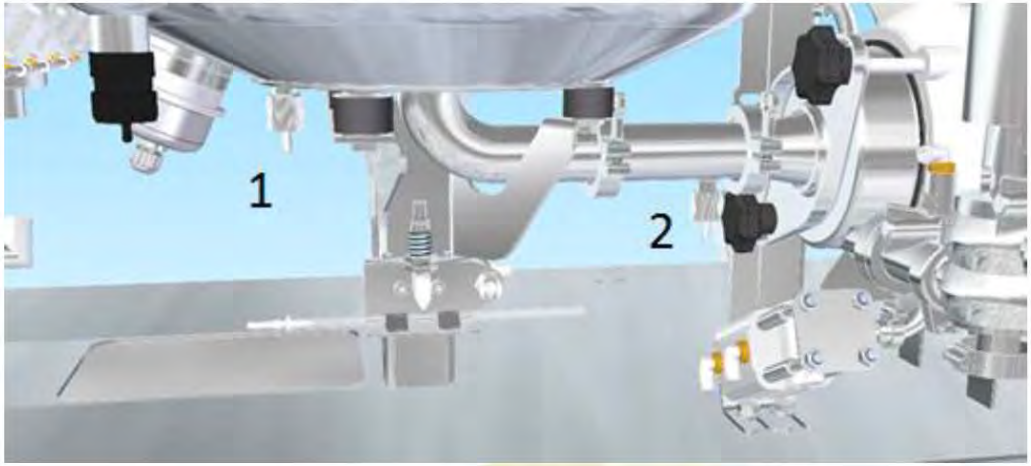


Figure 1 Detail view milk receiver and milk pump for systems build from 2013 or younger. The service pipe between both has a sample connector (2) for ICAR approved sampling. The old connector (1) needs to be trimmed to prevent usage on a later stage.

For systems manufactured from 2011 till 2013 no hardware changes are necessary . The dummy connector placed in the rubber connector can be removed and the sample connector can be placed. The rubber connector is highlighted at place 1 in Figure 2.

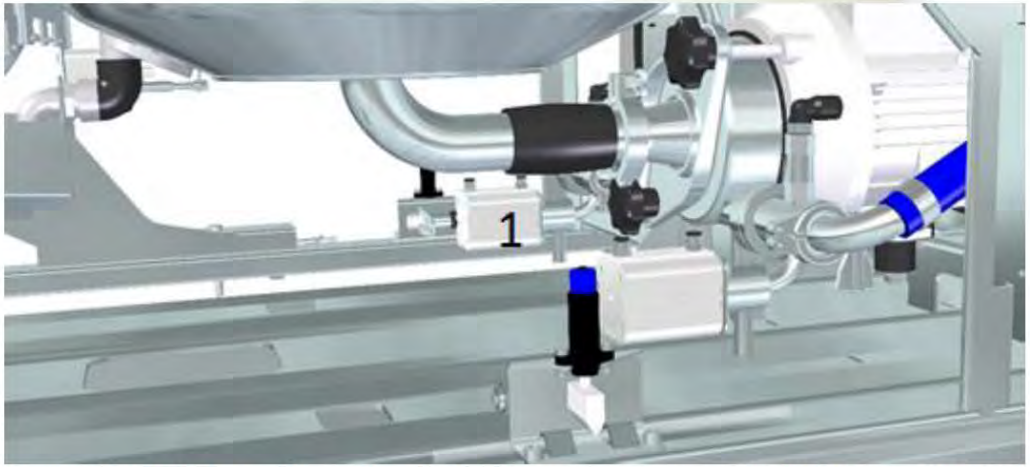


Figure 2 Detail view milk receiver and milk pump for systems build between 2011 till 2013. The sample connector can be placed in the rubber connector between milk receiver and milk pump (1).

INSENTEC

Resources Available

- **Calibration Manual**
- **Ori-Collector Manual**
- **Technical Bulletins**

AMS Galaxy USA *Volume 3*
Astrea 20.20 Maintenance Procedures

Milk Meter Calibration	03.19 Revision 0 October 2014 Page 1 of

Denotes Revision

1. **PURPOSE**

   The purpose of this document is to provide instruc

2. **SCOPE**

   This procedure applies and shall be used by all tra technicians.

3. **SUMMARY**

   This can be used as a guide for the service ch agencies. Under normal circumstances, this c

4. **PROCEDURE**

   4.1. To calibrate the milk meter you need to by so it is possible to measure the amount of which is shown in the SCU.
   4.2. Gather the following tools.
   4.2.1. Calibrated digital scale that measur necessary.
   4.2.2. 2 Temporary Hoses
   4.2.3. Milker Bucket
   4.3. Put the MCU in "Service" mode.
   4.4. Remove the hose between the milk meter milker bucket as shown in the diagram and

Dennis Millhoan Br

AMS GALAXY USA *Volume 2*
Astrea 20.20 Operating Procedures

Ori Sampling Rack Setup and Milk Testing	02.12a Revision 0 July, 2018 Page 1 of 15

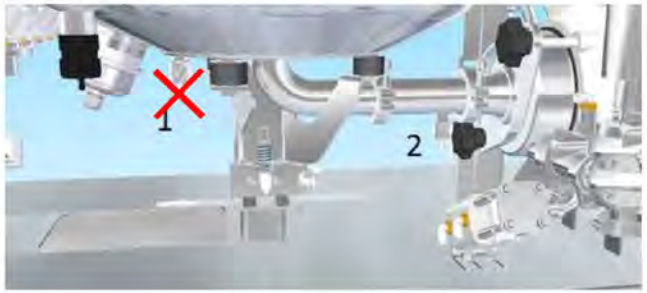
Denotes Revision

1. **PURPOSE**

   The purpose of this document is to provide guidelines for getting milk samples with an Ori Collector. The Ori Collector is the only device approved by ICAR for use with the Astrea 20.20 for official milk sampling. The Lely Shuttles can still be used for unofficial sampling (Procedure 02.12). This collector is found to be faster than the sample shuttle and will only cost a small amount of box time. The rack can also hold 90 bottles each and so in the case where cows visit the robot more on Box 1 vs. Box 2, there is ample capacity to accommodate for non-uniform visits.

2. **SCOPE**

   This procedure applies and shall be used by farm owners, AMS Galaxy USA support staff and DHI Testers. ICAR approved sampling is only on systems running RDS software 4.1 or greater, and which have a sampling nipple located in the milk pipe leading to the milk pump (2). Sampling Nipple in the receiver jar (1) are NOT ICAR approved. For more information regarding upgrading to ICAR approved sampling, see appendix.



Bradley Biehl

NATIONAL DHIA

Quality Certification Services Inc.

GEA

MIOne AMS

- **Must use the MIOne sampler**
- **The Ori-Collector is not certified (failed ICAR test) to work with the MIOne**

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Monobox AMS

- **The Monobox is not ICAR-certified – currently working with GEA on testing and approval – test began in October 2019 and aborted due to poor results.**

- **The Ori-Collector has not been tested with the Monobox – no plans for any test with Monobox.**

NATIONAL DHIA

Quality Certification Services Inc.

Challenges with Monobox AMS

- The Monobox uses 4 Lactoflow sensors for quarter milk flows and 1 Metatron meter for official DHI milk weight.
- Treated or fresh cows are diverted before the Metatron master meter and do not receive an official DHI milk weight or sample.

NATIONAL DHIA

Quality Certification Services Inc.

Challenges with Monobox AMS

- **Sensors that detect abnormal milk from a quarter will divert that milk prior to the Metatron meter (similar to handling of treated cows).**

- **Resulting milk yield will be incomplete (possibly missing milk from one or more quarters in total milk yield).**

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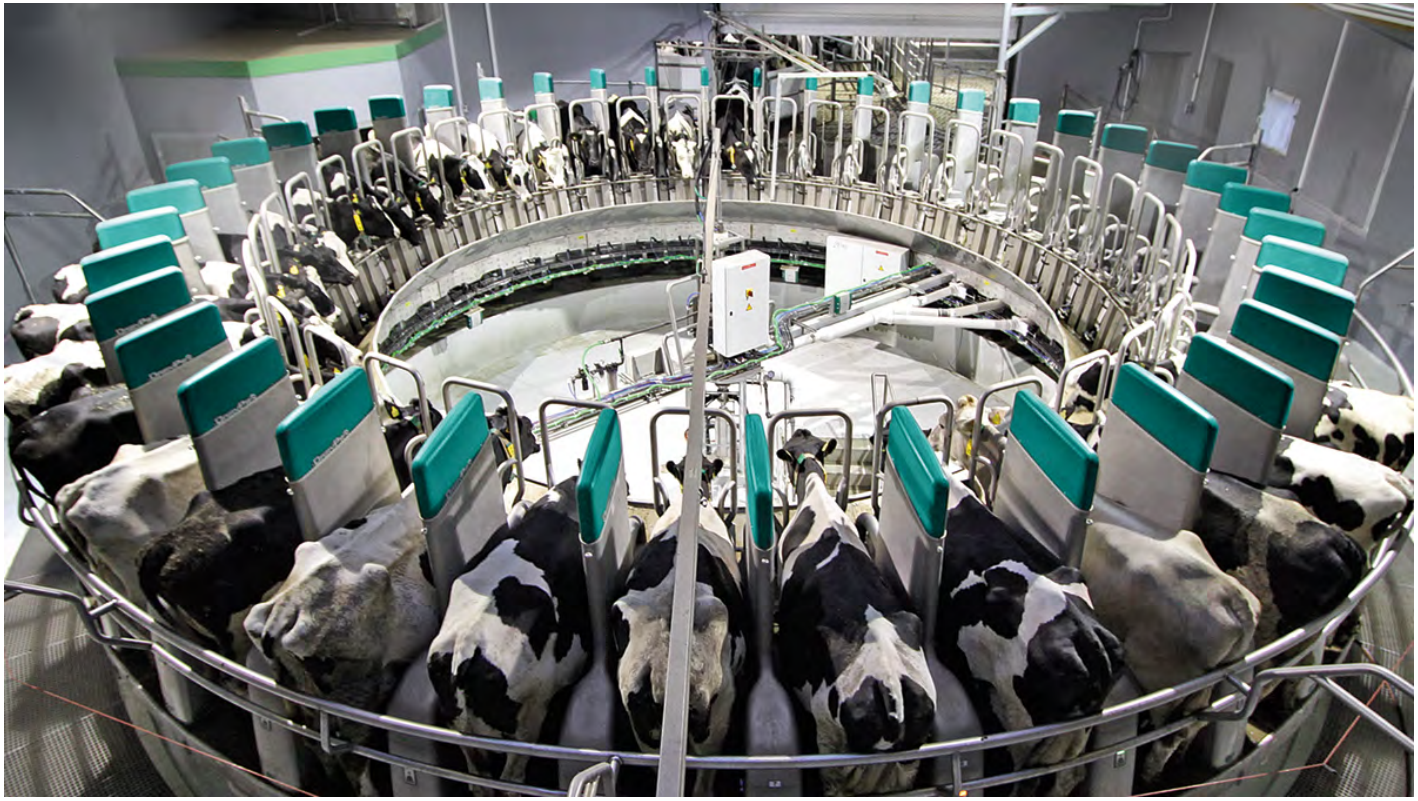

Dairy ProQ

- **System is more conventional but concerns exist – no cluster, sensors like Monobox, and carry-over.**
- **Working with GEA on testing and certification – access to installations, sampler certification, PCB changes all have impact on process.**

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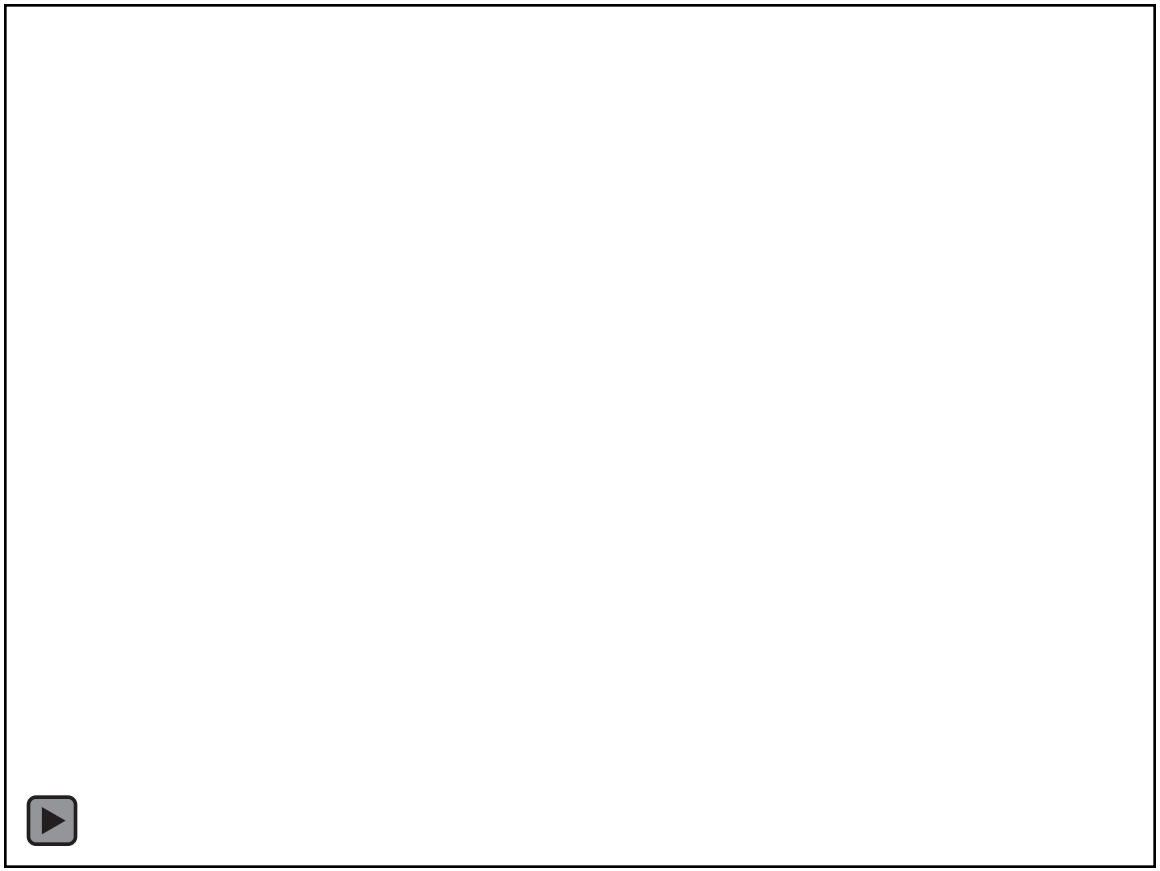

Dairy ProQ

Carry-over when using milk sampler for Metatron meter – approximately 5-8 ml milk from previous cow.

innovators in agriculture

- **Certified AMS Models**
  - **Astronaut/Astronaut A2**
  - **A3/A3 Next**
  - **A4**
  - **A5**

- **Certified Shuttles**
  - **Not all shuttles are certified with all Lely AMS Models**
  - **Lely Shuttle A**
  - **Lely Shuttle XY**
  - **Ori-Collector**

- **Modifications required to use Shuttle XY but moot point because not available in US/Canada**

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innovators in agriculture

Shuttle XY

- Used in Netherlands, Belgium & Luxembourg
- Does not come with sample tray or ability to rack vials
- CRV developed tray with QLIP to meet their needs

- Not a working solution for North America presently

- RSD-SC (Steve) will meet (again) with Lely International but no plans as of February 2019

NATIONAL DHIA
Quality Certification Services Inc.

ICAR-Certified AMS-Sampler Combinations

Updated 2/15/2019

Available on QCS Website

	Lely Shuttle A	Lely Shuttle XY [Not Available in US/Canada]	Ori-Collector 90	GEA Sampler	DeLaval Milk Sampler
					
Boumatic MR-D1	Not Certified	Not Certified	Not Certified		
Boumatic MR-D2	Not Certified	Not Certified	Not Certified		
Boumatic MR-S1	Not Certified	Not Certified	Not Certified		
Boumatic MR-S2	Not Certified	Not Certified	Not Certified		
Fullwood Merlin	Not Certified	Not Certified	Not Certified		
Fullwood M²erlin	Not Certified	Not Certified	Not Certified		
GEA MI-One			Not Certified	Certified	
GEA Monobox			Not Certified	Not Certified	
Lely Astronaut	Certified	Not Certified	Not Certified		
Lely A2	Certified	Not Certified	Not Certified		
Lely A3	Not Certified	Certified	Certified		
Lely A3 Next	Not Certified	Certified	Certified		
Lely A4	Not Certified	Certified	Certified		
Lely A5	Not Certified	Certified	Certified		
Galaxy Starline 2007/2009	Not Certified	Not Certified	Not Certified		
Galaxy Astrea 20.20 2011	Not Certified	Certified	Certified		
Galaxy Astrea 20.20 2013	Not Certified	Certified	Certified		
Galaxy Astrea 20.20 Premium	Not Certified	Certified	Certified		
Galaxy Astrea 20.20 Premium FDA	Not Certified	Certified	Certified		
DeLaval VMS			Certified		Certified
DeLaval VMS 2008			Certified		Certified
DeLaval VMS 2010			Certified		Certified
DeLaval VMS 2012			Certified		Certified
DeLaval VMS 300			Not Certified		Certified
Milkomax Roboleo	Not Certified	Not Certified	Not Certified		

NATIONAL DHIA

QCS Quality Certification Services Inc.

Fixed In-Place Electronic Meters & Samplers

afimilk®
The Heart of the Dairy Farm

- **Approved Models**
  - **Afiflo 2000**
  - **Afiflo 9000**
  - **Full Flow (MM 85/MM95)**
  - **Afilite (Germania's Essential)**
  - **Afilite MPC**
  - **Afi 155 & 155i (Sheep & Goat)**
- **Low-line installation for all models**
- **High-line certification now for Afilite, Afilite MPC, Afi 155/155i**
- **Must Use Afikim Sampler**
- **There is no meter performance report available– must interface with DC305 or PCDART for EMMR**
- **Possible report available at dealer level – QCS met with Afifarm on report in February 2019**

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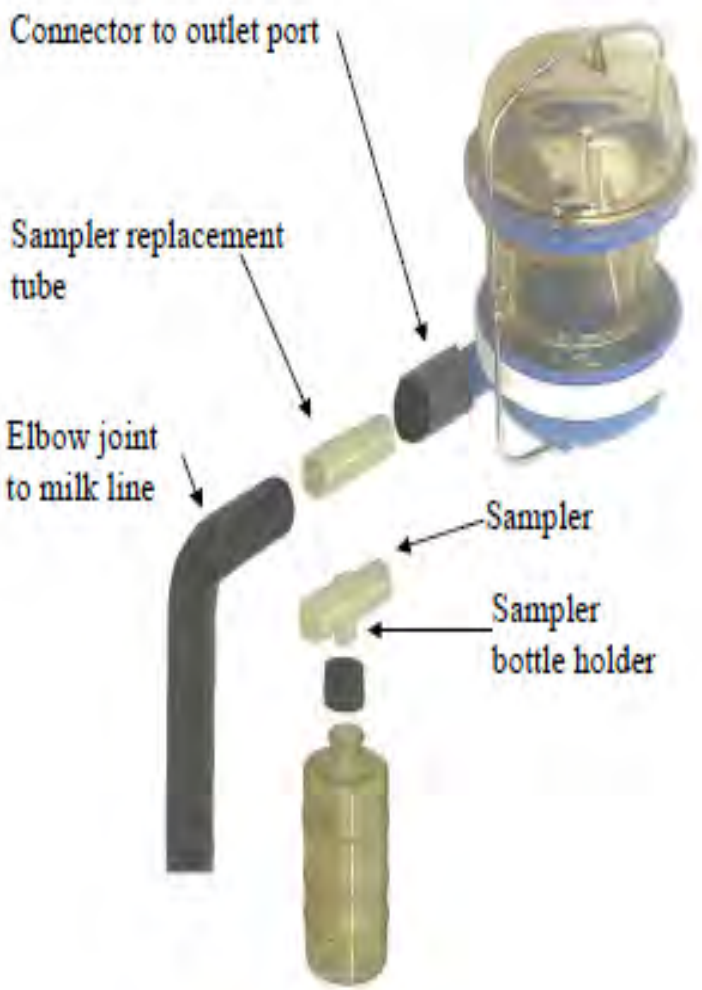
QCS Quality Certification Services Inc.



afimilk®
The Heart of the Dairy Farm

- **The Afi 2x Sampler is only certified for use with Afikim meters.**
- **Cannot be used with GEA Metatron, Boumatic Perfection, or DeLaval meters – this includes owner-sampler herds.**
- **Decoupled systems have not been tested and are not certified.**
- **Issues**
  - **Biased results**
  - **Sampler flooding with other meters**
  - **Foaming and flooding with vented inflations (impulseAir, Conewango)**

- **The Ambic sampler is not certified for DHI programs under any conditions including owner-sampler herds.**
- **It has never been ICAR tested.**
- **Appears to be a negative bias for fat in limited testing.**
- **The challenge is the local milking equipment dealers are selling this sampler with on-farm meters instead of the higher-priced ICAR-certified sampler for the respective meter model.**

BECO
DAIRY AUTOMATION INC.

- **The Beco Scan Nexus is not approved for recording of milk weights in DHI programs.**
- **Is not ICAR-certified.**
- **It cannot be ICAR tested as they do not have a sampler of their own.**
- **Option to use another manufacturer's sampler but BECO is not willing to invest in testing and certification at this time.**

NATIONAL DHIA
Quality Certification Services Inc.

BouMatic™

- **Precision/Precision XL National DHIA approved but was never ICAR tested – now grandfathered and ICAR-certified.**
- **Also known as Model M/M+**
- **Must use the Boumatic Precision Sampler.**
- **Service manual, troubleshooting guides, and calibration instructions are available from QCS.**

NATIONAL DHIA QCS Quality Certification Services Inc.

AMI 5450/5550

- **Automatic Milk Indicator**
- **Not ICAR tested/certified.**
- **Will not pass ICAR test – 5-7% bias on milk yield.**
- **There is no sampler for the system – cannot use another sampler like the Afi 2X sampler.**
- **Cannot be used for DHI programs at the present time.**

NATIONAL DHIA

Quality Certificat Services Inc.

Perfection 3000

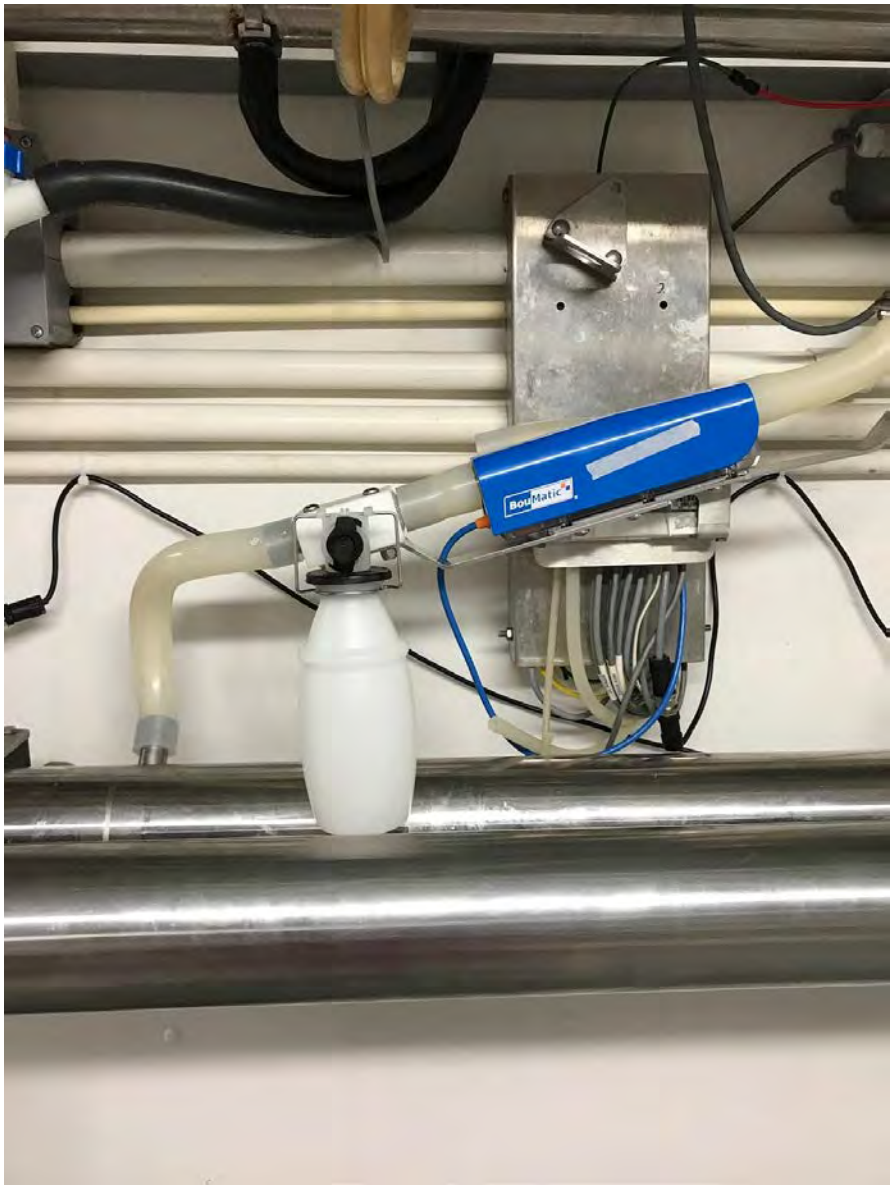
- Must use Boumatic Perfection Sampler with the meter
- Some components are no longer available – will have to be retested in near future
- New calibration module in software (AQUA) is causing concerns about meters reading low – ICAR is reviewing
- Service manual, troubleshooting guides, and calibration instructions are available from QCS.

SmartControl Meter

- ICAR-certified
- Must use the Boumatic Perfection Sampler
- Must retrofit deflector/upgrade software – still not completed in some areas (CA, CO, New England)
- Fat is underestimated with old deflector

New SmartFlo Meter

- New (free flow) meter being tested on DHI dairy
- Appears to use Perfection sampler with modified sampling port
- Will be tested in late 2018
- Cannot use yield or component data from this device



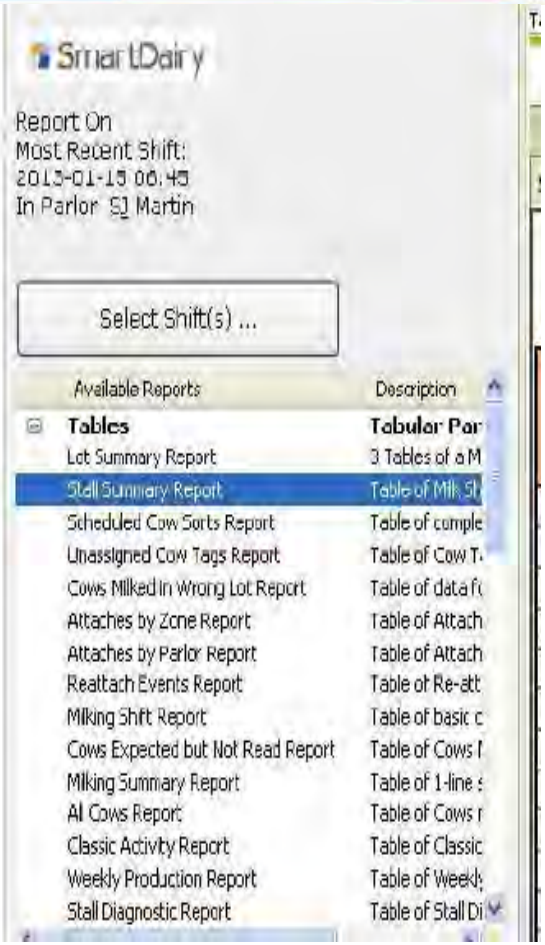
Provantage Parlor Report

DIAMOND S RANCH INC.
MLKG NO. IS 1
18 FEB 09
3:58 PM

ProVantage Prime

Stl	Cows	P/E	Prod	Exp	Time	#Cnd	C/AC	Cond	AvgC	MDet	MMod	RCtr	F120	Data	CIP
1	38	103	38	37	5	37	98	5.9	6.0	0	2	0	7	0	141
2	38	99	38	38	5	38	108	6.7	6.2	0	1	0	10	0	126
3	37	104	38	36	5	36	112	6.9	6.1	1	2	0	8	0	118
4	37	103	37	36	5	36	104	6.4	6.1	0	2	0	9	0	128
5	36	103	39	37	5	36	82	5.0	6.1	0	1	0	8	0	118
6	35	97	36	37	5	35	106	6.4	6.0	1	2	1	8	0	100
7	35	105	38	36	5	34	108	6.6	6.0	1	2	2	8	0	119
8	36	101	36	36	5	36	113	6.7	5.9	0	2	0	8	0	116
9	36	98	37	38	5	35	81	5.1	6.2	0	1	0	8	0	140
10	36	99	38	38	5	36	103	6.3	6.1	0	1	0	8	0	148
11	35	96	38	39	6	35	99	6.2	6.2	0	3	1	8	0	130
12	34	101	39	39	5	33	107	6.8	6.4	0	2	0	7	0	121
13	39	99	36	37	5	38	102	6.4	6.2	0	3	0	8	0	110
14	39	107	37	35	5	38	108	6.6	6.1	2	2	5	8	0	109
15	39	105	38	36	5	38	101	6.1	6.0	0	2	1	8	0	109
16	38	92	35	38	5	38	98	6.0	6.1	0	2	0	7	0	116
17	36	102	37	36	5	35	106	6.6	6.2	0	3	0	8	0	111
1	35	100	37	37	5	34	112	7.2	6.4	0	1	0	8	1	104
19	35	106	37	34	5	35	104	6.6	6.4	1	1	1	8	0	107
20	36	101	36	35	5	35	90	5.5	6.1	1	1	2	7	0	109
21	36	107	41	39	5	36	111	6.8	6.1	0	1	0	9	0	107
22	34	96	34	36	5	33	105	6.7	6.3	2	2	2	9	1	110
23	34	98	39	40	5	34	105	6.5	6.2	0	0	0	9	1	109
24	32	99	38	39	5	32	110	6.9	6.3	0	1	0	9	1	105

BouMatic™



SmartDairy

Stall Summary Report
ROTARYBARN
START:2014-05-01 10:05 - STOP:2014-05-01 16:52

STALL	MILK	TOTAL LBS	AVG COND	MANU. MODE	MANUAL DETACH	REATTACH	AVG LBS / MIN 60 120	MAX LBS / MIN 60 120	% OF XPCTD	MIN ATT'D	# WASH DUMP
1	39	1690.4	6.8	2	7	0	11.7	19.0	101	5.3	131
2	40	1796.8	7.0	1	5	2	12.2	26.0	100	5.2	136
3	40	1808.6	6.9	1	7	7	12.5	29.0	106	5.3	140
4	38	1714.0	6.6	5	10	2	10.5	20.0	101	5.8	79
5	39	1737.8	7.1	4	8	4	12.4	22.0	102	5.2	138
6	40	1738.3	0.0	6	10	10	12.3	24.0	104	5.3	134
7	40	1874.4	7.1	1	4	2	12.3	21.0	106	5.4	139
8	38	1732.4	6.5	1	8	8	11.9	24.0	110	5.5	133
9	36	1671.0	7.1	2	14	9	13.1	24.0	102	5.2	141
10	39	1703.5	5.3	0	3	0	13.3	24.0	102	5.1	149
11	39	1782.0	7.3	3	7	2	11.1	25.0	103	5.7	134
12	39	1726.5	7.0	6	6	7	12.7	21.0	98	5.5	143
13	37	1605.7	7.2	4	8	2	10.0	19.0	99	5.7	154
14	38	1621.7	6.8	2	4	3	11.0	19.0	99	5.4	136
15	40	1864.0	6.9	2	4	2	11.7	25.0	103	5.5	145
16	39	1755.5	7.2	1	6	2	12.4	24.0	107	5.5	140
17	40	1783.4	0.0	0	2	4	11.9	22.0	104	5.3	134
18	38	1726.0	4.0	2	3	2	12.4	24.0	101	5.6	143
19	39	1730.0	4.1	3	5	5	11.3	17.0	101	5.4	150
20	40	1886.3	6.9	2	5	6	13.6	22.0	105	5.2	147
21	38	1674.7	6.0	3	3	4	12.4	25.0	100	5.2	147
22	38	1739.6	0.0	8	18	15	12.1	21.0	110	5.7	144
23	40	1887.6	6.9	0	6	6	14.9	22.0	113	4.8	169
24	40	1561.0	7.1	3	4	3	11.2	19.0	96	5.1	164
25	39	1765.5	7.0	2	7	3	11.1	17.0	101	6.0	163
26	40	1980.3	6.8	4	6	3	12.8	22.0	110	5.7	132
27	38	1616.3	0.0	1	5	5	11.1	21.0	102	5.8	132
28	37	1613.7	7.3	3	4	2	12.4	22.0	101	5.4	135
29	37	1586.9	6.4	3	6	3	11.7	24.0	101	5.6	141
30	39	1726.6	7.1	1	2	2	13.0	22.0	103	5.3	133

reported: 2014-05-15 10:24

NATIONAL DHIA
Quality Certification Services Inc.

Weighall Milk Meter

- Both high line and low-line installations are certified at this time .
- Working on new meter performance report with Dairymaster.
- It appears that Dairymaster changed valve materials and dump cycle but denies any changes.
- Met with Dairymaster in February 2019 on routine procedures, reported changes and next steps to retain certification.

DAIRYMASTER

- Challenges with the Dairymaster subsampler
- Mixing of milk is crucial before sampling due to shape of sampler
  - 10 seconds mixing time
  - Complete drainage of sampler
- Failure to properly mix subsample can result in overestimating milk fat and SCC values
- High carryover potential if sampler is not emptied

NATIONAL DHIA

Quality Certification Services Inc.

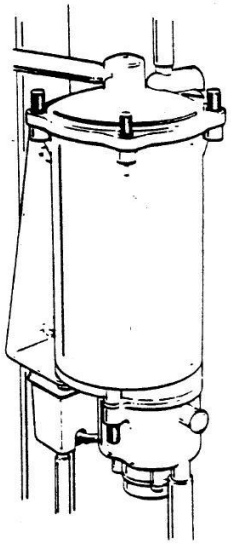
Swiftflo Commander

- **Uses old Weighall meter with a new controller called Swiftflo Commander.**
- **Not ICAR-certified.**
- **Met with Dairymaster and with indication that they will apply for ICAR test in 2019.**

Milk Flow Sensor and Swiftflo Commander

- **The combination of the new flow sensor and Swiftflo Commander panel is not ICAR-certified.**
- **Will not pass ICAR testing with current technology.**

DeLaval



- **Approved Models**
  - **Flomaster**
  - **SG (Sheep & Goat)**
  - **MM15 (Flomaster Pro)**
  - **MM25/MM25W/MM27BC**
  - **Delpro MU480/MU486**
- **Must use proper DeLaval sampler for each model**
- **All meters are low-line except for Delpro MU480/MU486**
- **New meter calibration functionality in Delpro software for MM25/MM27BC**

NATIONAL DHIA

Quality Certification Services Inc.

DeLaval

- **Unapproved models – these are flow indicators (FI) that are only in the 5-8% accuracy range**

FI 2

FI 5

DeLaval

MM15 (Flomaster Meter)

- Must use the correct sampler
- Fill and dump meter
- Calibration instructions and troubleshooting guides available from QCS

NATIONAL DHIA

Quality Certification Services Inc.

DeLaval

MM25/MM27BC

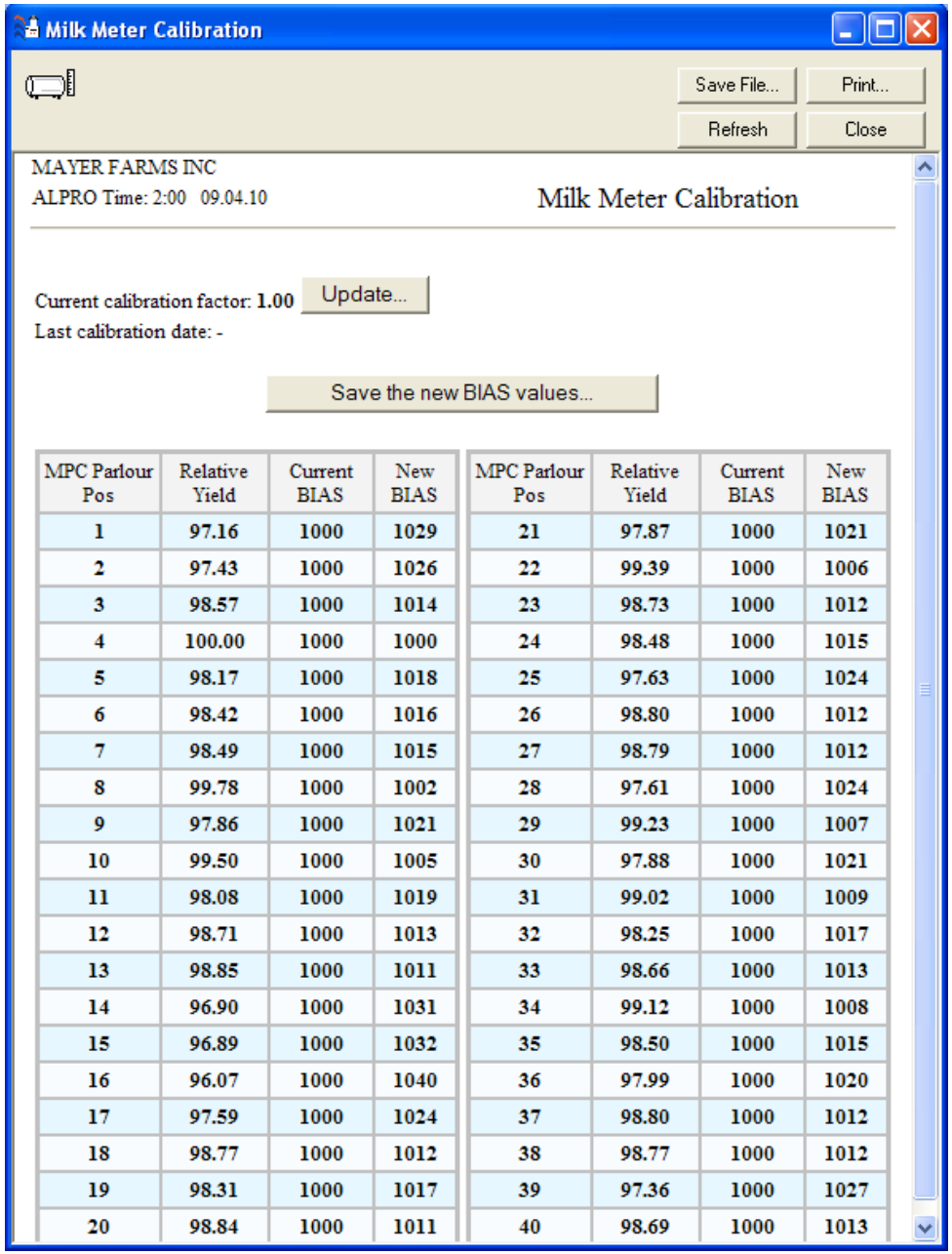
- Must use the correct sampler
- Continuous flow sensor meter from SCR that uses combination of infrared and white light
- Reported issues with vented inflations
- Calibration instructions and troubleshooting guides available from QCS

NATIONAL DHIA

Quality Certification Services Inc.

Alpro/Delpro Report for Calibration of MM25/27 Meters

- Can be calibrated every month
- Uses milk shipped weight info
- Presentation from DeLaval in folder explaining procedure.
- Meets ICAR and QCS requirements for meter calibration.



Milk Meter Calibration

Save File... Print... Refresh Close

MAYER FARMS INC
ALPRO Time: 2:00 09.04.10

Milk Meter Calibration

Current calibration factor: 1.00 Update...
Last calibration date: -

Save the new BIAS values...

MPC Parlour Pos	Relative Yield	Current BIAS	New BIAS	MPC Parlour Pos	Relative Yield	Current BIAS	New BIAS
1	97.16	1000	1029	21	97.87	1000	1021
2	97.43	1000	1026	22	99.39	1000	1006
3	98.57	1000	1014	23	98.73	1000	1012
4	100.00	1000	1000	24	98.48	1000	1015
5	98.17	1000	1018	25	97.63	1000	1024
6	98.42	1000	1016	26	98.80	1000	1012
7	98.49	1000	1015	27	98.79	1000	1012
8	99.78	1000	1002	28	97.61	1000	1024
9	97.86	1000	1021	29	99.23	1000	1007
10	99.50	1000	1005	30	97.88	1000	1021
11	98.08	1000	1019	31	99.02	1000	1009
12	98.71	1000	1013	32	98.25	1000	1017
13	98.85	1000	1011	33	98.66	1000	1013
14	96.90	1000	1031	34	99.12	1000	1008
15	96.89	1000	1032	35	98.50	1000	1015
16	96.07	1000	1040	36	97.99	1000	1020
17	97.59	1000	1024	37	98.80	1000	1012
18	98.77	1000	1012	38	98.77	1000	1012
19	98.31	1000	1017	39	97.36	1000	1027
20	98.84	1000	1011	40	98.69	1000	1013

NATIONAL DHIA

Quality Certification Services Inc.

- **The E-Z Sampler is not approved for DHI programs under any conditions.**
- **Is not ICAR-certified with any meter.**
- **The challenge is the local milking equipment dealers are selling this sampler with on-farm meters instead of higher-priced ICAR approved sampler for the respective meter model.**

Set-Up	# Cows	BF MD	BF SD	Protein MD	Protein SD	SCC MD	SCC SD
EZ Sampler before Boumatic Meter	167	+0.06	0.152	-0.04	0.082	+58	69
EZ Sampler behind Boumatic Meter (proper setup)	86	+0.18	0.368	-0.06	0.047	+121	127

NATIONAL DHIA Quality Certification Services Inc.

Metatron Meter

- Certified Controller Combinations
  - Metatron 12
  - S21/P21
  - Dematron 70
  - Dematron 75
- Low-Line Installation
- High-Line Installation is now ICAR-certified.
- Must Use GEA/Westfalia Sampler
- Reports of Sampler Flooding with Higher Milk Flow Rates or Vented Inflations – ICAR investigating.

NATIONAL DHIA

Quality Certification Services Inc.

Metatron Meter Report

DairyPlan DPList 5.212.022 NO10C108 BOS 4 1-02-09 6:45

Meter	Number Weights	No Cow#	Cow# Hand	Cow# Auto	Auto %	----Averages---- Milk	Time	%Dev	Total Milk
54	47	0	0	47	100	27.11	5.0	0	1274
55	46	0	0	46	100	27.79	5.1	1	1278
56	47	0	0	47	100	31.78	5.1	9	1494
57	45	0	0	45	100	27.42	5.1	-5	1234
58	47	0	0	47	100	28.78	5.1	7	1352
59	46	0	0	46	100	26.76	4.8	-3	1231
60	46	0	0	46	100	26.96	4.8	-2	1240
61	47	1	0	46	100	25.81	5.0	-0	1213
62	47	0	0	47	100	24.92	4.8	-6	1171
63	47	1	0	46	100	28.43	5.0	3	1336
64	46	0	0	46	100	28.17	4.8	4	1296
65	46	0	0	46	100	25.97	5.0	-5	1195
66	46	0	0	46	100	26.98	5.0	-1	1241
67	46	0	0	46	100	26.73	4.9	-7	1230
68	45	0	0	45	100	26.49	5.0	-3	1192
69	47	0	0	47	100	28.53	5.0	2	1341
70	46	0	0	46	100	27.88	5.1	-1	1283
71	45	0	0	45	100	25.84	4.9	-0	1163
72	46	0	0	46	100	26.23	5.0	-3	1206
	3302	8		3294	100	26.67	4.9	-1	88060

NO QUALIFYING DATA TO PRINT

0 Cows identified more than once

0 Unknown responders

NATIONAL DHIA Quality Certification Services Inc.

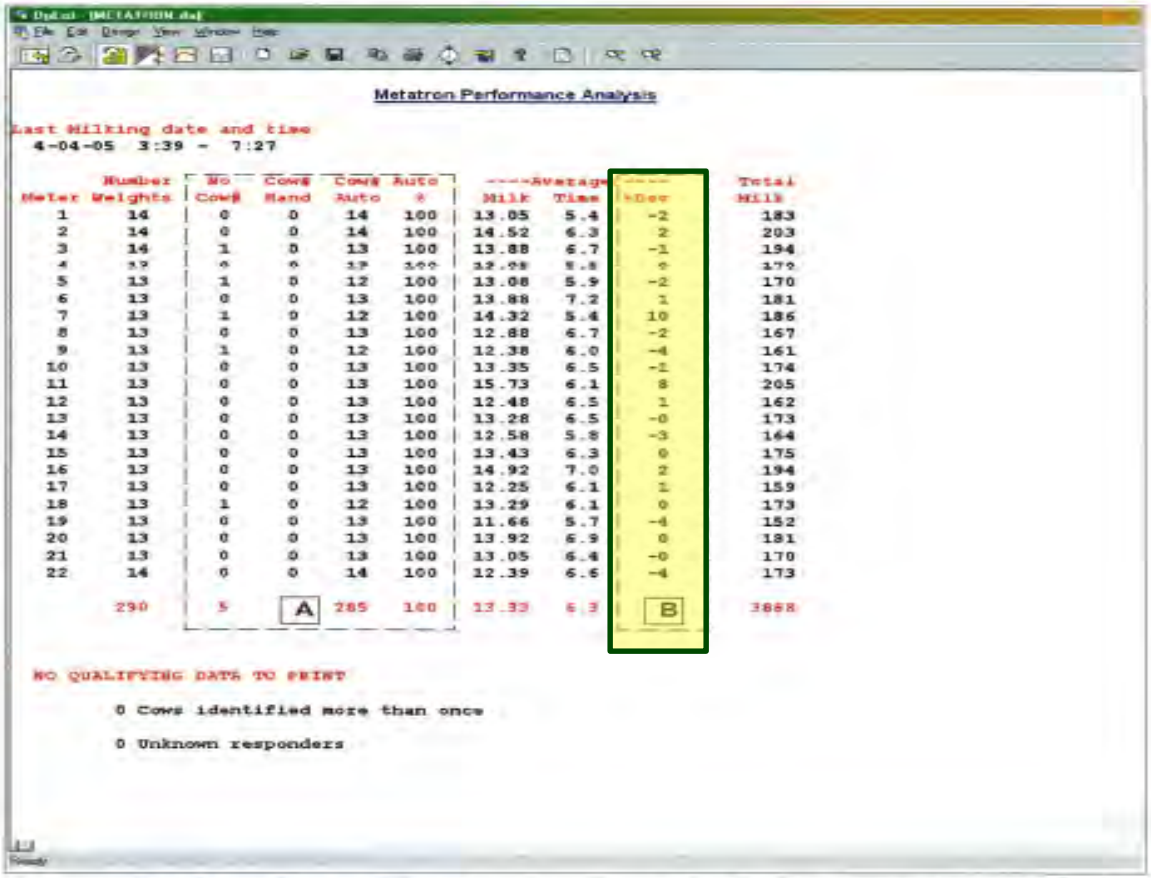
Metatron Meter Report

Metatron yield analysis

At the end of the milking session, the Metatron yield analysis gives an overview of the key figures for the milking session.

An identification statistic (A) gives an idea of the quality of automatic identification. Milk quantities without identification are not included in this because the causes are too numerous.

In this example, the percentage deviation (B) of the amount milk obtained from the amount of milk expected shows a negative trend in the herd.
If individual Metatron units show two-figure deviations over several days, this points to a fault.



Metatron Performance Analysis

Last Milking date and time
4-04-05 3:39 - 7:27

Meter	Number Weights	No Cows	Cows Hand	Cows Auto	Auto %	Average Milk	Average Time	% Dev	Total Milk
1	14	0	0	14	100	13.05	5.4	-2	183
2	14	0	0	14	100	14.52	6.3	2	203
3	14	1	0	13	100	13.88	6.7	-1	194
4	12	0	0	12	100	12.08	5.8	0	170
5	13	1	0	12	100	13.08	5.9	-2	170
6	13	0	0	13	100	13.88	7.2	1	181
7	13	1	0	12	100	14.32	5.4	10	186
8	13	0	0	13	100	12.88	6.7	-2	167
9	13	1	0	12	100	12.38	6.0	-4	161
10	13	0	0	13	100	13.35	6.5	-1	174
11	13	0	0	13	100	15.73	6.1	8	205
12	13	0	0	13	100	12.48	6.5	1	162
13	13	0	0	13	100	13.28	6.5	-0	173
14	13	0	0	13	100	12.58	5.8	-3	164
15	13	0	0	13	100	13.43	6.3	0	175
16	13	0	0	13	100	14.92	7.0	2	194
17	13	0	0	13	100	12.25	6.1	1	159
18	13	1	0	12	100	13.29	6.1	0	173
19	13	0	0	13	100	11.66	5.7	-4	152
20	13	0	0	13	100	13.92	6.9	0	181
21	13	0	0	13	100	13.05	6.4	-0	170
22	14	0	0	14	100	12.39	6.6	-4	173
	290	5	A	285	100	13.33	6.3	B	3868

NO QUALIFYING DATA TO PRINT

0 Cows identified more than once

0 Unknown responders

The results of previous milking sessions can also be displayed by shifting the visible section of the window.

NATIONAL DHIA

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milkrite | InterPuls

MMV Meter

- Certified Controller Combinations
  - iMilk 600+
  - ACR Smart
- Must use sampler from Interpuls
- Low-Line Installation is ICAR-certified
- High-Line will be tested in 2019
- Software designed with multiple algorithms to compensate for vented inflations

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PRECISE DAIRY FARMING

- **Uncertified Sensor from SCR**
  - **FFS 30 Sensor**
  - **ED 200 Display**
  - **MC 200 Controller**
- **FFS 30 is same as DeLaval FI 5**
- **SCR has not tested or applied for ICAR testing/certified**
- **Cannot be used for DHI programs**

NATIONAL DHIA Quality Certification Services Inc.

DATAMARS

TRU-TEST

Lactocorder T-T

- Lactocorder is manufactured by WMB from Switzerland
- ICAR-certified for cattle, goats and sheep
- Marketing agreement between Datamars/Tru-Test and WMB
- Lactocorder is not field ready yet – device is certified however total system needs refinement/review
- Meter works on the expected milk yield principle – need to have ID and previous milk in the system

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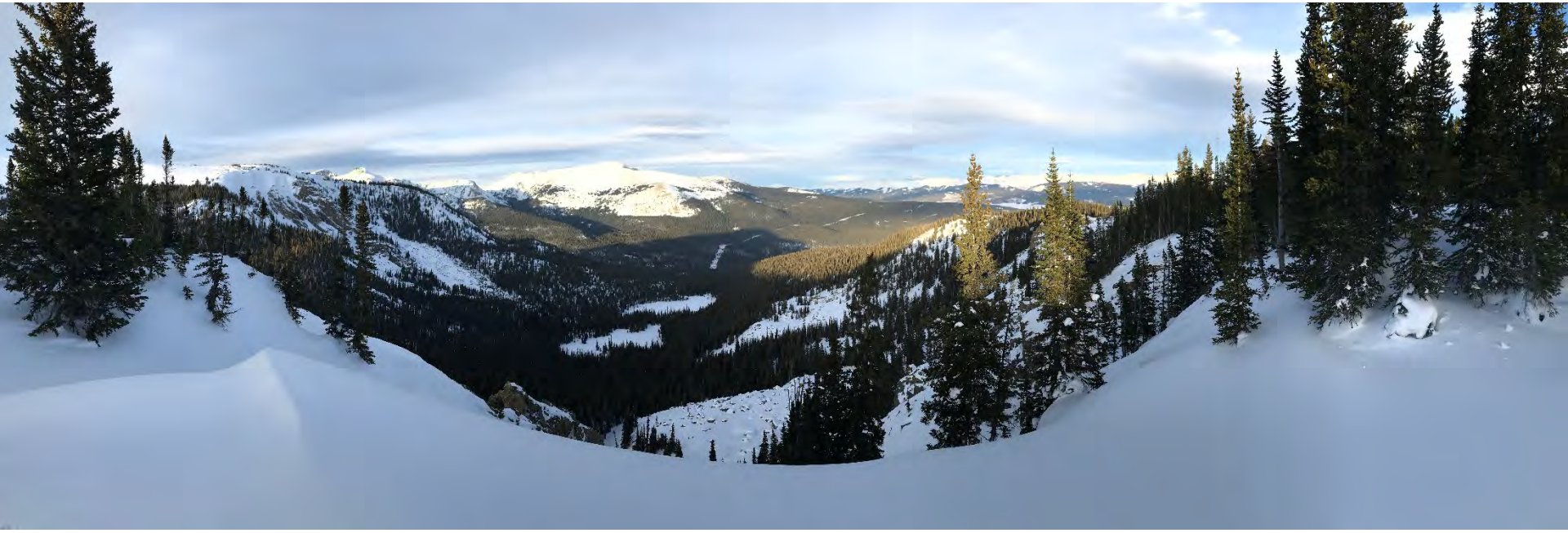
Waikato Electronic Milk Meter

- Waikato applied for ICAR test late in 2017 – delayed four times by Waikato.
- Includes EMM, new sampler and software
- Will be conducted in three parts
  - Lab – France
  - Farm #1 – Michigan
  - Farm #2 – Ireland
- Cannot use this meter for DHI programs currently

USDA
United States Department of Agriculture



Update from the National Animal Health Monitoring System

Jason Lombard, DVM, MS

Outline

- *Salmonella* Heidelberg in Calves
- Tuberculosis in Dairy Cattle
- *Brucella abortus* RB51
- Calf Death Categories
- DHIA Pilot Study 2017
- Potential NAHMS/DHIA 2020/21 Study
- DHIA Herd Summary Record Monitoring

Outline

- *Salmonella* Heidelberg in Calves
- Tuberculosis in Dairy Cattle
- *Brucella abortus* RB51
- Calf Death Categories
- **DHIA Pilot Study 2017**
- **Potential NAHMS/DHIA 2020 Study**
- DHIA Herd Summary Record Monitoring

DHIA Pilot Study

- Working group
  - Angie Coburn (AgSource)
  - Jere High (Lancaster DHIA)
  - George Cudoc, John Tauzel (Dairy One)
  - Bill Verboort (AgriTech Analytics)
  - John Clay (DRMS)
- Pilot conducted by 4 service providers/DRPCs in 2017
- Face-to-face interviews

DHIA Pilot Study

DHIA Source	Operations Surveyed	States
AgSource	7	2
AgriTech	6	2
Dairy One	12	3
Lancaster	5	2
Total	30	7

DHIA Pilot Focus Areas

- Dairy Herd Information
- Housing and Facility Information
- Reproduction Practices
- Milking Facilities and Udder Health
- Newborn Calf Survival and Management
- Priority Diseases

DHIA Pilot Study Outcomes

- Feasible
- Needed to be coordinated at the field level
- Summary of responses
  - 30 operations
  - Not randomly chosen
  - No inference population

Top Five Disease Rankings

	DHIA source				
Rank	AgSource	AgriTech	Dairy One	Lancaster	All
1	Calf diarrhea	Lameness	Lameness	Lameness	Lameness
2	Respiratory disease	Abortions	Respiratory disease	Calf diarrhea	Respiratory disease and Calf diarrhea (tied)
3	*Salmonella*	Respiratory disease	Calf diarrhea	Respiratory disease	
4	Lameness	*Cryptosporidium* and *Neospora* (tied)	Abortions	*Staph aureus*	Abortions
5	*E. coli* and abortions (tied)		*Staph aureus*	Johne's disease	*Staph aureus*

NAHMS / DHIA Survey

- Conducted in 2020/2021?
- Requires OMB approval
- Priority topics
- Sample testing (milk, filters, other)

- Meet Thursday

National DHIA Annual Meeting CDCB Report

João Dürr & Javier Burchard

March 5, 2019 – San Diego, CA

CDCB

COUNCIL ON DAIRY CATTLE BREEDING

Outline

- From genomics to big data
- Genomic evaluations including crossbred animals
- Early first calving
- Updated service fees

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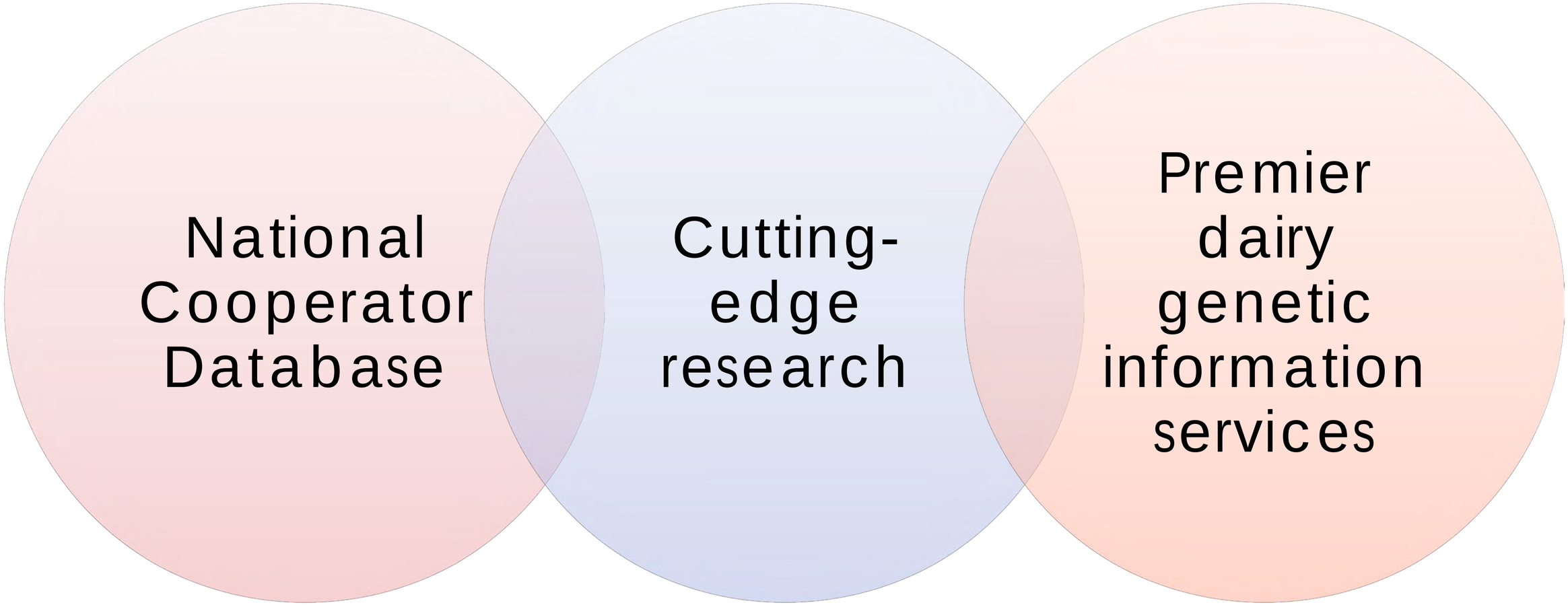
CDCB is a non-profit dairy driven company that provides pre-competitive services and products in an independent and transparent framework to improve the genetics and management of dairy herds worldwide.

Value-added to dairy producers



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FROM GENOMICS TO BIG DATA

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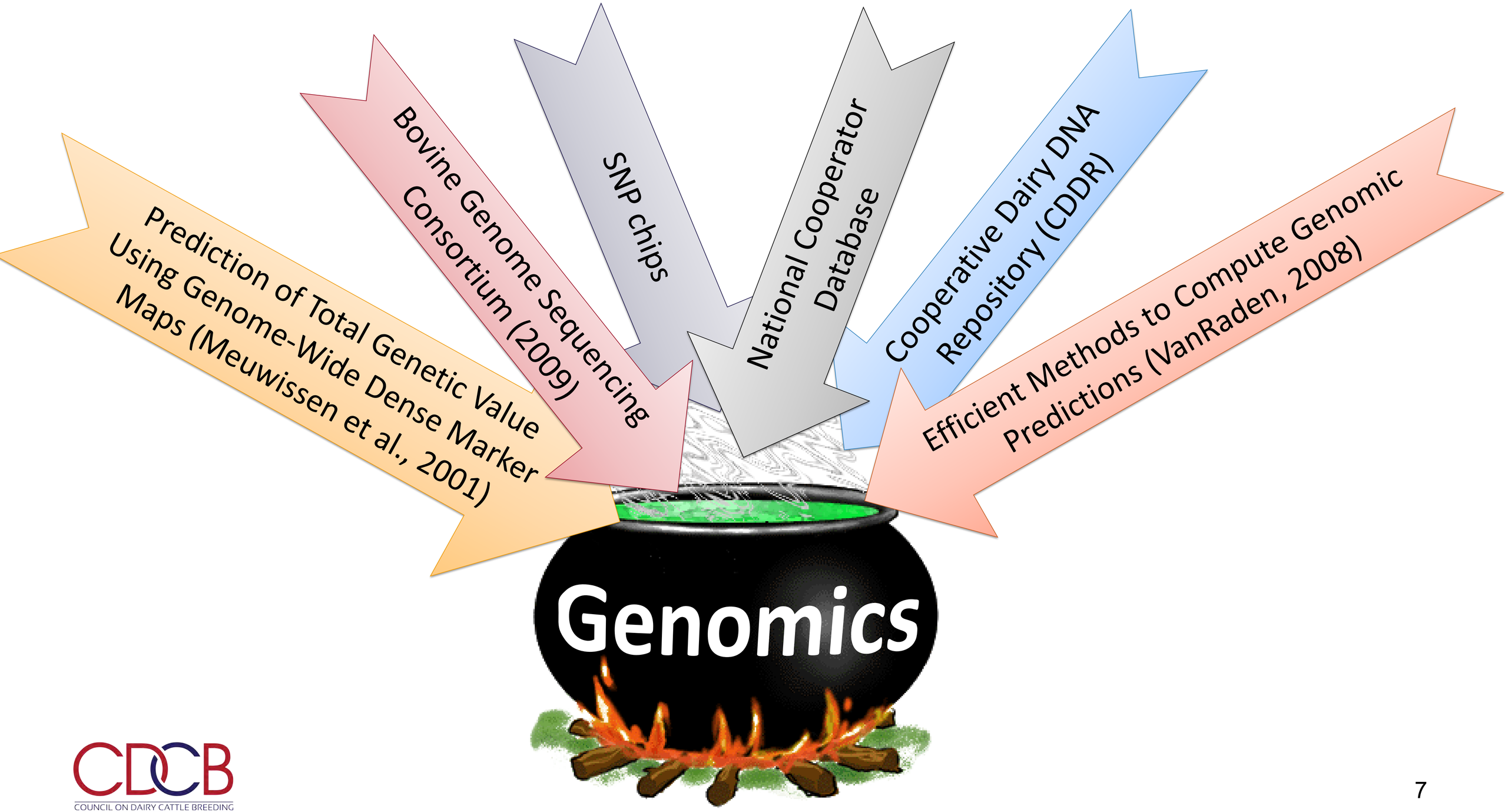

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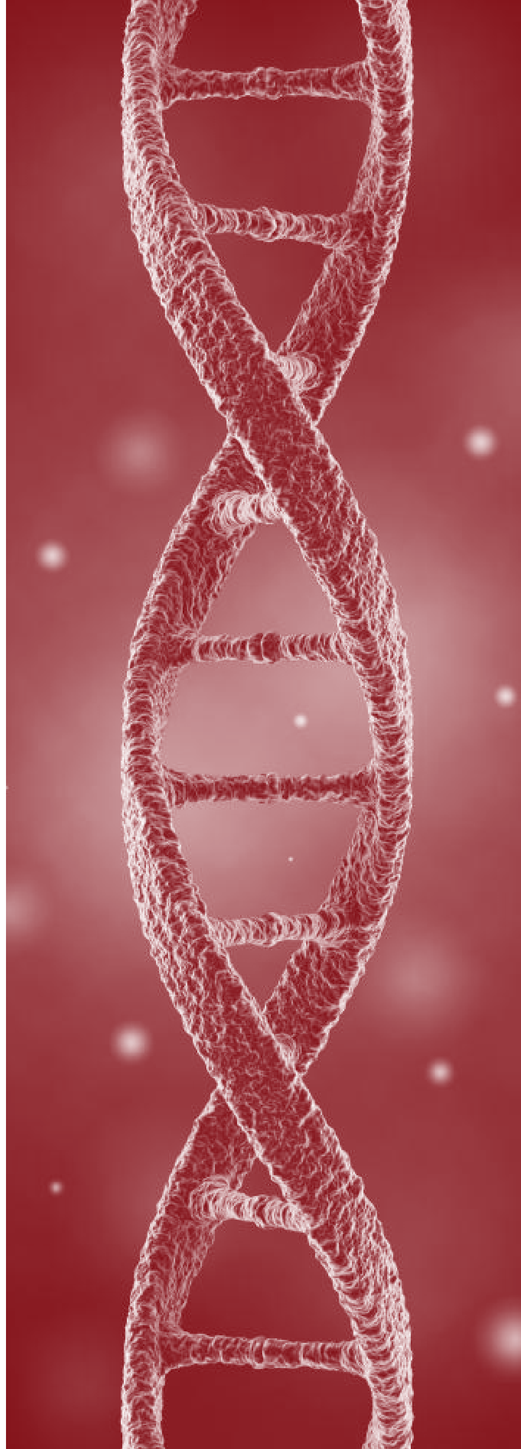
Consequences of genomic selection

- Large reference populations closely connected to predicted individuals
- Drastic reduction in generation interval
- Early genotyping vs. progeny testing schemes
- Evaluation turnaround



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Consequences of genomic selection

- Parentage verification & discovery
- Haplotypes & recessive mutations
- Low heritable traits
- Traits difficult to measure

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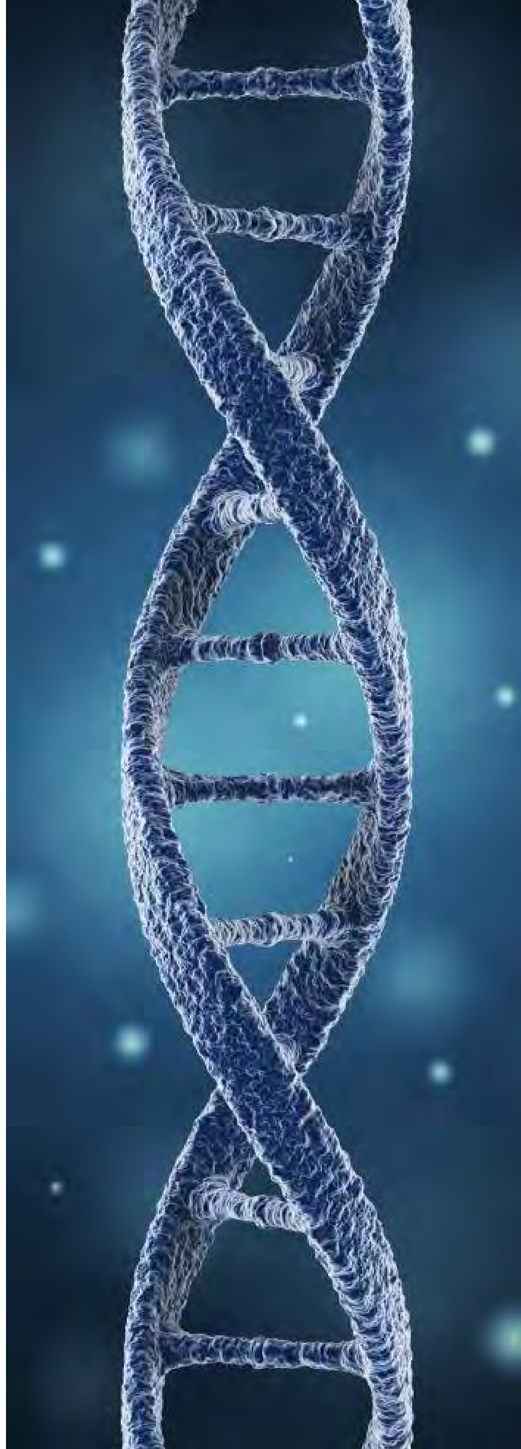
Consequences of genomic selection

- Consolidation and concentration
- Genotyping: new business
- Phenotypes more valuable than ever
- Nucleus herds concentrate bull dams
- Genomics as a management tool



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Year	Trait
1926	Milk & fat yields
1977	Protein yield (& solids-not-fat)
1978	Conformation (type)
1994	Productive life, somatic cell score (mastitis resistance)
2000	Calving ease (Iowa State University, 1978–99)
2003	Daughter pregnancy rate
2006	Stillbirth rate, bull conception rate (ERCR, DRMS, Raleigh, NC, 1986–2005), milking speed
2009	Cow and heifer conception rates, genomic evaluation
2012	Mobility, calving-to-insemination interval
2016	Gestation length
2017	Cow livability
2018	Health traits (milk fever, displaced abomasum, ketosis, mastitis, metritis, retained placenta)
2019	Early first calving, genomic evaluation for crossbreds, feed efficiency

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Ear Tag Technologies
Temperature
Activity

Milking System Collar
Daily activity, Behavior, Locomotion

Rumen bolus
Rumen temperature
Activity
Water Intake

Thermosensor
Vaginal temperature

Daily Feed intake

Others (coming soon)

Image data
Body weight estimates
Time at feeding bunk
Other activities

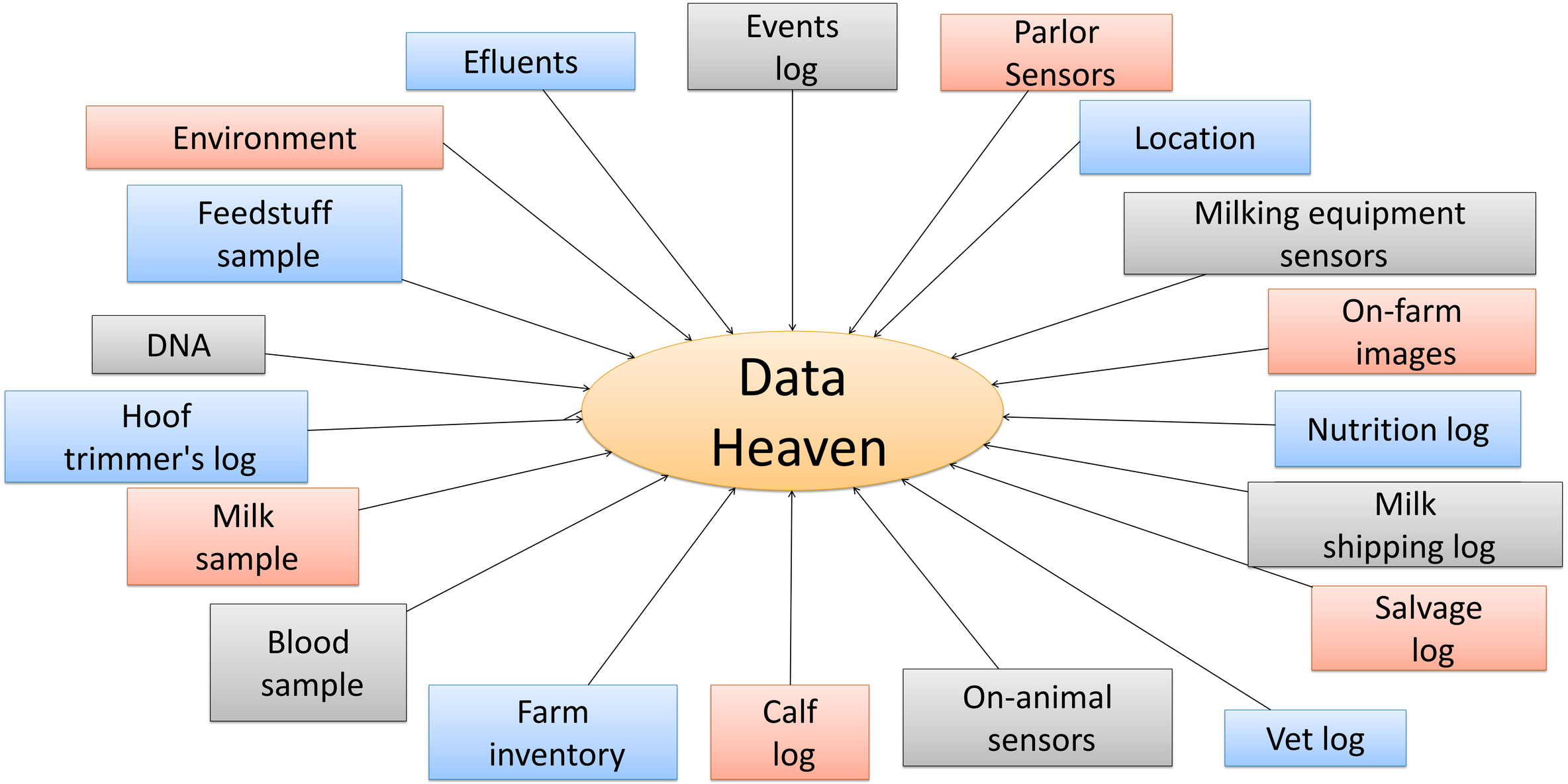
Body Weight

Milk Samples
Milk production
Milk components
Milk spectral data
(MIR and AfiMilk)

Pedometer
Locomotion/ activity

COUNCIL ON DAIRY CATTLE BREEDING

Author: Dr. James E Koltes. ASU



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BIG
DATA
INFORMATION
MANAGEMENT
TECHNOLOGIES
PETABYTES
ANALYSIS
RESEARCH
SEARCH
INTERNET
LEARNING
STORAGE
LARGE
SETS
MILLION
SOFTWARE
SAN
NAS
VOLUME
PROCESS
GOVERNMENT
DEVELOPMENT
TECHNOLOGY
SCIENCE
FUTURE
BILLION
NEW
PARALLEL
INITIATIVE
ECONOMIC
TERABYTES
SIZE
DATABASES
PROCESSING
BUSINESS
FRAMEWORK
BETWEEN
STATISTICS
VISUALIZATION
ANALYTICS
SIMULATIONS
EXABYTES
AMOUNT
APPLICATIONS
INFRASTRUCTURE
WORK
STRUCTURE
REAL
RATE
HIGH
USERS
DEPARTMENT
SET
WELL
DETERMINE
ALGORITHMS
COMPANIES
HIGHER
QUERIES
MASSIVE
USING
DEFINITION
FACTOR
ONLINE
MANAGE
DAY
WORLDWIDE
SYSTEMS
MAKING
INTEGRATION
RESULTS
SOCIAL
YEARS
DRIVE
REPLICATION
HANDLE
SOURCES
CHALLENGES
LIMITS
COMPLEX
ANNOUNCED
PAST
HAND
CAPACITY
ONE
OUT
PRIVACY
INTERNATIONAL
IMPLEMENTATION
BECOMES
SECOND
NATIONAL
FLOW
INTELLIGENCE
APPROACHES
PROCESSES
PRIVATE
TERMS
YEAR
SUCCESSFUL
NEEDED
USES
SHARED
COMPARED
CAPABILITIES
LESS
HUGE
EVERY
WORLD
VARIOUS
BASED
TIMES
ARCHITECTURE
PARADIGM
FUNDING
INSIGHT
TOOLS
CENTER
RECORDS
COST
PER
DISTRIBUTED
RELEVANT
PROJECT
ANNUAL
NOW
USED
VARIETY
MARKET
TIME
SENSOR
WOULD
RELATED
USE
CURRENTLY
STATE
CRITIQUE
PEOPLE
TRAFFIC
CRITIQUES
MANY
APPROACH
BILLION
PARALLEL
MAPREDUCE
NEARLY
MOST
END
INCLUDE
NETWORKS
HYPOTHESIS

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Dialog and Awareness (2019)

- **Series of activities to promote dialog and awareness :**
  - Meeting of the CDCB Board of Directors, Orlando, December 13-14, 2018.
  - NDHIA Annual Board Meeting, Orlando, January 28-30, 2019
  - CDCB Industry Meeting at the Western Dairy Management Conference Reno NV, February 25, 2019
  - National DHIA Annual Meeting, San Diego, March 5-7, 2019

  - **Visit organizations related to the dairy supply chain:**
    - DRPCs
      - Dairy Records Management Systems (DRMS) Raleigh, NC
      - AgSource Cooperative Services Verona, WI
      - AMELICOR Provo, UT
      - AgriTech Analytics Visalia, CA

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Genomic Revolution: The Next 10 Years

CDCB Industry Meeting with Western Dairy Management Conference (Reno Feb, 25th, 2019)

- **Vision: How does dairy look in 2029?,** Jack Britt, PhD, Britt Consulting
- **Genomic Legacy: What have we achieved in the genomic revolution?** Paul VanRaden, PhD, USDA Animal Genomics and Improvement Laboratory
- **What has changed in the dairy business since 2009?,** Mark Stephenson, PhD, University of Wisconsin-Madison
- ***Panel Discussion:*** **What future advancements do we envision through genomics?**

Jack Britt, Pat Maddox, (RuAnn Dairy, California), Denton Ross (Arizona Dairy Company, Arizona), Mark Stephenson, Paul VanRaden, USDA AGIL

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- **Transforming Big Data into Value: Put Data to Work for Your Dairy**, Miel Hostens, DVM, Ghent University
- **Big Data for Innovative Solutions in Ag**, Cameron Holbrook, Amazon
- Panel Discussion: How can dairy leverage big data?
  - Cameron Holbrook, Miel Hostens, Austin Hyde, (Heglar Creek Dairy, Idaho), Mark Rodgers, (MKVT Polled Holsteins, Vermont), Renee Smith, (My Dairy Dashboard)

- Roundtable discussions: How do we leverage data and new technologies?

15 tables (7-9 people) with a facilitator)

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GENOMIC EVALUATIONS INCLUDING CROSSBRED ANIMALS

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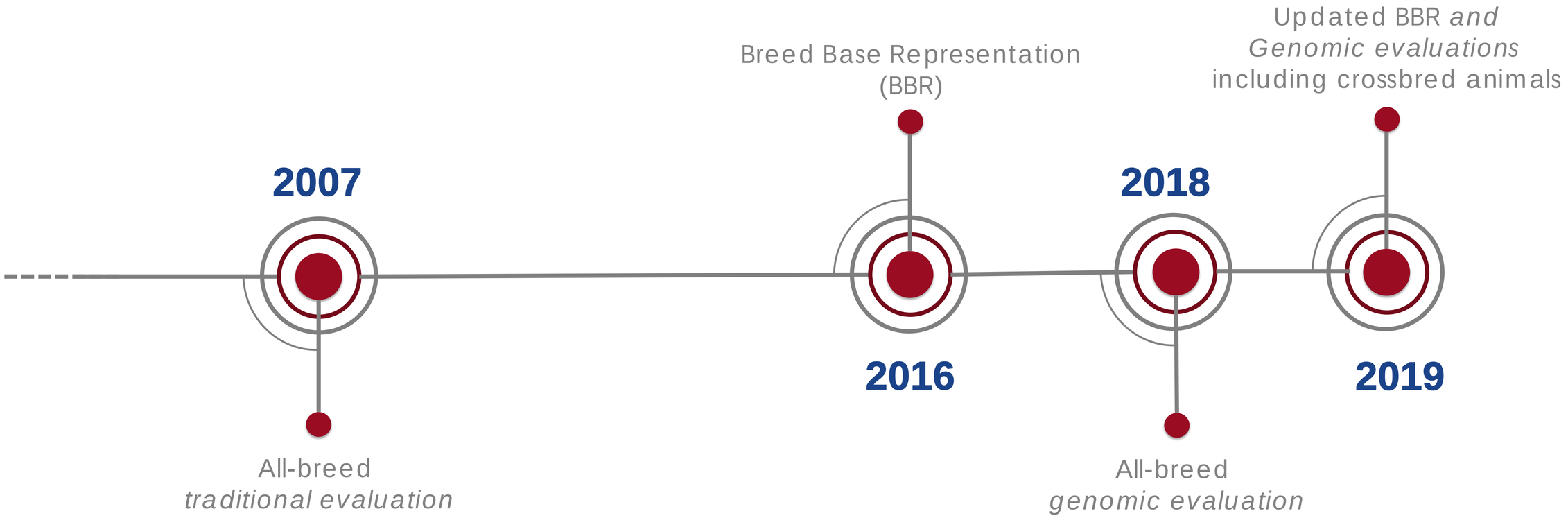
Towards a genomic evaluation of crossbreds



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Genomic predictions for crossbreds

- Genomic predictions computed within-breed since 2009
- More crossbreds will receive predictions in April 2019
  - Weighted combination of purebred predictions
  - Breed base representation (BBR): Genetic contribution of each breed
- Currently about 60,000 animals with >10% BBR from another breed
- About 17,000 animals with 6–10% BBR from another breed
  - Will no longer contribute to purebred reference
  - Will be predicted using only purebred data

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EARLY FIRST CALVING

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Early first calving (EFC)

- Heifers eat feed but produce no milk until calving
  - Earlier calving is worth $2.50 per day
  - Economic emphasis could be 3% of NM$
  - Removes some emphasis from heifer conception rate
- Large database (23 million records) available for EFC
  - Heritability of 2.7%
  - PTA standard deviation only about 3 days
  - Reliability of genomic predictions of 66% for Holsteins

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Starting April 3, 2019

CDCB FEE SCHEDULE UPDATE

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Expansion of the CDCB services portfolio

- New traits:
  - Cow livability, gestation length
  - Resistance to mastitis, ketosis, displaced abomasum, metritis, hypocalcemia and retained placenta
  - Early first calving: April 2019
- Genomic predictions for crossbred animals: April 2019.
- Profitability indices: two updates on Net Merit, Fluid Merit, Cheese Merit and Grazing Merit
- New Haplotypes
- Accuracy: all-breed genomic predictions & 80K SNP list
- Genealogy: Breed Base Representation (BBR) & Parentage discovery

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Expansion of the CDCB services portfolio

- Further expansion of the services
  - Access to new data streams
  - New tools and infrastructure – e.g. feed efficiency
- Simplification of the fee schedule
- CDCB service schedule update: April 3, 2019.
- Webinar: March 12, 2019, 1:00 pm EST

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CDCB Fee Schedule Principles

- Data providers to the national cooperator database
- US herds and companies
- International genotype exchange partners
- Credits

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Female nomination fees

Female Basic Nomination Fee	**$**	**8**
<u>Cooperator Credits[a]:</u>		
Female born in a US herd?	$	4
• Milk yield data provider?	$	2
• Conformation data provider?	$	1
• Health data provider?	$	1
Female born in a Canadian herd?	$	2

[a]*Final nomination fee = Basic nomination fee – Cooperator credits*

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Male nomination fees

Male Basic Nomination Fee	**$**	**200**
Cooperator Credits[a]:		
Controller is a collaborator stud?	$	175
Foreign male submitted by an international genotype exchange partner?	$	200
US herd providing data?	$	100
• Milk yield data provider?	$	25
• Conformation data provider?	$	25
• Health data provider?	$	25

[a]*Final nomination fee = Basic nomination fee – Cooperator credits*

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Artificial insemination service fees

Basic AI Service Fee	**$**	**1,600**
<u>Cooperator Credits[a]:</u>		
Controller is a collaborator stud?	$	800
Foreign male submitted by an international genotype exchange partner?	$	800

[a]*Final AI service fee = Basic AI service fee – Cooperator credits*

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home

- National Cooperator Database rules!
- Big data is the next genomics
- Genomics for crossbreds are here!
- We can save money with early calvings!
- CDCB fees that we can understand!

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Thank you!

www.uscdcb.com

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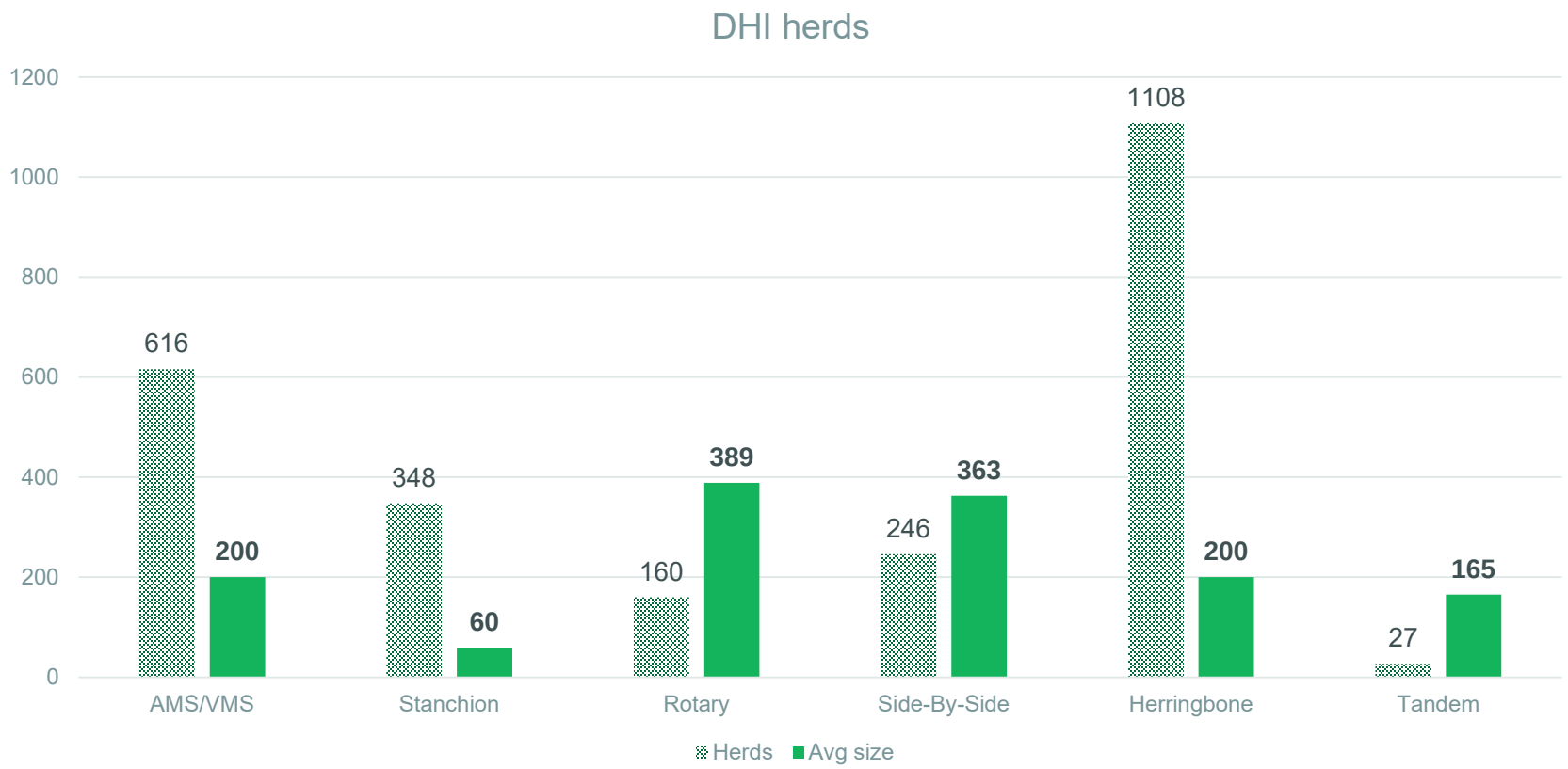
DENMARK – DHI TECHNICAL UPDATE

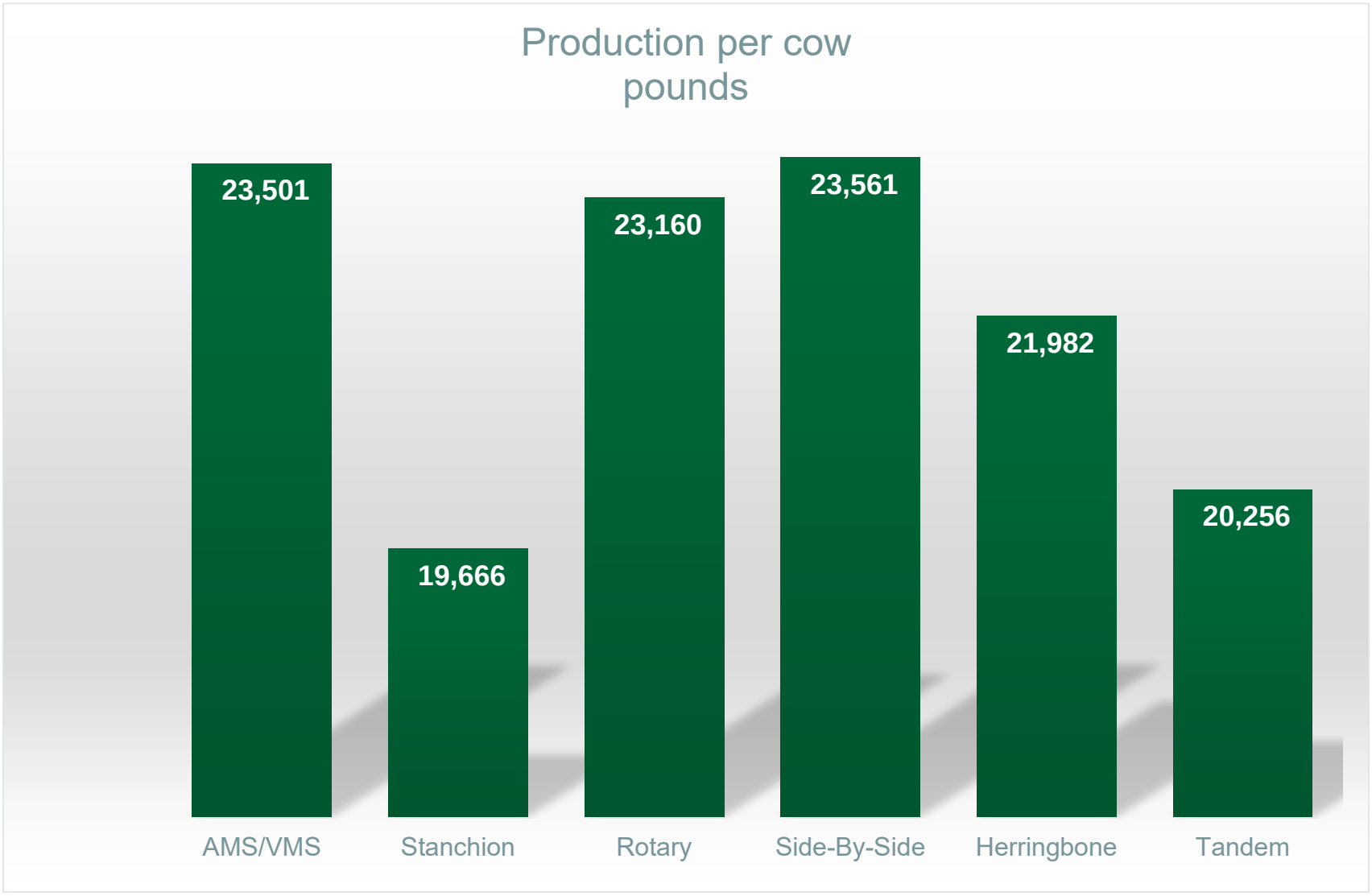
Uffe Lauritsen

San Diego
March 2019

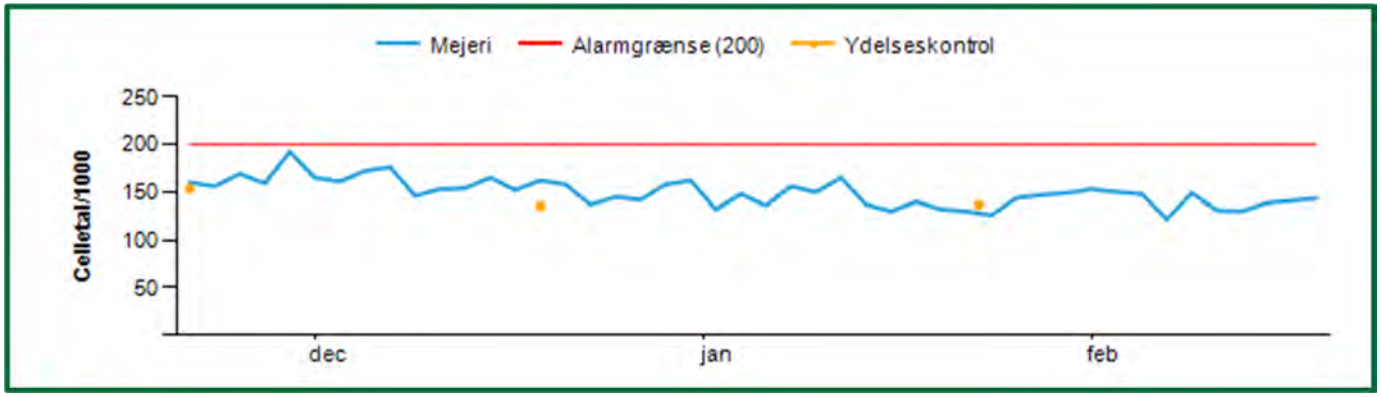
RYK provides milk recording for dairy cows. RYK are collecting annually about 5.5 million milk samples, serves 2,600 dairy farmers, and have a turnover of 15 million euro. We have 65 employees, and offices in Aarhus, Sorø, Holstebro, and Vojens.

OUR FARMERS AND THEIR HERDS

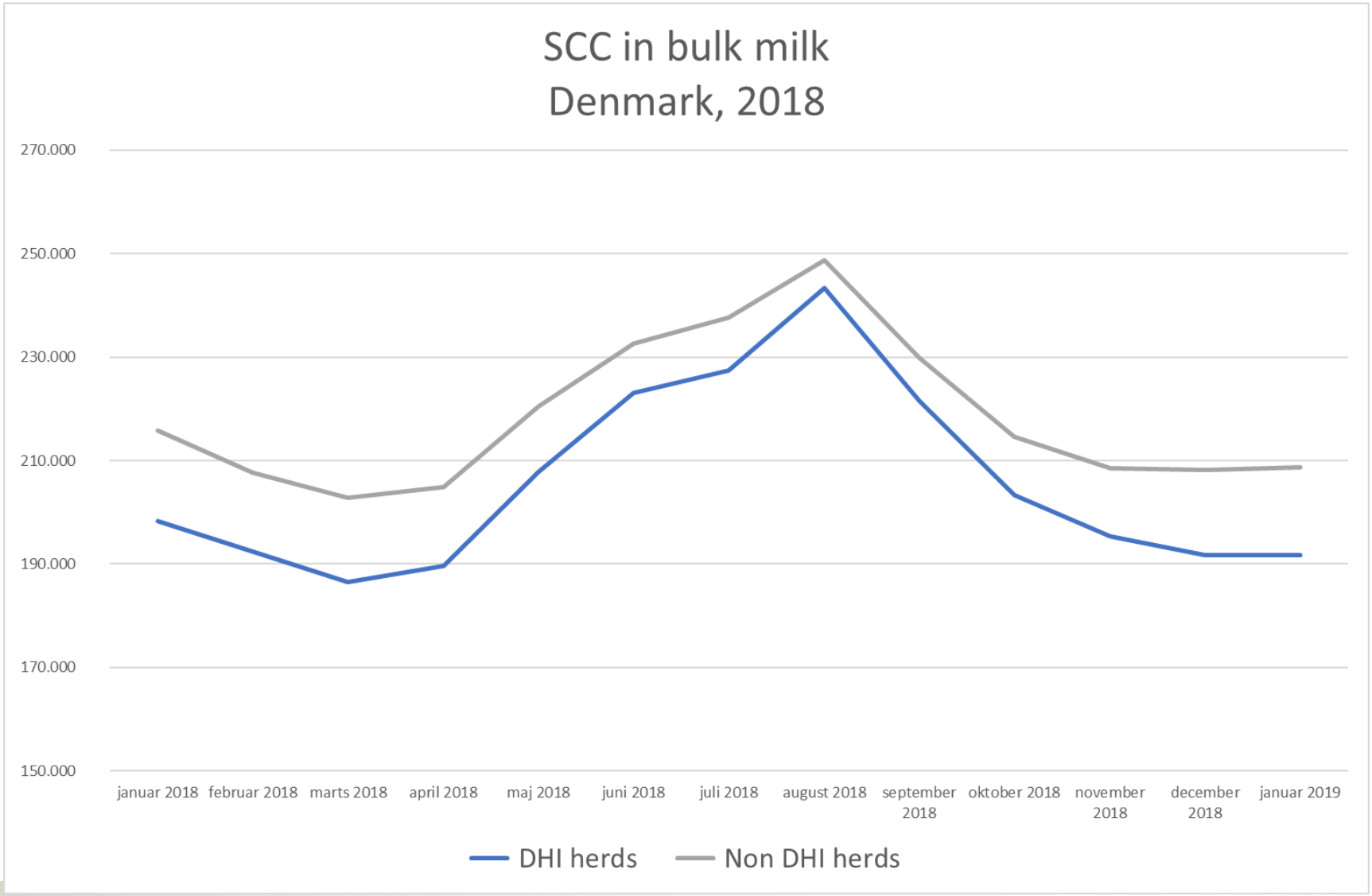



Production per cow
pounds
23,501
19,666
23,160
23,561
21,982
20,256
AMS/VMS
Stanchion
Rotary
Side-By-Side
Herringbone
Tandem

CELL COUNTS



Testday	11/20	12/18	1/22
All cows	153	136	137
-1st lactation	105	55	81
-2nd lactation	110	126	168
Later lactations	237	205	149
Dairy (testday or +/-1)	160	162	130


SCC in bulk milk
Denmark, 2018
270.000
250.000
230.000
210.000
190.000
170.000
150.000
januar 2018
februar 2018
marts 2018
april 2018
maj 2018
juni 2018
juli 2018
august 2018
september 2018
oktober 2018
november 2018
december 2018
januar 2019
DHI herds
Non DHI herds

FOCUS AREAS – THE DAIRY FARM

- Documentation, documentation, documentation
- Increasing number of cows per time unit
- Increasing amount of data
- Larger distance between cows and crucial decissions
- Welldefined responsibilities
- Better precision in data catch

FOCUS AREAS TO FOLLOW - DHI

- Catch a reprensentative milk sample
- Milkweights
- Data quality
- Cow ID
- Speed
- Data transfer
- Equipment for milk weigths and sampling
- Maintenance and cleaning
- Staff, recruitment and education

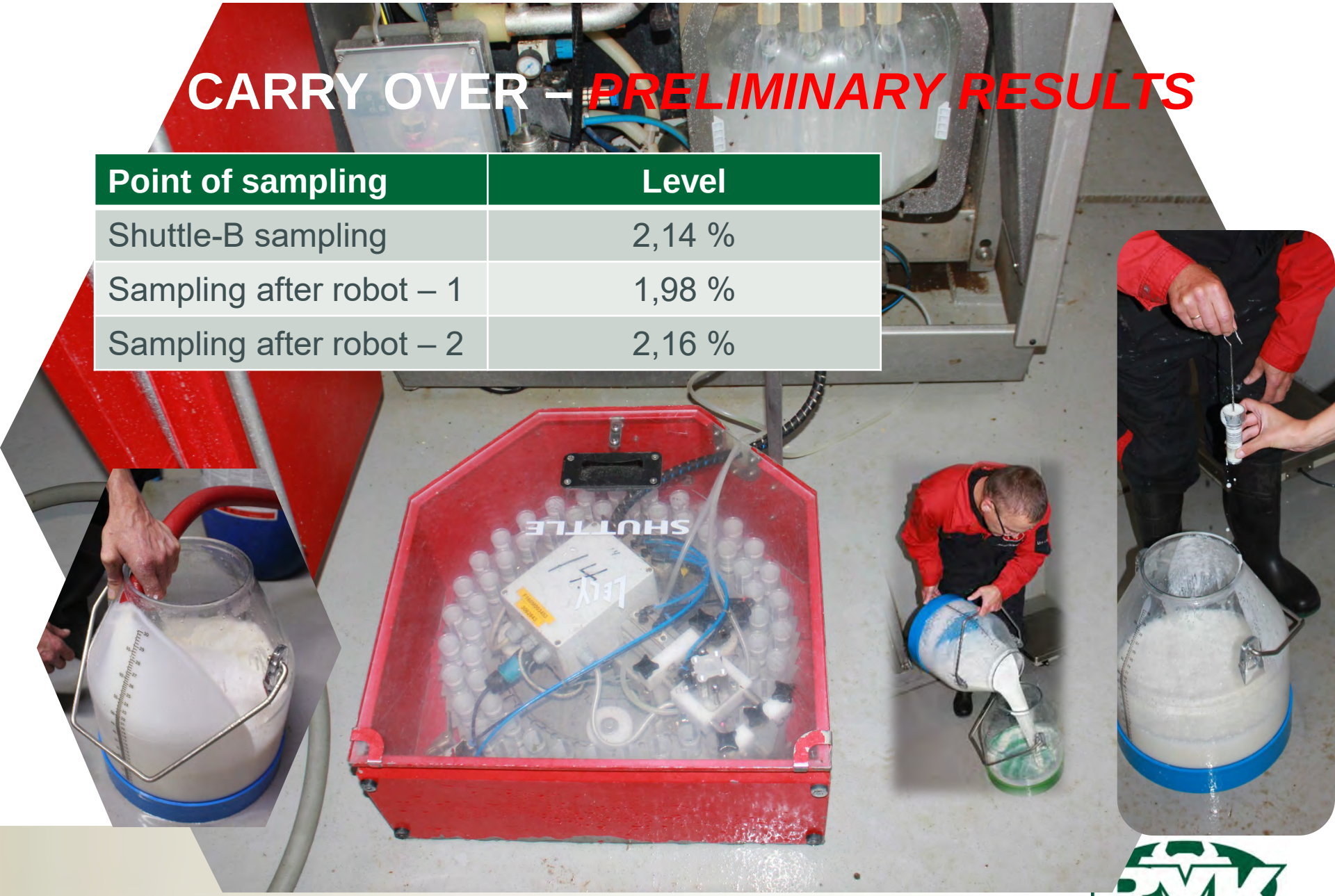
CARRY OVER FIXED METERS – *PRELIMINARY RESULTS*

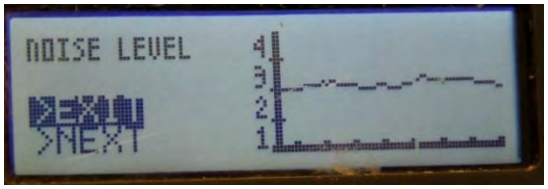
- Double 8 parlor
- DeLaval MM25 meters
- Tracked per milking point
- 2 sets of samples
- Sampled by 2 technicians, one per set of samples

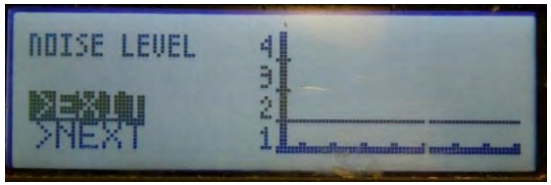
Carry over is calculated to 2,5 %

CARRY OVER – *PRELIMINARY RESULTS*

Point of sampling	Level
Shuttle-B sampling	2,14 %
Sampling after robot – 1	1,98 %
Sampling after robot – 2	2,16 %



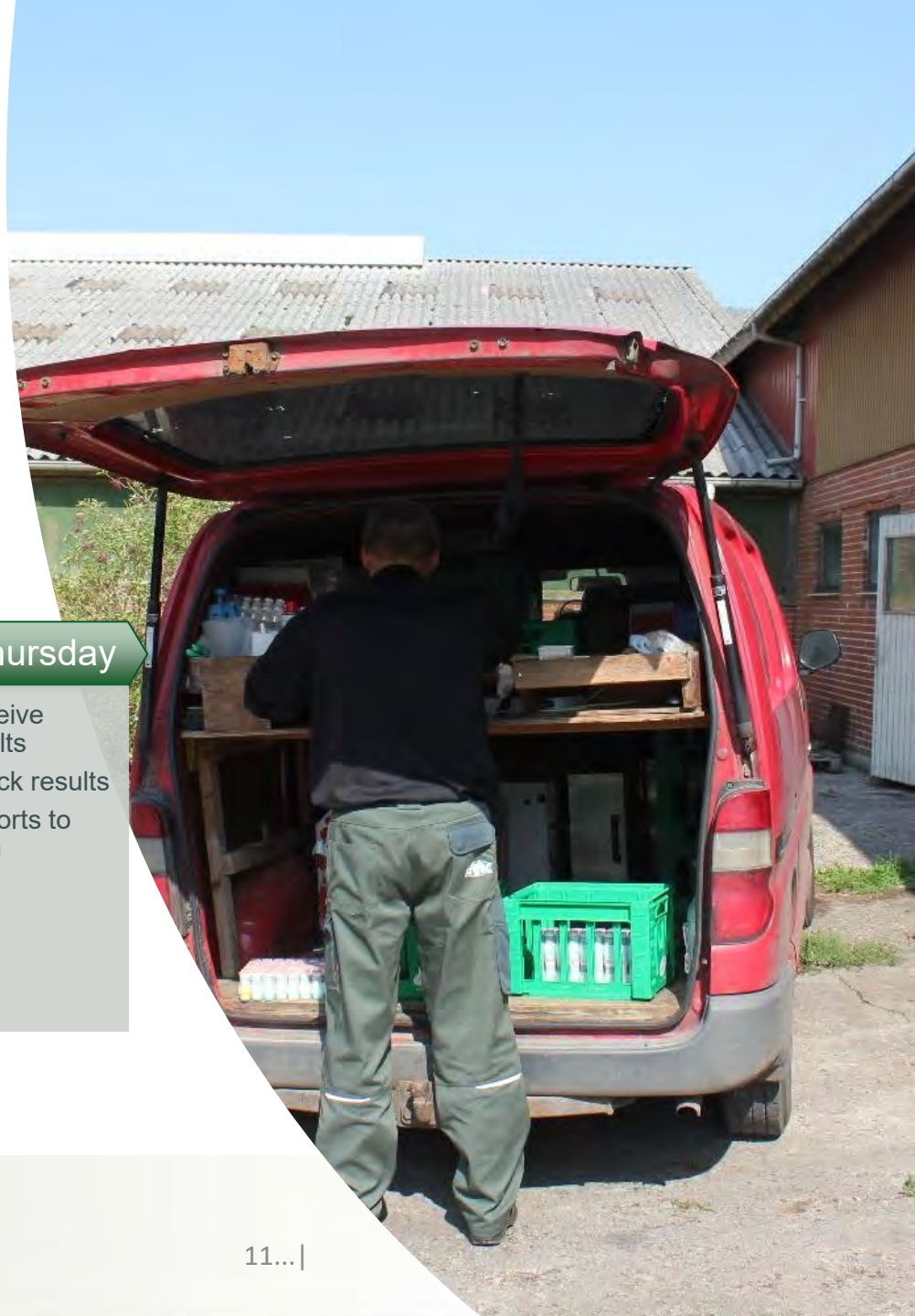




ELECTRONIC NOISE

PROCESS FOR MILK RECORDING– RYK

Monday	Tuesday	Wednesday	Thursday
Delivery of equipment (Supervised or DIY test)	Pick up equipment and samples Validate data Correct data Prepare samples for shipment Push data	Samples arrive at lab Analyze Receive results	Receive results Check results Reports to farm



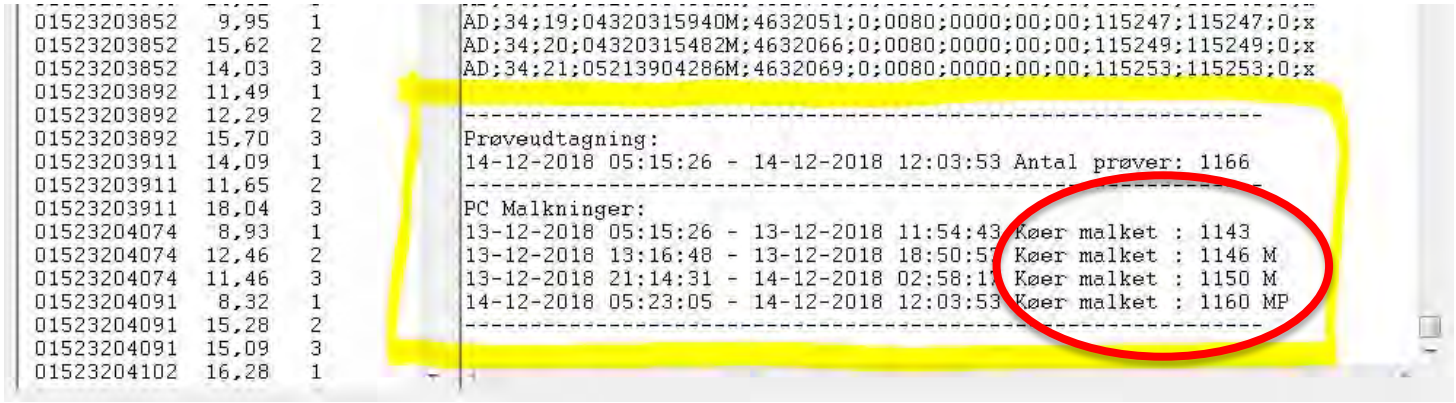
DATA CAPTURE SOFTWARE

Many versions of Herd Management systems

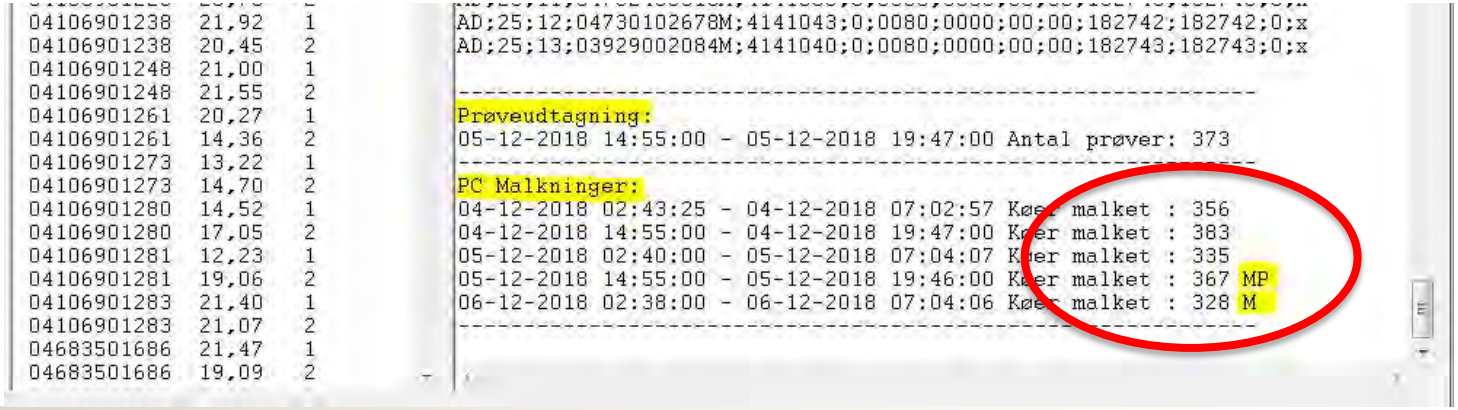
IDENTIFICATION

- Correct ID is key to valuable data

TESTDAY – CHALLENGES ON COW ID



```
01523203852   9,95   1   AD;34;19;04320315940M;4632051;0;0080;0000;00;00;115247;115247;0;x
01523203852  15,62   2   AD;34;20;04320315482M;4632066;0;0080;0000;00;00;115249;115249;0;x
01523203852  14,03   3   AD;34;21;05213904286M;4632069;0;0080;0000;00;00;115253;115253;0;x
01523203892  11,49   1
01523203892  12,29   2   ----------------------------------------------------------------
01523203892  15,70   3   Prøveudtagning:
01523203911  14,09   1   14-12-2018 05:15:26 - 14-12-2018 12:03:53 Antal prøver: 1166
01523203911  11,65   2   ----------------------------------------------------------------
01523203911  18,04   3   PC Malkninger:
01523204074   8,93   1   13-12-2018 05:15:26 - 13-12-2018 11:54:43 Køer malket : 1143
01523204074  12,46   2   13-12-2018 13:16:48 - 13-12-2018 18:50:57 Køer malket : 1146 M
01523204074  11,46   3   13-12-2018 21:14:31 - 14-12-2018 02:58:17 Køer malket : 1150 M
01523204091   8,32   1   14-12-2018 05:23:05 - 14-12-2018 12:03:53 Køer malket : 1160 MP
01523204091  15,28   2   ----------------------------------------------------------------
01523204091  15,09   3
01523204102  16,28   1
```

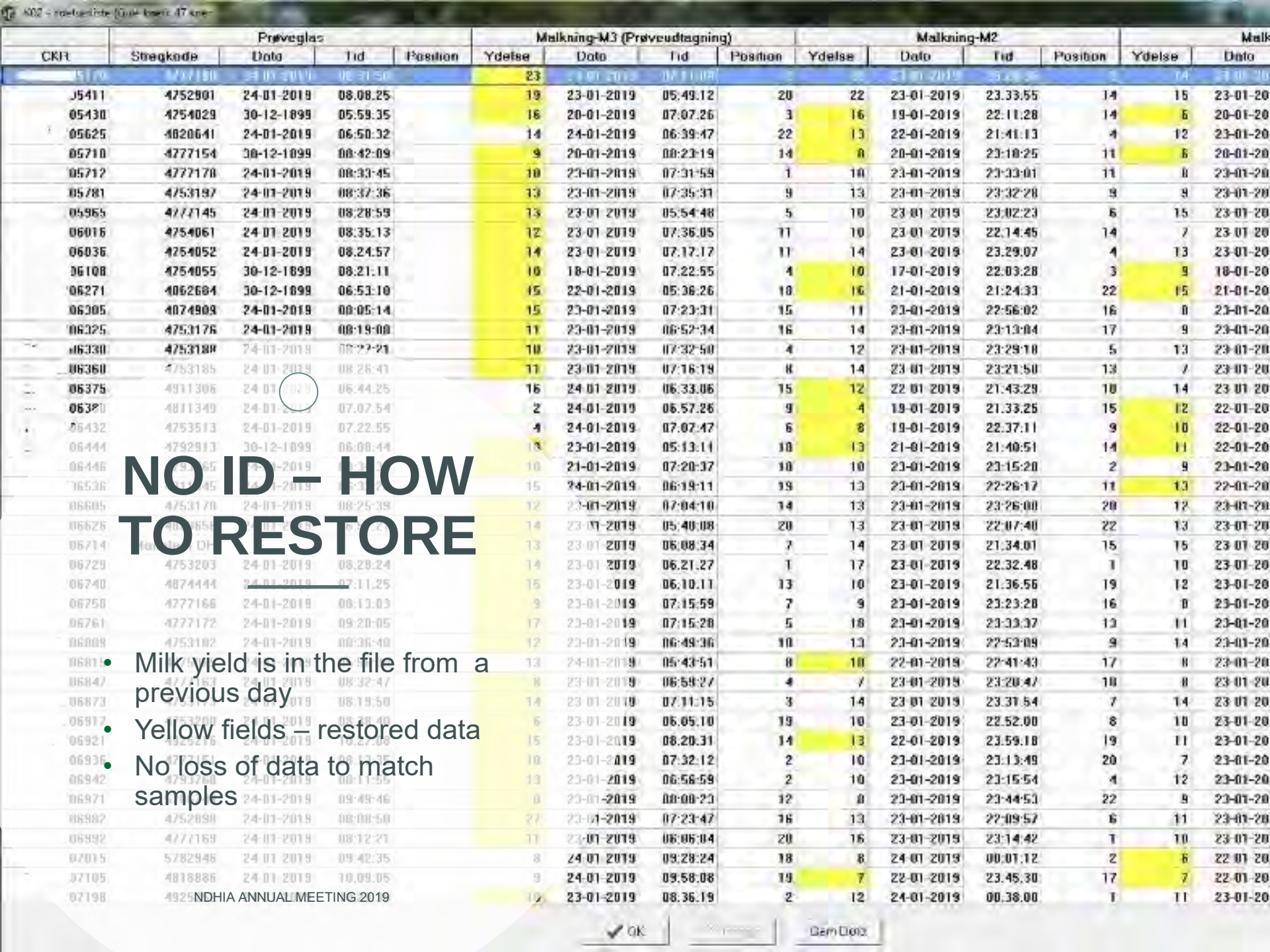


```
04106901238  21,92   1   AD;25;12;04730102678M;4141043;0;0080;0000;00;00;182742;182742;0;x
04106901238  20,45   2   AD;25;13;03929002084M;4141040;0;0080;0000;00;00;182743;182743;0;x
04106901248  21,00   1
04106901248  21,55   2   ----------------------------------------------------------------
04106901261  20,27   1   Prøveudtagning:
04106901261  14,36   2   05-12-2018 14:55:00 - 05-12-2018 19:47:00 Antal prøver: 373
04106901273  13,22   1   ----------------------------------------------------------------
04106901273  14,70   2   PC Malkninger:
04106901280  14,52   1   04-12-2018 02:43:25 - 04-12-2018 07:02:57 Køer malket : 356
04106901280  17,05   2   04-12-2018 14:55:00 - 04-12-2018 19:47:00 Køer malket : 383
04106901281  12,23   1   05-12-2018 02:40:00 - 05-12-2018 07:04:07 Køer malket : 335
04106901281  19,06   2   05-12-2018 14:55:00 - 05-12-2018 19:46:00 Køer malket : 367 MP
04106901283  21,40   1   06-12-2018 02:38:00 - 06-12-2018 07:04:06 Køer malket : 328 M
04106901283  21,07   2   ----------------------------------------------------------------
04683501686  21,47   1
04683501686  19,09   2
```

TESTDAY – MALFUNCTION OF ANTENNA

K02 information. <Ydelses fejl> <Stregkode fejl> <Malknings fejl> (57)

CKR	Ydelse	Prøveglas	Position	Start tid
05170	0,00	4777160	0	08:31:50
05411	0,00	4752901	0	08:08:25
05430	0,00	4754029	0	05:59:35
05625	0,00		0	00:00:00
05710	0,00	4777154	0	08:42:09
05712	0,00	4777178	0	08:33:45
05781	0,00	4753197	0	08:37:36
05965	0,00	4777145	0	08:28:59
06016	0,00	4754061	0	08:35:13
06036	0,00	4754052	0	08:24:57
06108	0,00	4754055	0	08:21:11
06271	0,00	4862684	0	06:53:10
06305	0,00	4874909	0	08:05:14
06325	0,00	4753176	0	08:19:08
06330	0,00	4753188	0	08:27:21
06360	0,00	4753185	0	08:26:41
06371	0,00	4754367	0	07:36:13
06375	0,00		0	00:00:00
06380	0,00		0	00:00:00
06380	0,00		0	00:00:00
06432	0,00		0	00:00:00
06432	0,00		0	00:00:00
06444	0,00	4792913	0	06:08:44
'06446	0,00	4793765	0	08:34:36
06462	0,00		0	00:00:00
06462	0,00	4875044	0	05:54:04
06536	0,00		0	00:00:00
06554	0,00	4875047	0	05:55:23
06605	0,00	4753170	0	08:25:39
06626	0,00	4820656	0	06:51:21
06714	0,00		0	00:00:00



NO ID – HOW TO RESTORE

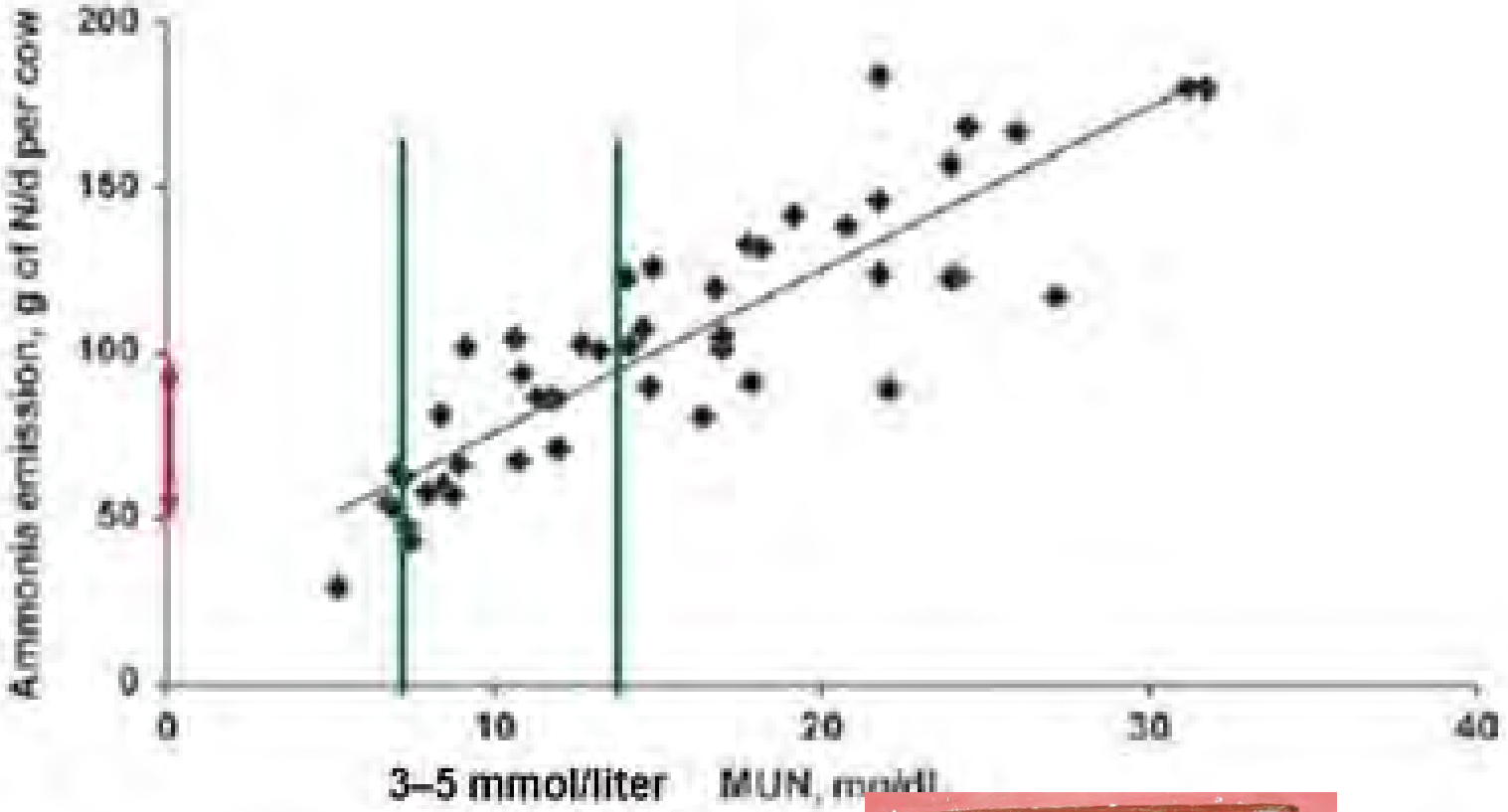
- Milk yield is in the file from a previous day
- Yellow fields – restored data
- No loss of data to match samples

ANALYSIS OF UREA IN MILK

- The Danish Agriculture & Food Council encourage farmers to lower N emmision.
- Milk samples is an important tool to support this
- DHI is a natural way to collect valuable data

ANALYSIS OF UREA IN MILK

- Urea in milk is a way to measure the protein utilization
- If we can bring down the level of MUN then the N emission from the Danish farms can be lower
- Lower emission supports public acceptance of dairy farming



HIGH LEVEL OF MUN IN THE MILK GIVES HIGH AMMONIA EMISSION

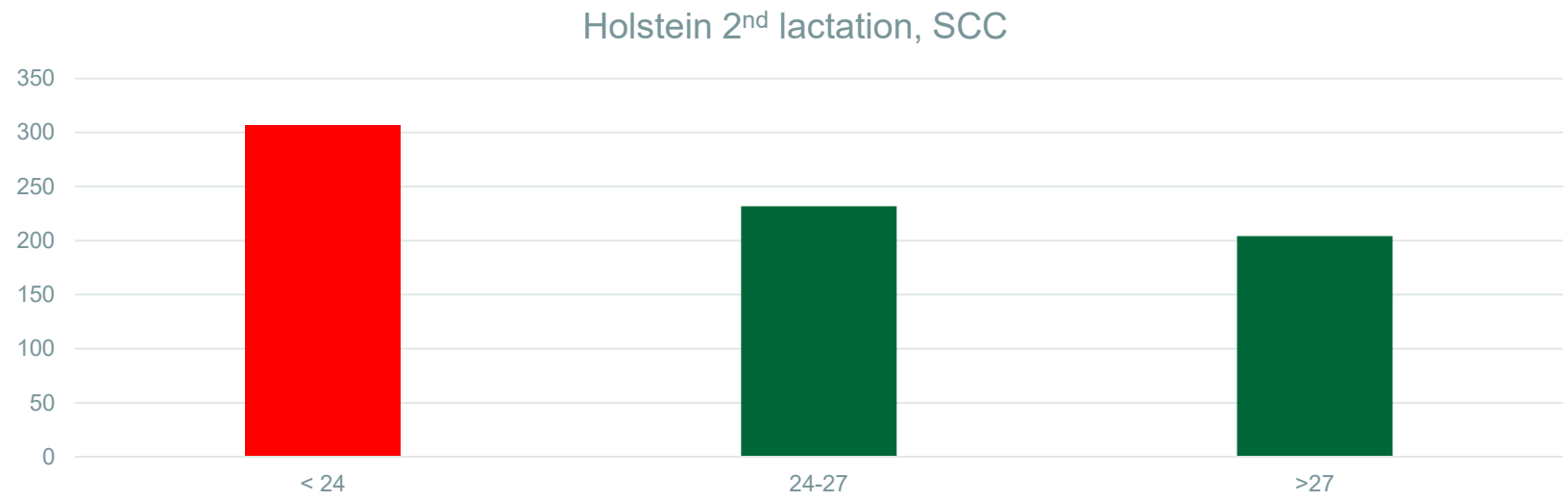
ANALYSIS OF FATTY ACID IN MILK

- Project FA data collection 2015-2016
- Report published 2016
- Full part of DHI samples from January 2019
- Fatty acid as a reference to feeding and cow welfare
- Rumen function is reflected in composition of fatty acids
- Fatty acids is a tool to monitor feeding

FATTY ACID

- Inspired by Dr. Barbanos work about fatty acid as a indicator for rumen health
- Danish data from SOB cow project find limit for level of de novo fatty acid in danish condition
- 24 g de novo fatty acid / 100 g fat for Holstein
- 28 g de novo fatty acid / 100 g fat for Jersey

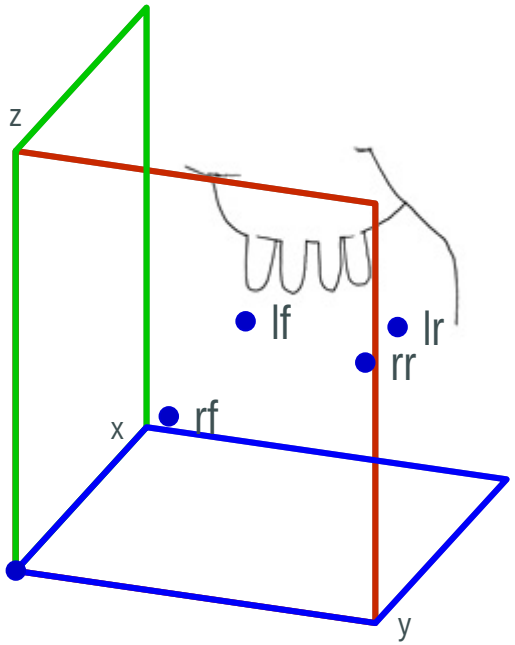
THE LOWER LEVEL OF DE NOVO FATTY ACID, THE HIGHER SOMATIC CELL COUNT



UDDER CONFORMATION

- **Udder conformation is already evaluated**
  - Classified by experienced classifiers
- **115,000 Danish cows are classified per year**
  - The majority of the cows are 1st parity cows
- **Information on teat co-ordinates in genetic evaluation is in place**

UDDER CONFORMATION BY TEAT CO-ORDINATES



- Front teat placement
- Rear teat placement
- Distance, front - rear
- Udder balance
- Udder depth, tip of the teat - measuring point

SUMMARY

- Milk sampling is our nerve
- Milk sample is our key product
- Data is next to come
- Dealing with cow ID is a challenge
- Sensors are slowly moving in

THANKS FOR YOUR ATTENTION

NDHIA/QCS Annual Meeting
"Lely AMS update"

March 5, 2019

Adam Griffin, SR. FMS Advisor, Lely N.A.

farming innovators

Updates on…

- Brief history of the Astronaut milking robot…
- North America Lely AMS trends…
- Data Exchange…
- Questions???

History: We've come a long way with AMS

< 1992: Playing around in workshop/parlor

1992: Commercial introduction in Europe

2001: Introduction in North America:

Focus on machine

2006: Commercial start in USA

Focus on cow

2008: Farm management support

Focus on dairy management

2017:

DAIRY AUTOMATION 25 YEARS 1992 2017

Today, with an eye on tomorrow…

2018: Released A5 milking robot in April

Focus on farmers and cows!

Greatest improvement in technology over early years?

>Prep and Attachment accuracy/time

>cow comfort in the box

>Milk analysis

Now: ≈ 40,000 Lely robots worldwide

≈ 4000 Lely robots North America

U.S: ≈ 3.2 robots/farm (2.5 in 2014)

Canada: ≈ 2.1 robots/farm (1.9 in 2014)

Global: ≈ 1.8 robots/farm (1.7 in 2014)

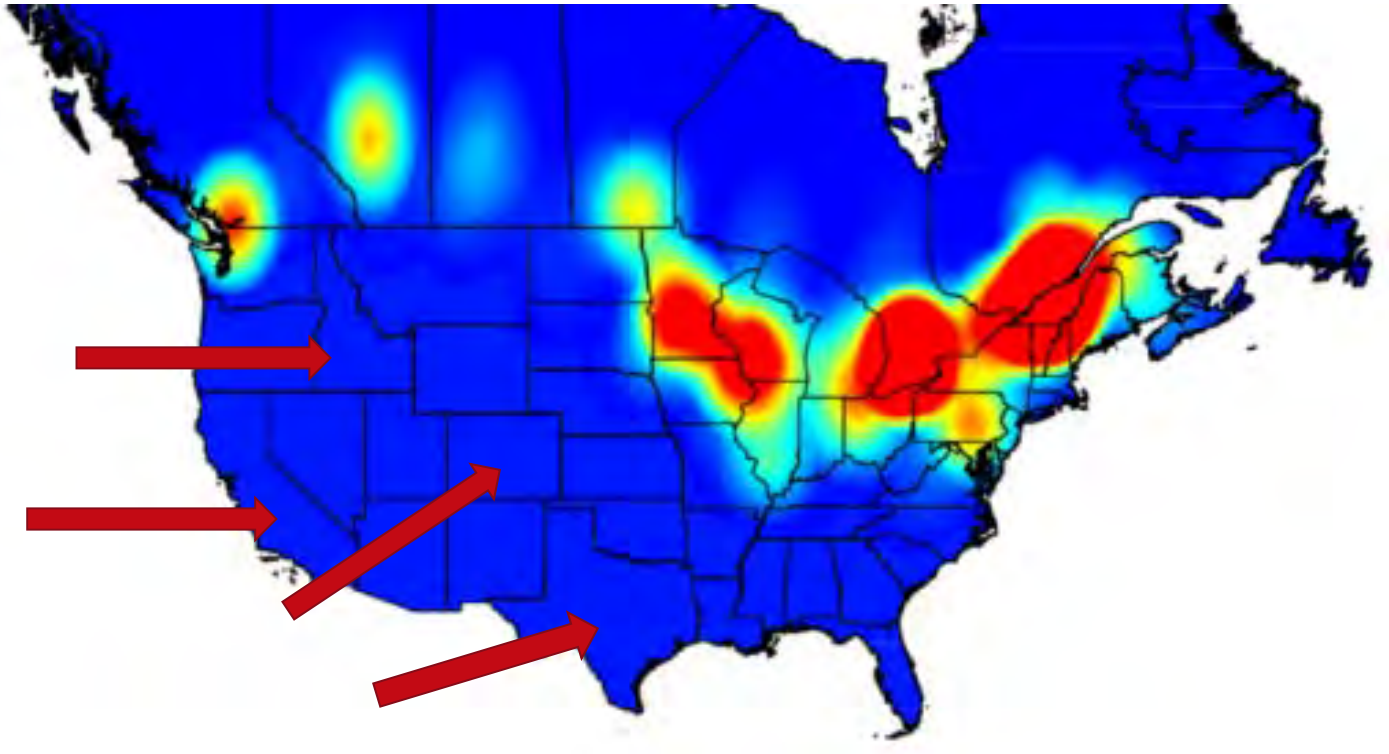
Farm adoption in N.A.

Year end 2018 Farm stats

- >1500 Lely robot farms
- 40+ Dairy XL farms
  - 11.6 robots/farm

57 Lely Centers in N.A.

- New LC in CA, CO and TX



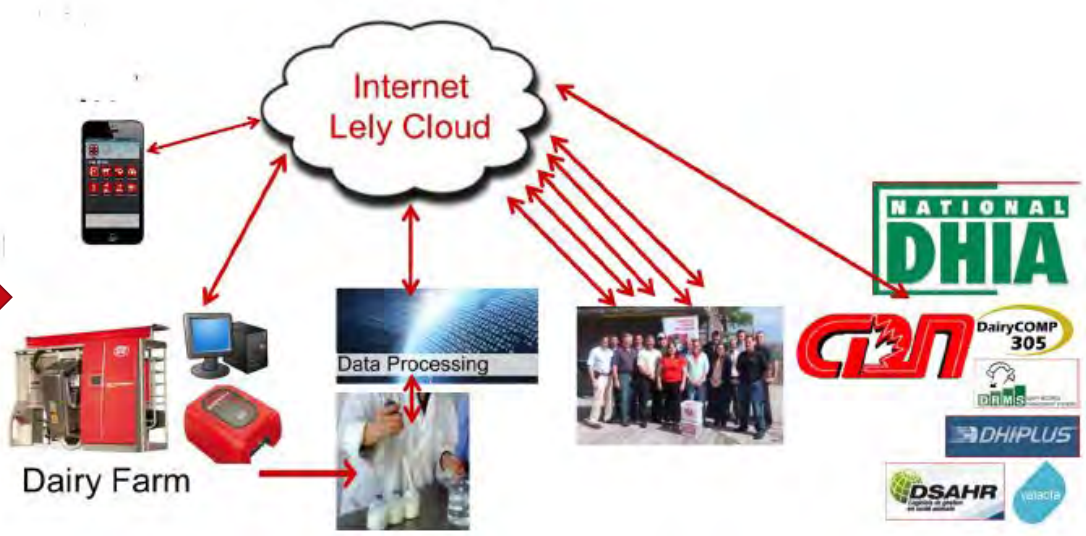
Data Exchange

- In March of 2017, Lely announced global transition from current data exchange platform (aka “Taurus” link)
- Data partners at that time were provided with materials about the shift to an API platform (local and cloud options)
- 2018: Many meetings and calls with current or new partners. Started to receive API applications and agreements in N.A.
- Dec. 2018: Lely adjusted the date forward of the Taurus shutdown from Jan. 7th to June 1st 2019

Data exchange… API advantages

- The API will provide stronger data security and dairy farmer control over who receives their AMS data.
- The API will provide enhanced data exchange solutions to meet the needs of a diverse group of industry partners with common customers.
- Faster data exchange process with a larger data set from T4C available vs current Taurus file.

- ***120 Values/cow/day from the robot:***



Thank you for your attention.

Questions??

farming innovators

At the Heart of Your Dairy

What's NEW at VAS?

Sue Hart, Vice President of Sales and Marketing

New CEO – Tim Taylor

New Culture

What we are all about

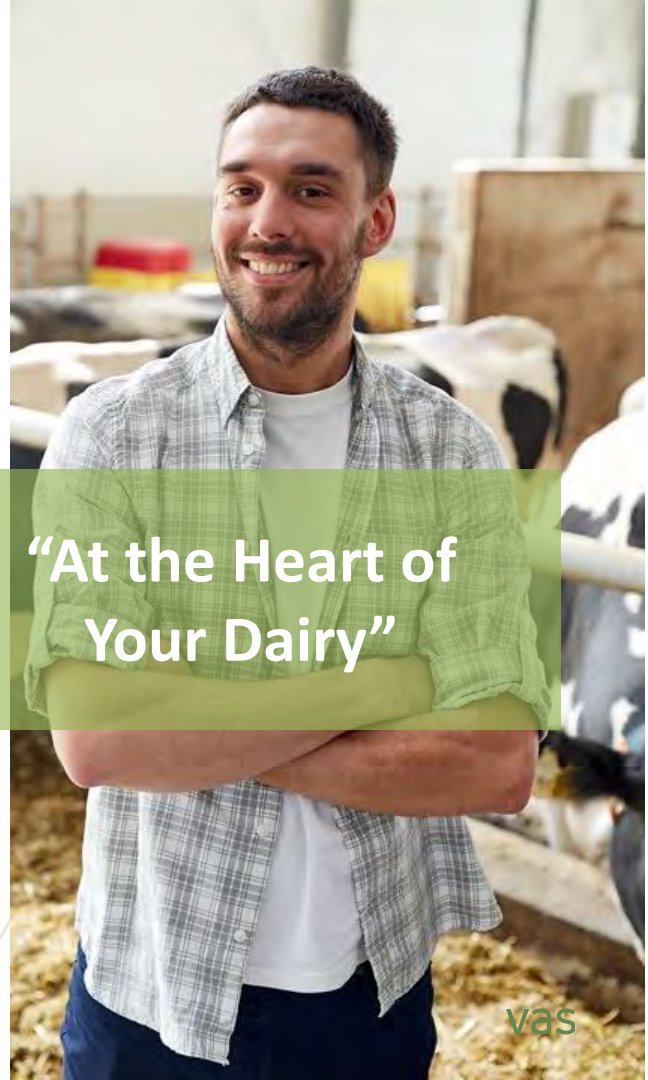
VAS is the global leader in dairy operations software

We provide a full suite of cloud-based and on-premise software solutions for dairy operations.

We have applications in:

- Herd Management
- Feed Management
- Parlor Management
- Mobility and Workflow
- Analytics and Dairy Intelligence

We provide integration between on-farm and off-farm technologies

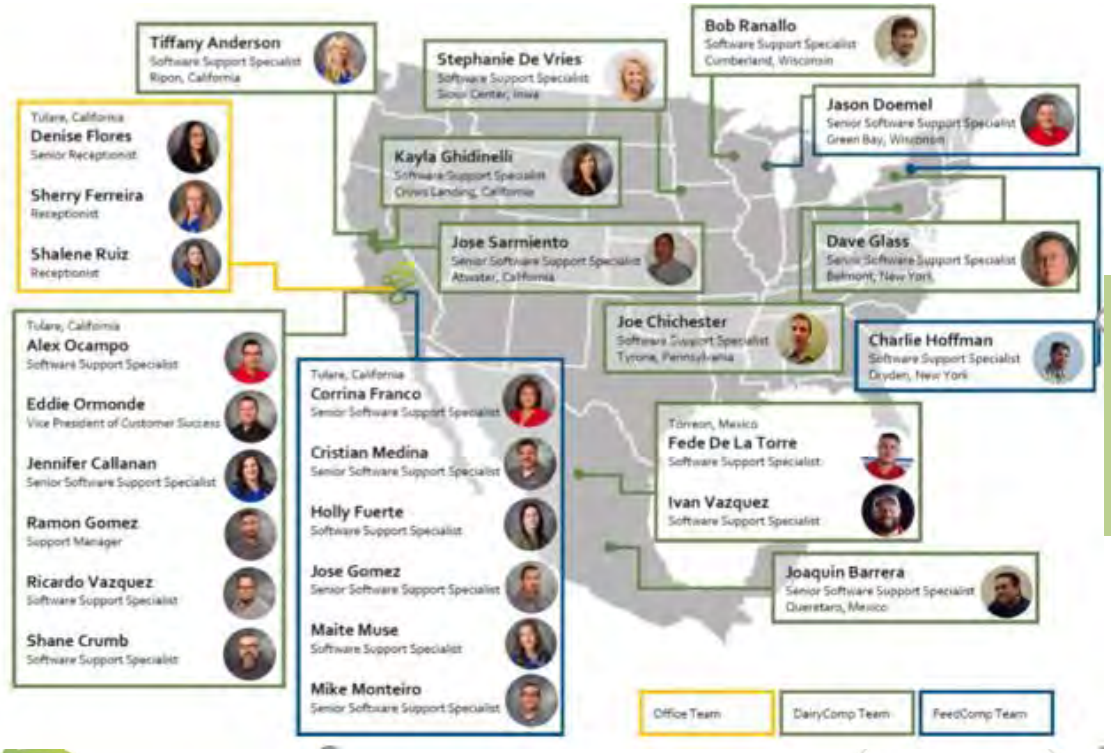


Passion & Vision

- Great business is fueled by showing up, listening to customers and being passionate about helping them improve
- VAS is committed to transparency and collaboration
- We are driven to make the entities around us successful
- Ultimately we will measure our success by the progress and transformation of the dairy ecosystem globally

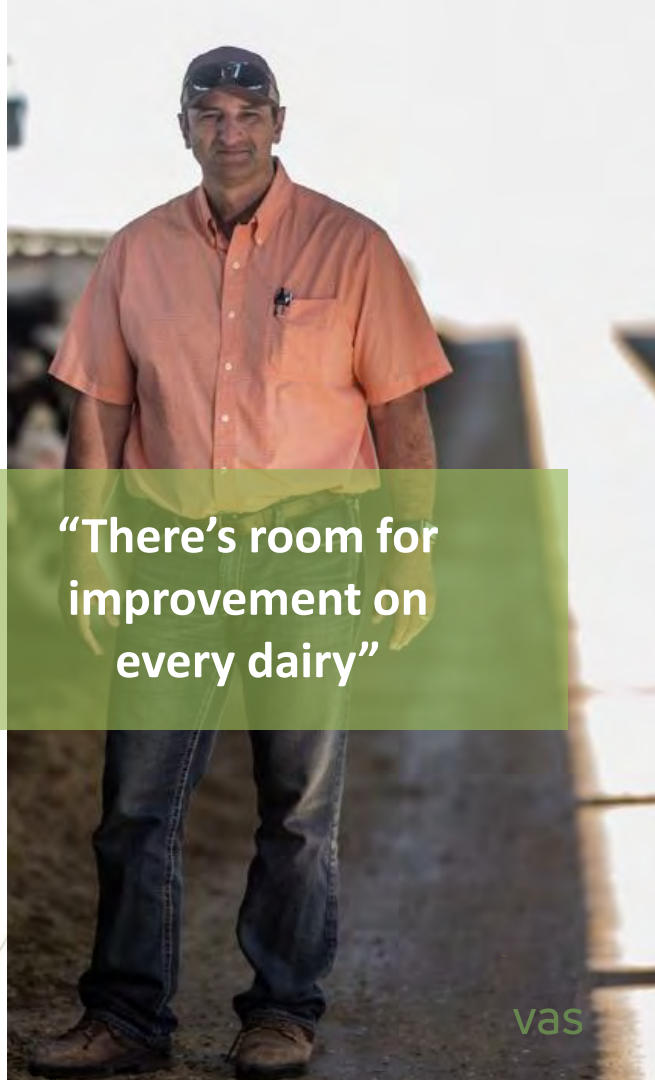
Passion & Vision

Passion & Vision



Needs in the Dairy Industry

- Collaboration among dairies, providers and stakeholders
- Connectivity and data flow
- Analytics and decision tools
- Improved dairy operations, process flow and performance
- Transparency and traceability in the ecosystem



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VAS Platform — Now Available!

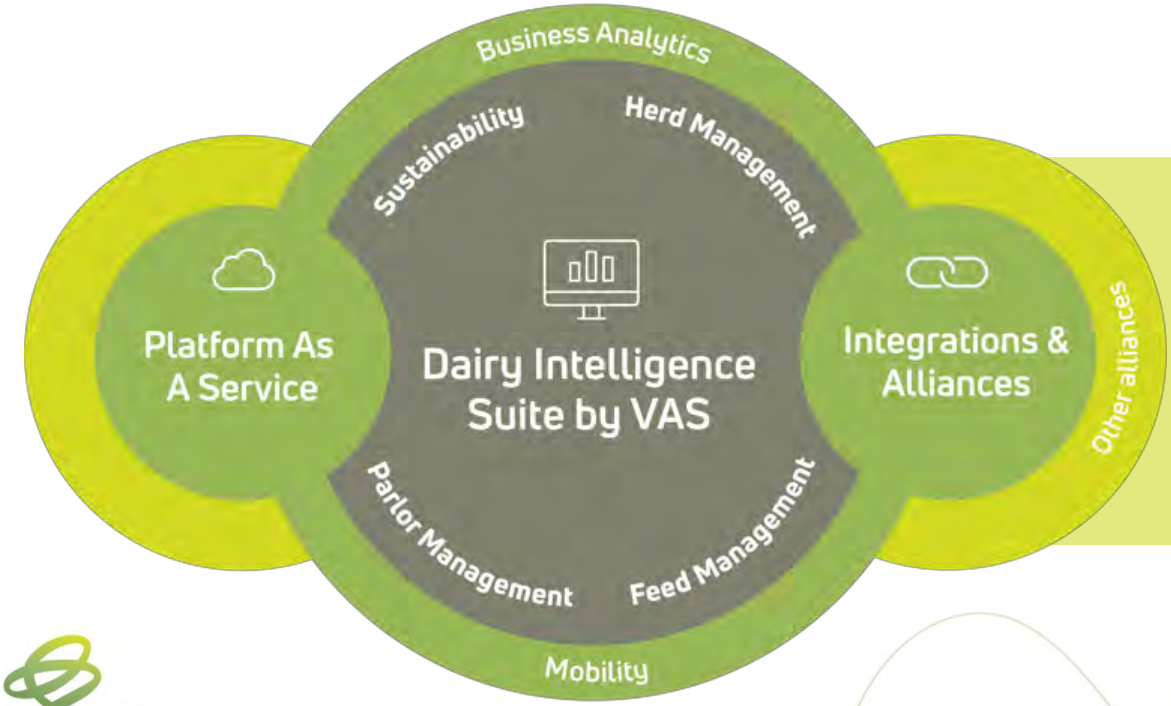
vas

Your Data. Anytime. Anywhere.

For more information, please contact us at 888-225-6753
or visit our website www.vas.com.

vas

Transparency Platform



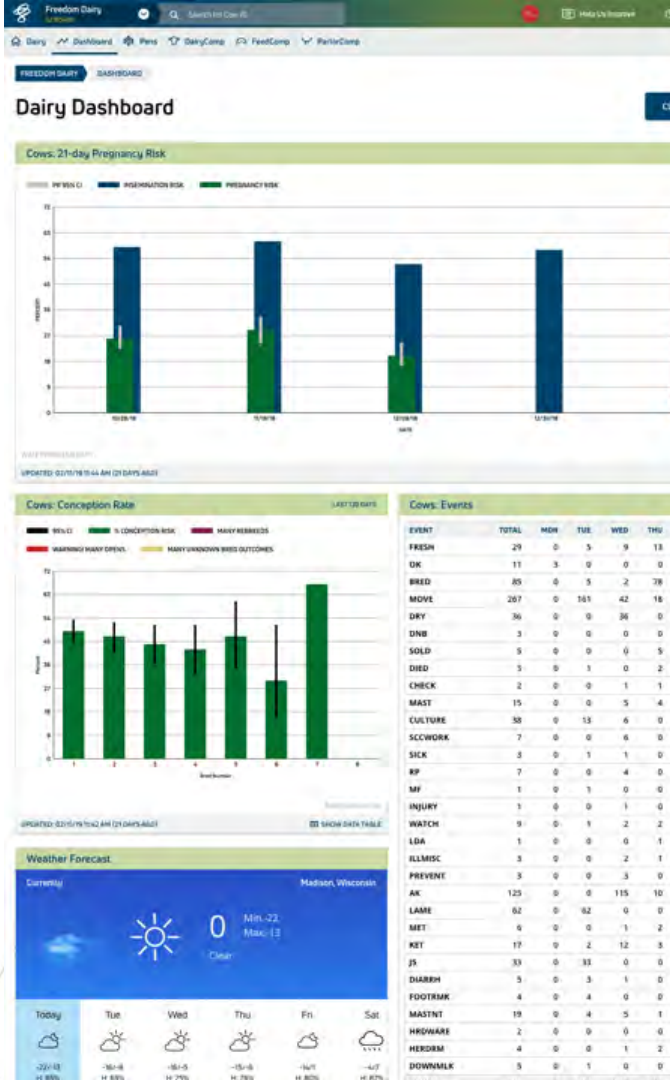
Improve Communications:
Lely, DeLaval, SCR, Nedap, CowManager, Afimilk

New Integrations:
AgSource, CafoPro, Smartbow, Holm & Laue, Forester-Technik, Hoof Supervisor and many more to come!

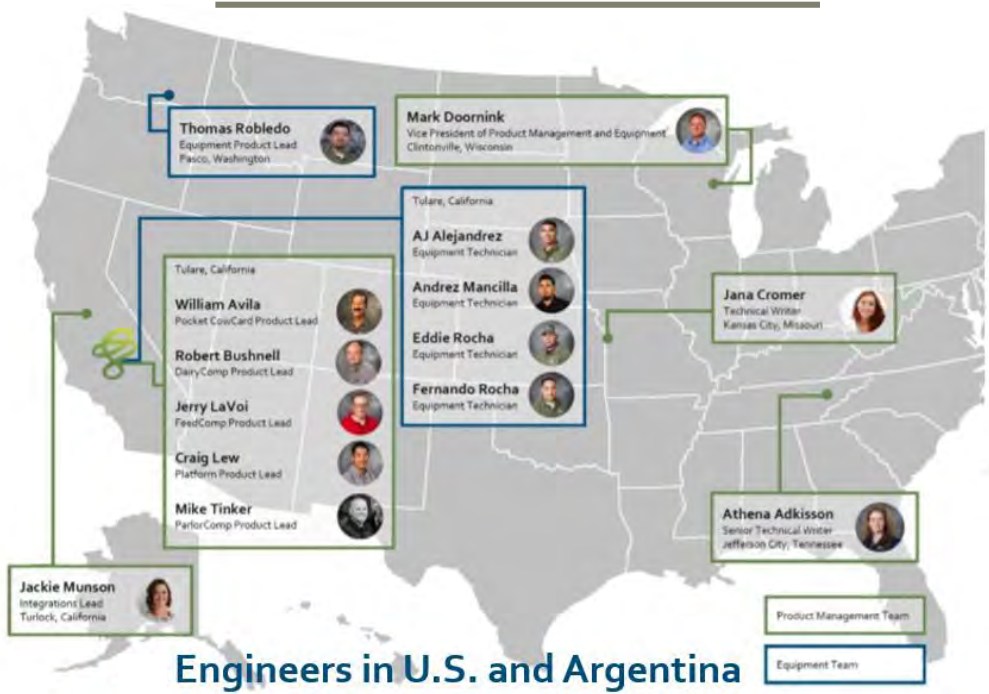
vas

Dashboarding and Business Intelligence

- The VAS Platform brings together the three critical components of the dairy – herd, feed and parlor – into a single screen
- Allows for faster, well-informed business decisions to be made
- Access to information from any web-connected device saves time, effort and resources in collecting and analyzing data
- Integrated, streamlined reporting capabilities in a single solution



Product Development Team



13 Product leads, UX/UI and 30 VAS Engineers in the U.S. and Argentina

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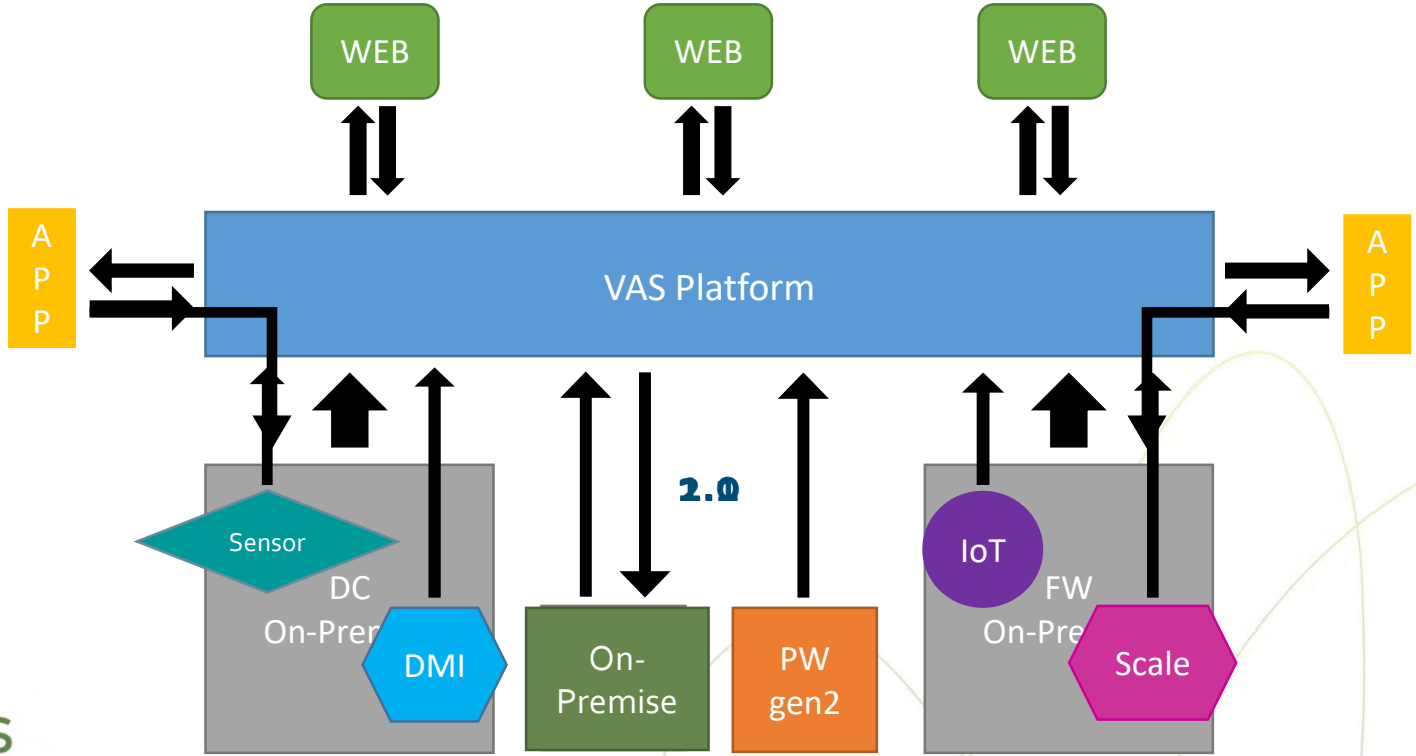
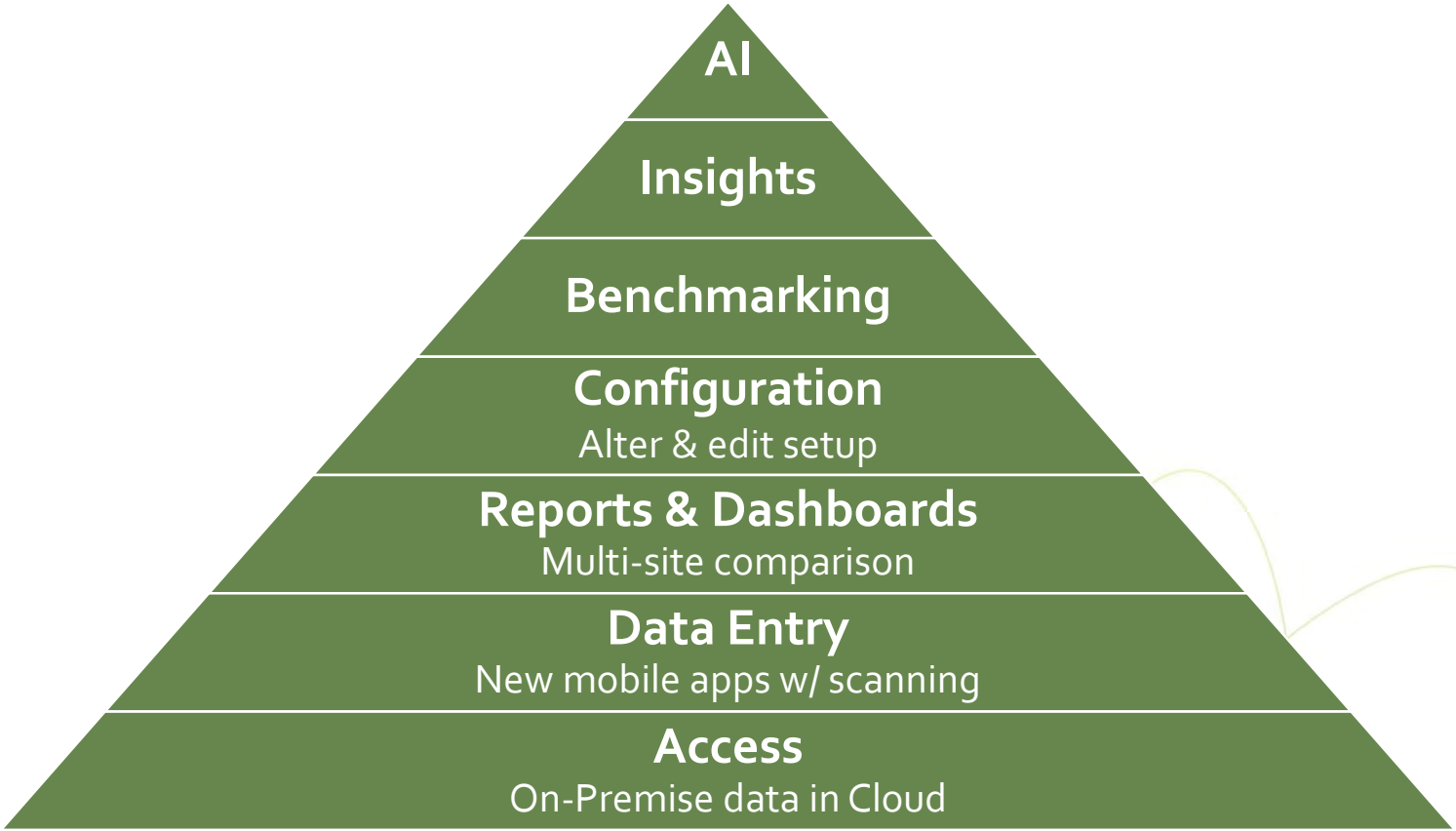
Transition to the VAS Platform



Platform Progress



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VAS Solution Delivery

2018

Launched VAS Platform
CowCare 1.0
Launched FeedComp
Configurable Dashboards
View CowCard Data

Q1 2019

Animal Inventory
Embryo Module
API for data exchange
Data Entry on VAS Platform
Launch ParlorComp
More Dashboard widgets

Q2 2019

Data Entry on VAS Platform
VAS Platform Reports
Multi-Site KPI Comparison
CowCare 2.0
Mobile Worklist
More Dashboard widgets

Q3 2019

Platform Reports with
DairyComp & FeedComp
Multi-Site dashboards
CowCare 2.0
Multi-Site Analysis
More Dashboard widgets

Q4 2019

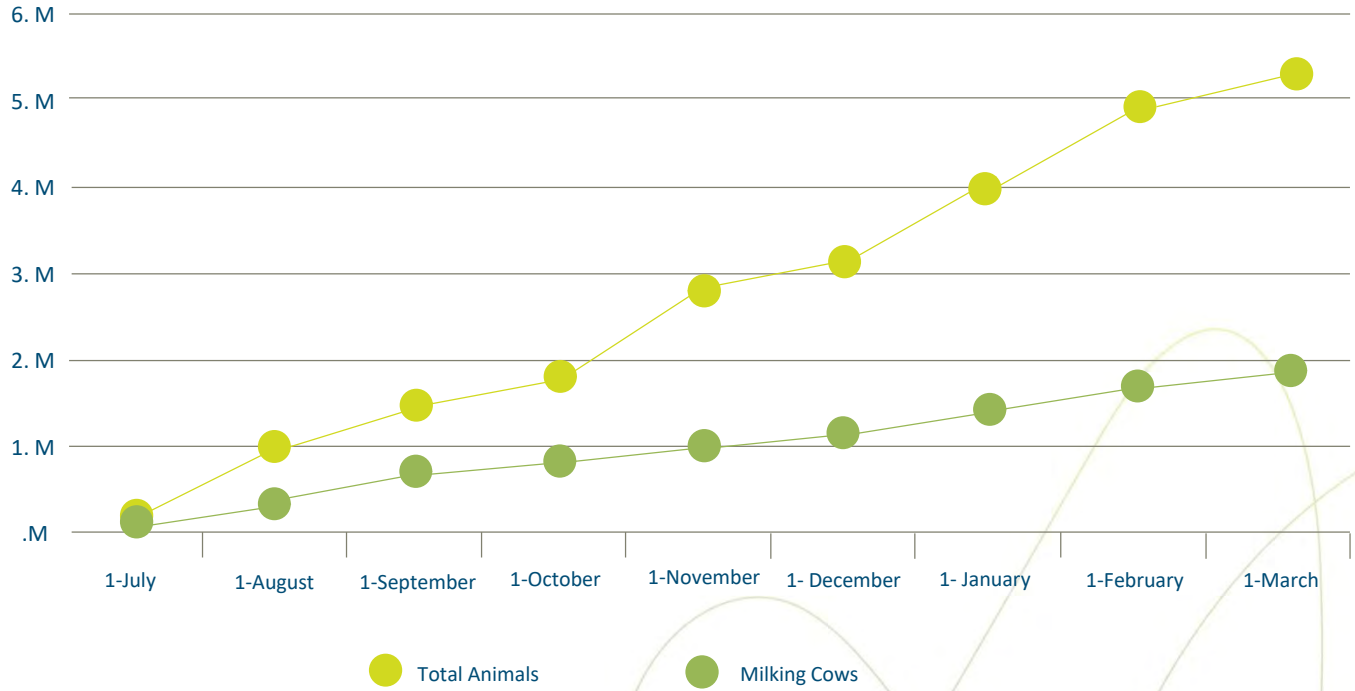
Mobile Workflow guidance
Launch WeighRite 2.0
Multi-Company Dashboard
Platform as a Service

Industry Integrations

Improve Communications: **Lely, DeLaval, SCR, Nedap, CowManager, Afimilk**

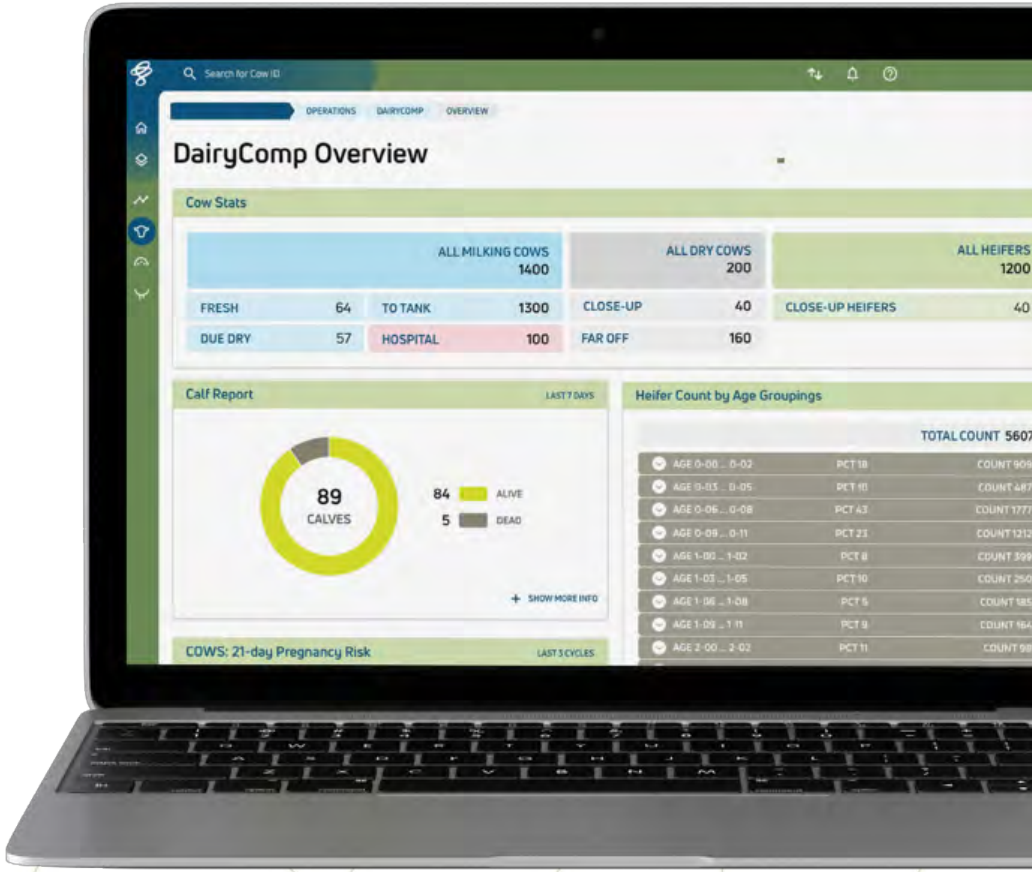
New Integrations: **AgSource, CafoPro, Smartbow, Holm & Laue, Foerster-Technik, Hoof Supervisor and many more to come!**

Platform Adoption



VAS Platform

Demo



Our Products

DC

DairyComp

Manage your herd
easily and accurately
with the world's leading
herd management
software

FC

FeedComp

Boost your bottom
line with increased efficiency and
decreased waste with
your feed

PC

ParlorComp

Capture key information
that will aid in production management while
monitoring the performance
of milkers in the parlor

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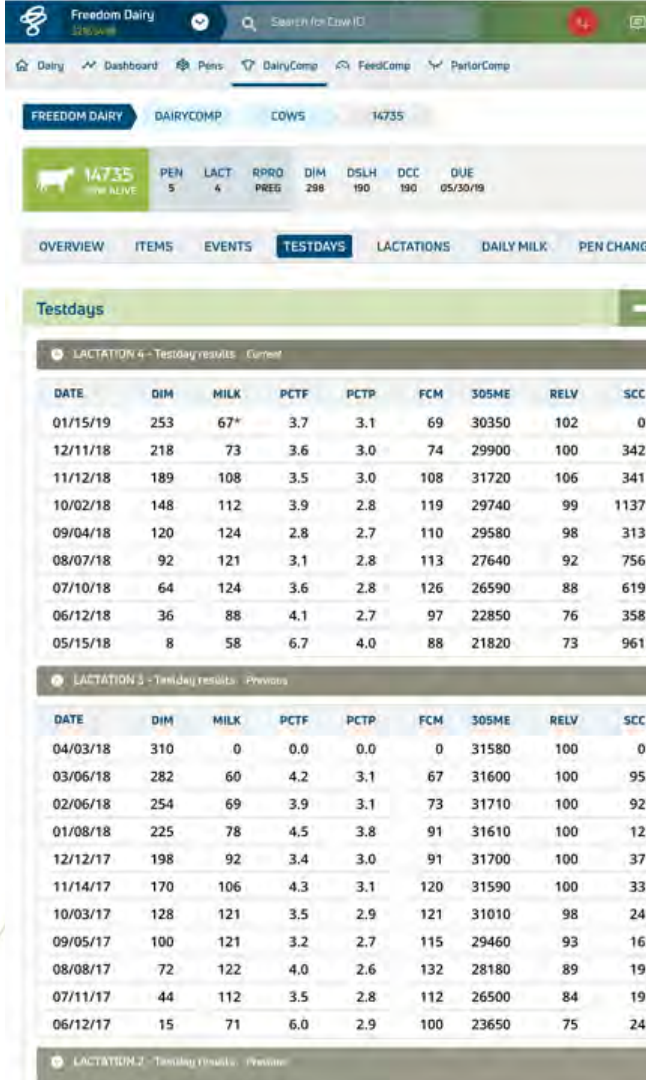
DairyComp

- The cow is the center of the milk production universe
- All animal information (health, treatment, reproduction, milk production) is stored in one centralized program, easily accessible by the dairyman
- Easy access and reporting of data helps producers make proactive decisions about handling and treatment, ensuring optimal cow uptime and production



DairyComp

2019 Functionality Roadmap

Mobile
Data Entry of Worklists, Vet & Hospital Lists cow-side, also with RFID

Configuration
Customization of DairyComp from a web browser

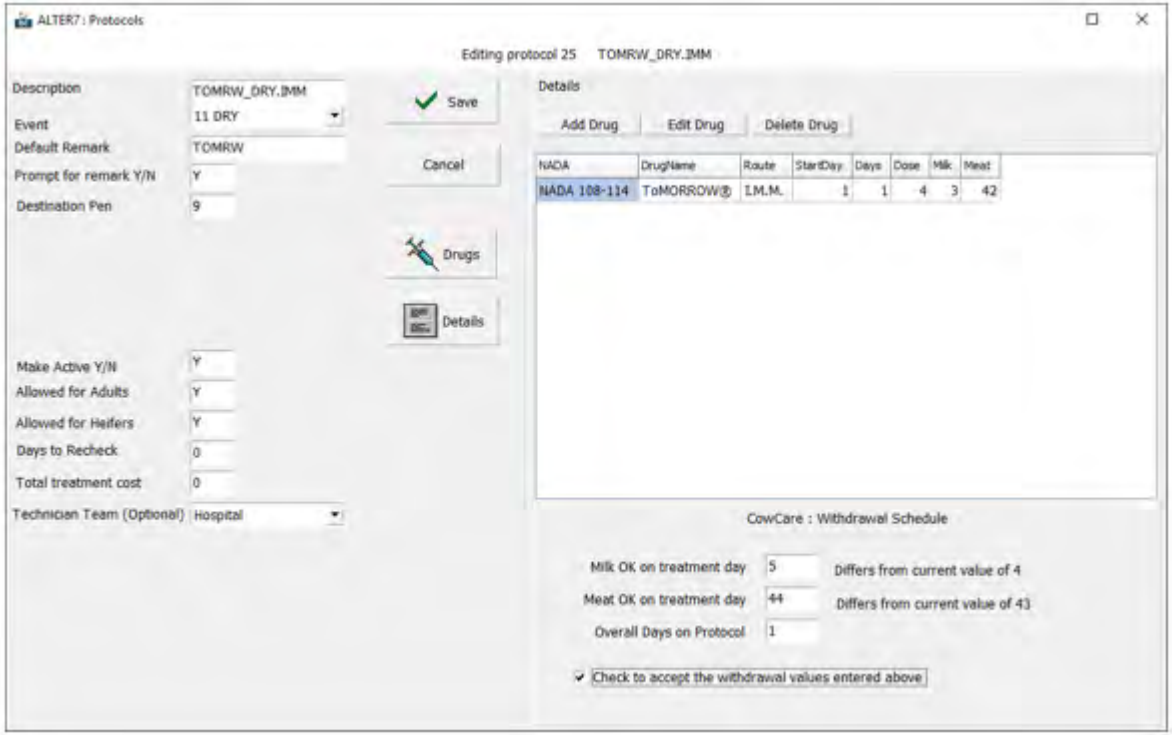
Embryo Module
Manage the collection and transfer embryos

DHI Integration
View vital DHI reports and herd statistics

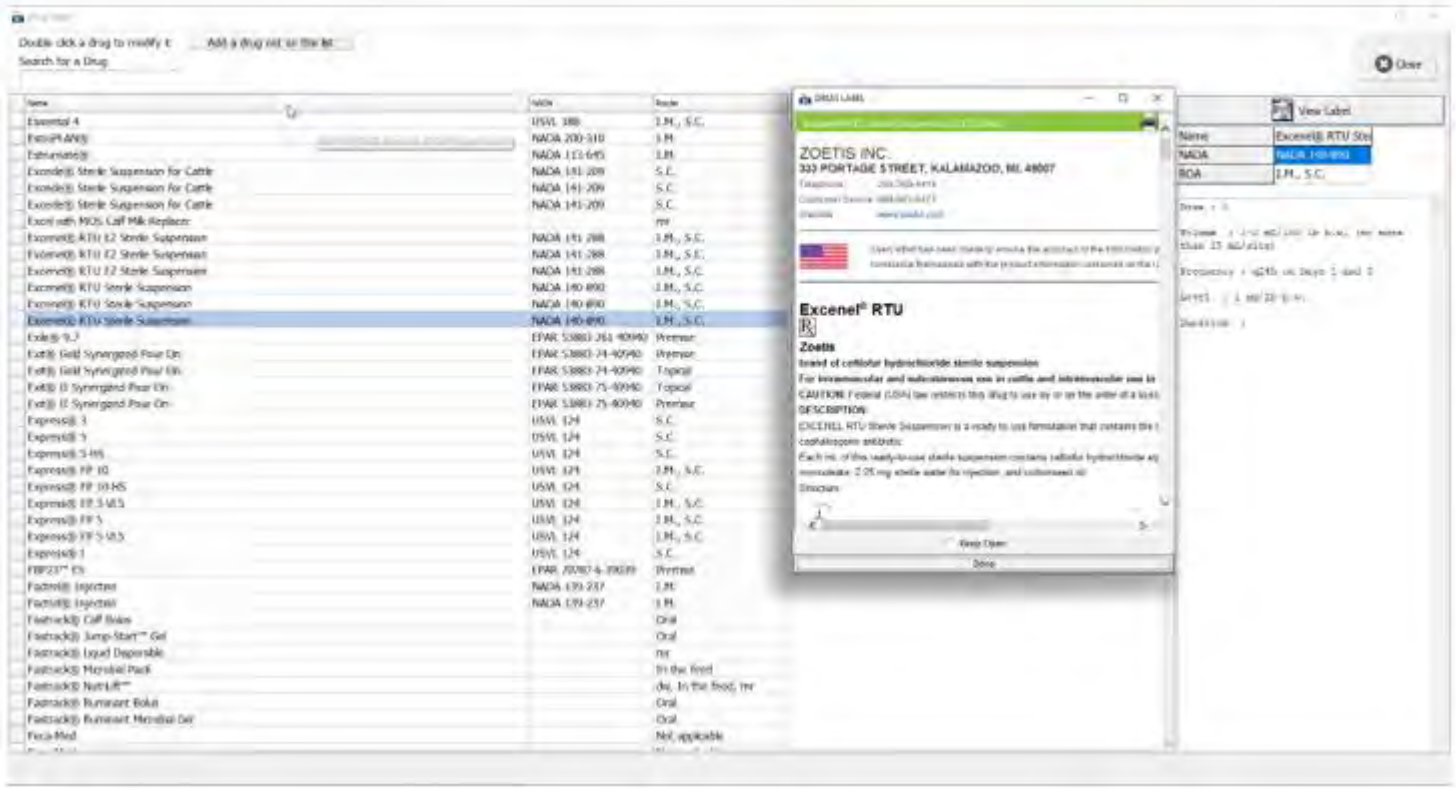
vas

CowCare – New Traditional DairyComp Added Feature

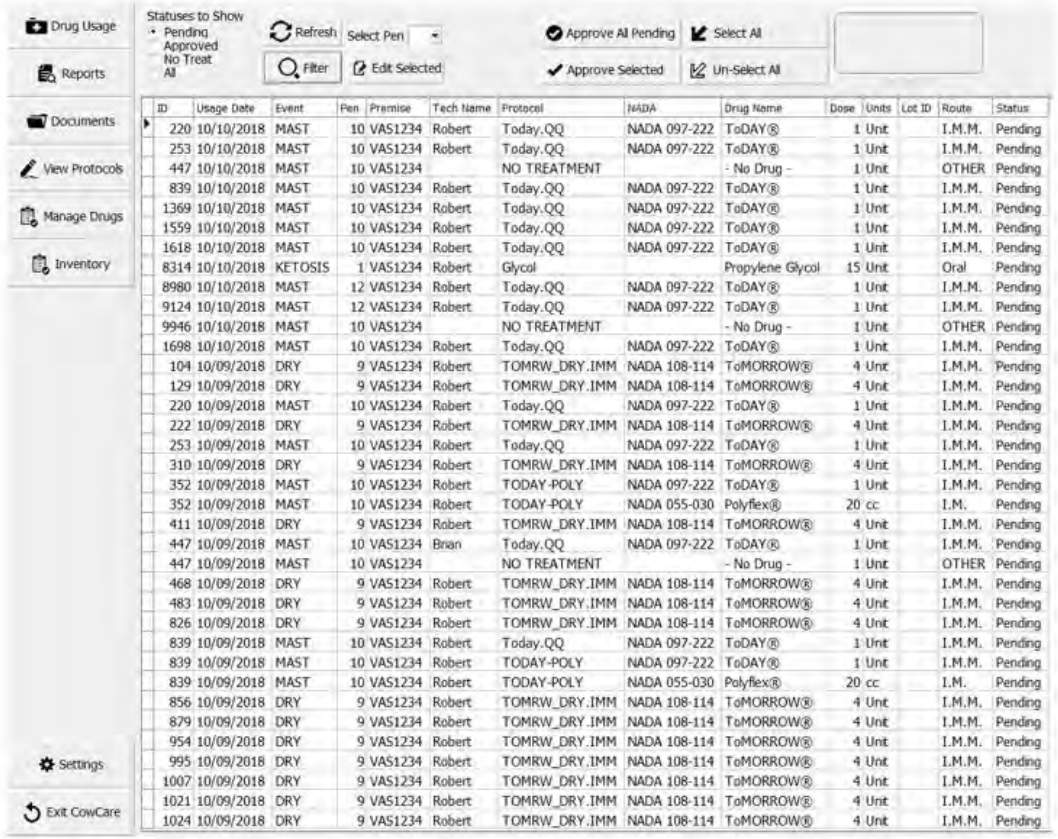
CowCare - Protocols



CowCare – Track Drugs

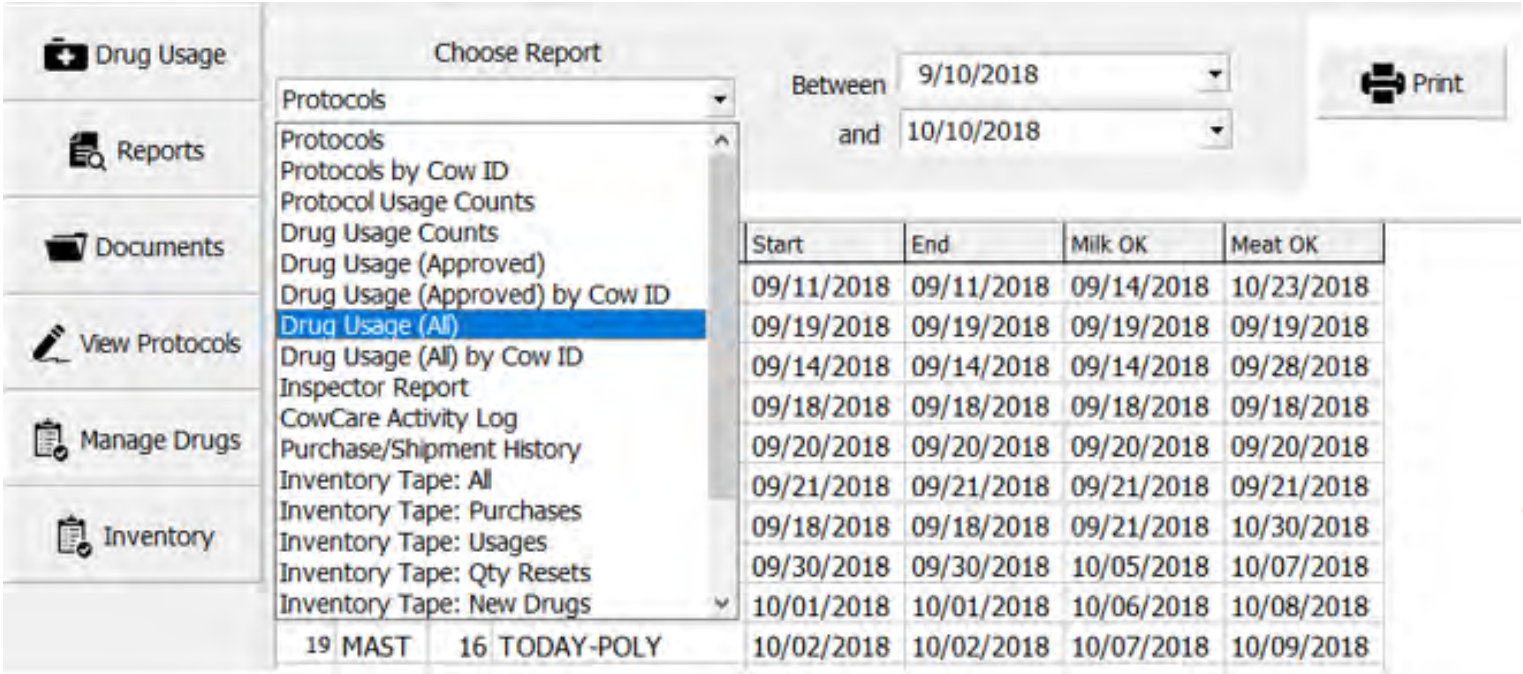


CowCare – Drug Usage



ID	Usage Date	Event	Pen	Premise	Tech Name	Protocol	NADA	Drug Name	Dose	Units	Lot ID	Route	Status
220	10/10/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
253	10/10/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
447	10/10/2018	MAST	10	VAS1234		NO TREATMENT		- No Drug -	1	Unit		OTHER	Pending
839	10/10/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
1369	10/10/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
1559	10/10/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
1618	10/10/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
8314	10/10/2018	KETOSIS	1	VAS1234	Robert	Glycol		Propylene Glycol	15	Unit		Oral	Pending
8980	10/10/2018	MAST	12	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
9124	10/10/2018	MAST	12	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
9946	10/10/2018	MAST	10	VAS1234		NO TREATMENT		- No Drug -	1	Unit		OTHER	Pending
1698	10/10/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
104	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
129	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
220	10/09/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
222	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
253	10/09/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
310	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
352	10/09/2018	MAST	10	VAS1234	Robert	TODAY-POLY	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
352	10/09/2018	MAST	10	VAS1234	Robert	TODAY-POLY	NADA 055-030	Polyflex®	20	cc		I.M.	Pending
411	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
447	10/09/2018	MAST	10	VAS1234	Brian	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
447	10/09/2018	MAST	10	VAS1234		NO TREATMENT		- No Drug -	1	Unit		OTHER	Pending
468	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
483	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
826	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
839	10/09/2018	MAST	10	VAS1234	Robert	Today.QQ	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
839	10/09/2018	MAST	10	VAS1234	Robert	TODAY-POLY	NADA 097-222	ToDAY®	1	Unit		I.M.M.	Pending
839	10/09/2018	MAST	10	VAS1234	Robert	TODAY-POLY	NADA 055-030	Polyflex®	20	cc		I.M.	Pending
856	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
879	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
954	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
995	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
1007	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
1021	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending
1024	10/09/2018	DRY	9	VAS1234	Robert	TOMRW_DRY.IMM	NADA 108-114	ToMORROW®	4	Unit		I.M.M.	Pending

CowCare - Reports



FeedComp

Maximize your profits and minimize your waste
by efficiently running your facility

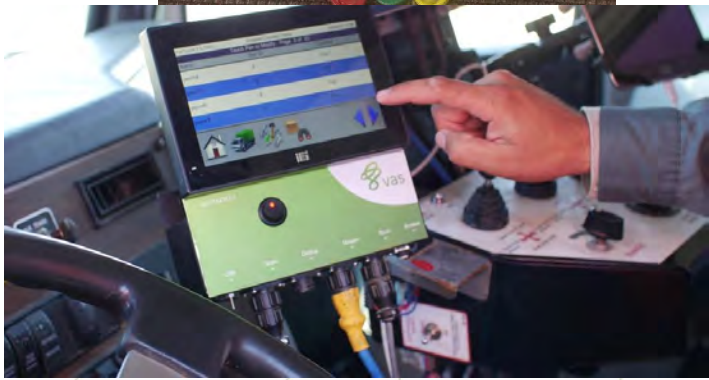
Feed Comp

• Provides data on feeding volumes, accuracy and timing to provide perspective on labor and dietary execution

• Helps automatically control feed mixing and quantities to ensure dietary needs of each animal are being met to promote their health and optimal milk production

• Keeps track of inventories to better plan for ordering/delivering of supplemental ingredients

• Analyzes production/income over feed cost to give best snapshot of how feed/diet affects profitability



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FeedComp

2019 Functionality Roadmap

Entry of Ingredient DM%
Test feed & make DM changes with the FeedComp app

Adjust Target DM / HD
See how much feed is being targeted for this specific pen and adjusting if needed

Change Pen Counts
Change the number of animals to be fed with the FeedComp app

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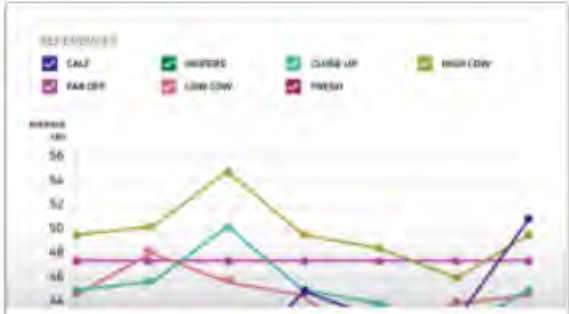
VAS Platform



Dry Matter Intake by Pen Type

Feed

View dry matter intake for each pen type (dry, fresh, etc.) over the past week.

Equipment Status

Feed

View target & actual feed mixer load weights for the previous & next loads.

Ingredient Loading Issues

Feed

Shows the Ingredients that are outside the tolerance. (Default: 15%)

ParlorComp/ParlorBoss

Gain efficiency, streamline, and maximize production with ParlorBoss

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ParlorComp

• Leverages same tagging technology to directly connect the cow's location (pen, milking stalls, etc.) to its output

• Parlor performance is collected and presented for analysis in the ParlorComp on the Platform

• ParlorBoss streamlines cow treatment in the parlor, and improves counting/organization/placement of cows

• Ensures milk quality by monitoring the washing process, milk temperatures, and provides dairies with a historical record

ParlorComp

2019 Functionality Roadmap

Integrations

Integration with Milk Creamery and Co-Ops to provide milk shipment quality & quantity

Configurations

Configuration of ParlorComp on-farm Software (milking schedule, wash cycles) from app

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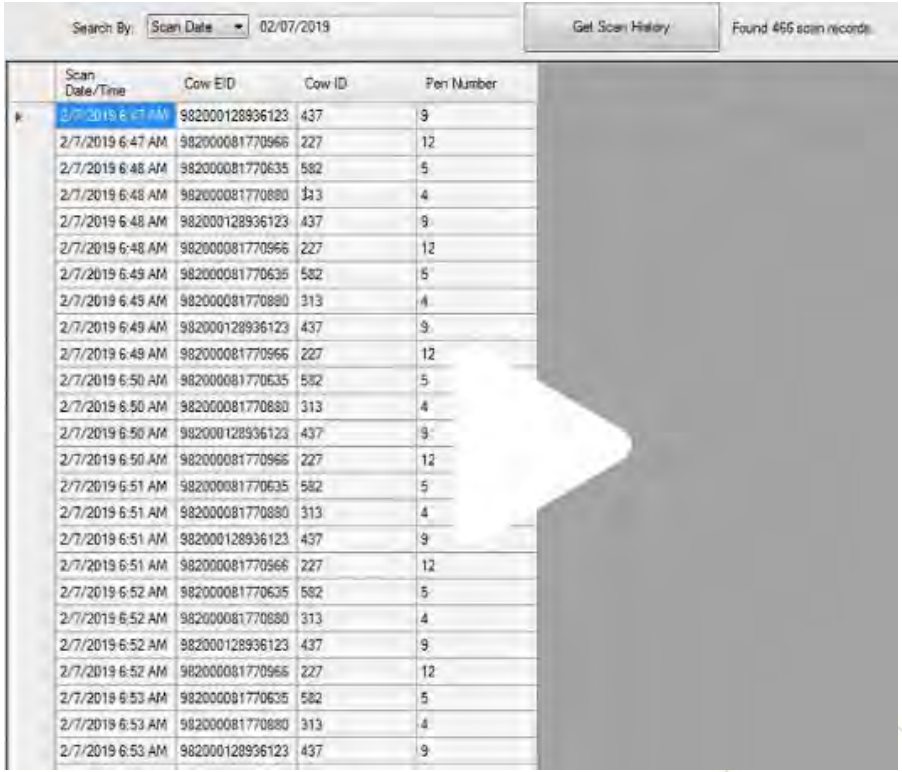
Stall ID CBRD DSLR DIM TASK2 DCC NPRO MILK FMILK
99 35414 H 98 177 - 98 FRSG 52 52
100 ------ ---
101 47787 ---
102 26696 X 0 65
103 70215 H 109 222 - 0 OK/OPEN
104 37662 H 153 229 - 109 FRSG 64 0
105 73569 H 16 241 - 153 FRSG 52 72
106 68969 X 14 140 - 0 FRSG 72 88
1 20771 H 7 84 - 0 BRED 66 72
2 33399 H 30 228 - 0 BRED 56 84
3 37613 H 105 246 - 0 BRED 76 60
4 22437 H 153 249 - 105 BRED 64 112
5 47064 X 147 228 - 153 FRSG 60 84
6 46648 X 0 37 - 147 FRSG 100 84
H 21 189 - 0 OK/OPEN 68 60
0 BRED 44 84

Milk Testing Scan History



Scan Date/Time	Cow EID	Cow ID	Pen Number
2/7/2019 6:47 AM	982000128936123	437	9
2/7/2019 6:47 AM	982000081770966	227	12
2/7/2019 6:48 AM	982000081770635	582	5
2/7/2019 6:48 AM	982000081770880	313	4
2/7/2019 6:48 AM	982000128936123	437	9
2/7/2019 6:48 AM	982000081770966	227	12
2/7/2019 6:49 AM	982000081770635	582	5
2/7/2019 6:49 AM	982000081770880	313	4
2/7/2019 6:49 AM	982000128936123	437	9
2/7/2019 6:49 AM	982000081770966	227	12
2/7/2019 6:50 AM	982000081770635	582	5
2/7/2019 6:50 AM	982000081770880	313	4
2/7/2019 6:50 AM	982000128936123	437	9
2/7/2019 6:50 AM	982000081770966	227	12
2/7/2019 6:51 AM	982000081770635	582	5
2/7/2019 6:51 AM	982000081770880	313	4
2/7/2019 6:51 AM	982000128936123	437	9
2/7/2019 6:51 AM	982000081770966	227	12
2/7/2019 6:52 AM	982000081770635	582	5
2/7/2019 6:52 AM	982000081770880	313	4
2/7/2019 6:52 AM	982000128936123	437	9
2/7/2019 6:52 AM	982000081770966	227	12
2/7/2019 6:53 AM	982000081770635	582	5
2/7/2019 6:53 AM	982000081770880	313	4
2/7/2019 6:53 AM	982000128936123	437	9

FREEDOM DAIRY | OPERATIONS | PARLORCOMP | OVERVIEW

ParlorComp Overview

CUSTOMIZE THIS PAGE

Parlor Status

PARLOR STATUS	CURRENT SHIFT	CURRENT PEN	CURRENT FLOW
Milk	1	4	65 GPM

COWS IN PEN	289
CURRENT PEN TOTAL MILK	2850.0 GAL
CURRENT SHIFT TOTAL MILK	28500.0 GAL
CURRENT TEMP	145.9 F
TEMP ALARM	NONE
TOTAL TIME	0 MIN
SEC/STALL	97

Current Tasks

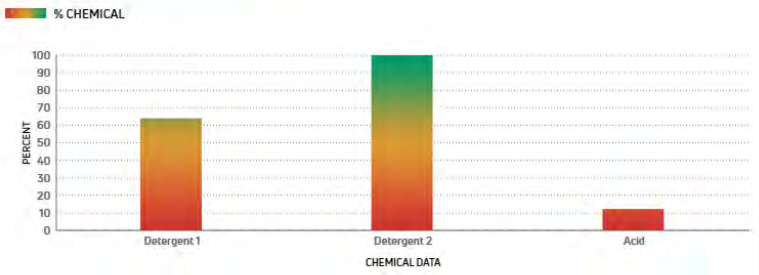
TASK	COWS
GNRH	56
MOVE	156

TASK	COWS
DRY	16

Last Rotary Data

ROTARY	MINS/ TURN	SEC/ STALL	COWS/ HOUR	TURNS/ HOUR
FASTEST	9	8.2	441.0	6.1
AVERAGE	9	7.8	460.0	6.4

Chemical Volume Monitoring



VIEW DATA TABLE

Milk Shipment

ECM
25,528

SEPTEMBER 27, 2018
24,306 lbs
AVERAGE FOR THE LAST 10 DAYS

FCM
24,510

Future VAS

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Exciting Future!

- Platform will continue to grow
  - Working with 120 partners in the ecosystem
  - AI (artificial intelligence)
  - All data one location – data overload, we will interpret and present
- ParlorBoss has great potential
- FeedComp is really gaining momentum
- Grow in the U.S and internationally (currently in 46 countries)
- Develop new technology
  - Improve efficiency and profitability

Data Privacy

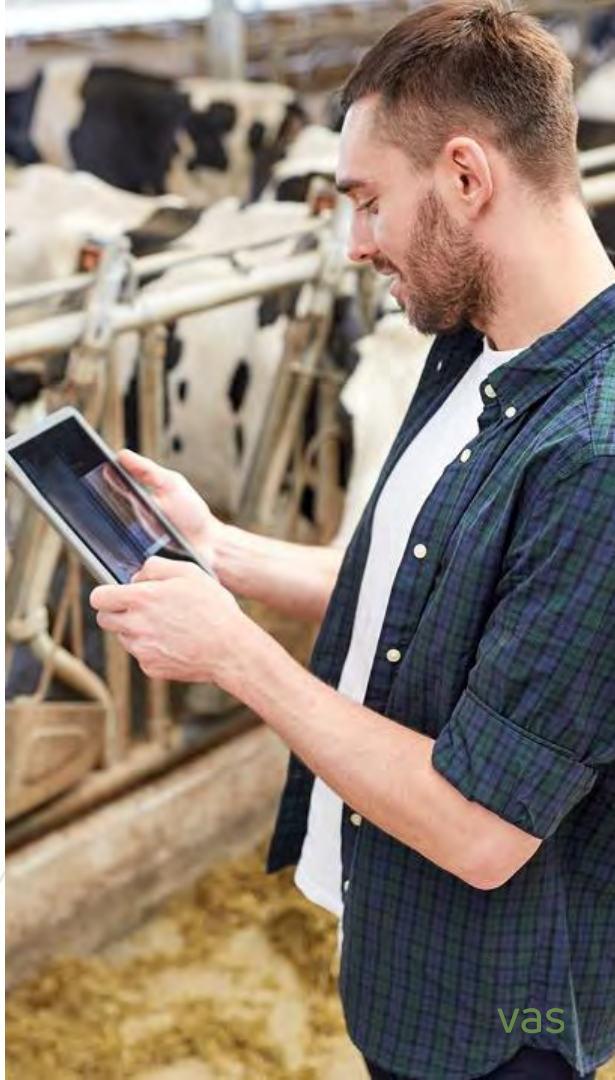
- Data privacy & data protection is critical today

- VAS created an Intellectual Property (IP) framework & IP position to protect the farm data

- The Facts:
  - Compatible with NDHIA policies
  - The farm owns their data
  - VAS does not share your data with anyone without your written permission
  - VAS does not sell your dairy data

Robots

- VAS working very closely DeLaval & Lely
- Creating a two-way data exchange of robot data and farm information
- Develop new metrics tools with Infolytics



Ownership and Structure

Owned by the Pon family in the Netherlands

- Long term commitment to the dairy industry
- Owners of three dairies (Netherlands, Germany and Poland)
- Majority ownership of Urus Group (Alta, Genex, SCCL, AgSource)

VAS statistics

- Customers in 42 countries
- 100 employees
- 8 million milking cows on our products
- 2019 revenue approaching $20 million USD
- 20%+ annual revenue growth
- Annual development budget of $7.5 million


vas


AgSource™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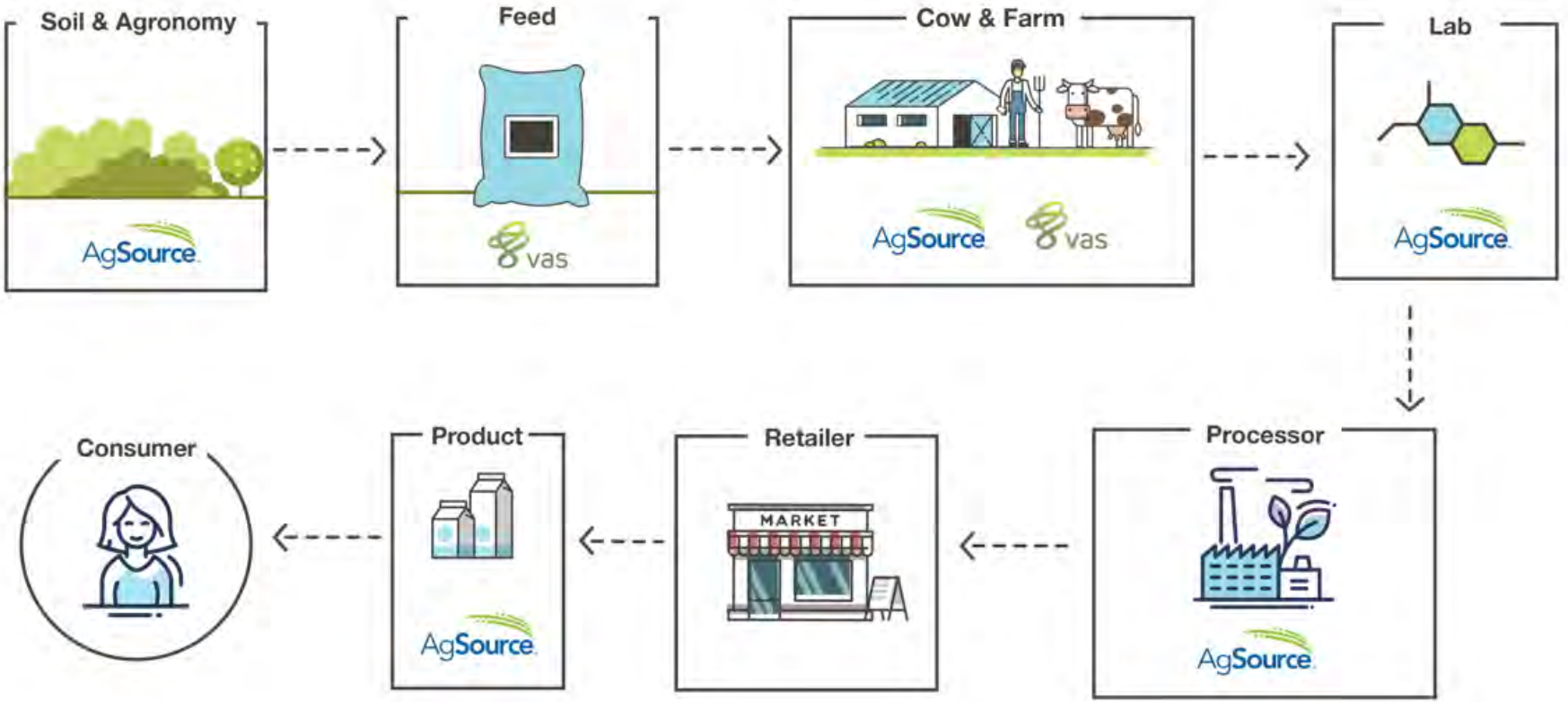
"Coming together is a beginning; keeping together is progress; working together is success."

Henry Ford

HOW WE SEE THE FUTURE OF AGRICULTURAL INFORMATION MANAGEMENT



Thank You

Discussion