Transforming Dairies with Livestock and Dairy Intelligence

Tom Breunig
VP Global Accounts and Business Development
Evolution of Dairy Practices

• **90s:** advancement of TMRs, the start of the transformation of cow comfort, stall configuration, sand bedding research, modern ventilation and cow cooling

• **Late 90s:** synchronization (shortage of heifers, little known about health and reproductive traits on bulls), increasing milk production and problems getting cows pregnant

• **Mid 2000s:** Sexed Semen and the start of Genomics

• **Just starting:** sensors transforming individual and group management of animals without the (human and animal) stress, and time, associated with past management practices
Increasing Level of Risk Going Into the Future

- Antibiotics, Reproductive Hormones
- Permitting/Regulatory and Waste Issues
- Feed Cost Risk
- Consumer/Processing Expectations
- Labor Issues
Using Data to Reduce Risks

- Sensors and Alert Monitors
- Turn Data into Information
- Add new Dashboards and Integrations across, and with, various Platforms
- Make New Improvements
- Implement and Evaluate Results
- Gain Wisdom for better Decision-Making

Add new Dashboards and Integrations across, and with, various Platforms
What Do You Currently Spend Your Time On?

- ** Majority of time checking and identifying cows that need attention**
- **Amount of time attending to sick and challenged cows, and problem prevention**
Transforming Management and Time

- Sensor identifying cows needing attention and setting action items
- Attending to 1-5% of cows needing attention and leaving the others alone to rest
- Time transitioned toward other higher value activities like problem prevention and immediate needs
Sensors Will Provide Information on Animals from Birth to End of Life

**Health**
- Young Stock Health

**Reproduction**
- Animals in Heat
- Anestrous Cows
- Irregular Heats
- Suspected for Abortion

**Reproduction + Health**
- Animals to Inspect
- Health
- Animal Distress
- Early Fresh Cows
- Distress Alerts

**Reproduction + Health + Group**
- Group Heat Stress
- Group Consistency
- Group Routine

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**SENSEHUB™ DAIRY**
- Young Stock
- Heifers
- Dairy cows
- Dairy cows

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*Allflex
Livestock Intelligence
An Antelliq company*
Sensors Can Map Everything an Animal is Doing

Healthy Calf—fed late in the morning and early in afternoon

Research into Actions

Sensors will offer the opportunity for rumination based weaning and will give another data point (with genomic and management information) for culling before heifer raising cost incurred

Non-healthy Calf:
What have we learned?
A Window into Dry Cow Health and Nutrition Pays Dividends Later…

Dry period
Pre-partum  →  Calving  →  Fresh period and beginning of lactation  →  Reproductive Management

Health
Repro
Start with Dry Cows

“Cows with lower RT before calving maintained lower RT after calving, and suffered a greater frequency of disease than cows with higher RT in late pregnancy.”


120 minute drop in Rumination is 9.4 gal/da more saliva production or about the daily bicarb requirements
Distress and Health Alerts on the History Graph
Association Among Pattern of Rumination and Prevalence of Sub-clinical Hypocalcemia and Ketosis

\[ y = 1.4044x - 16.778 \]
\[ R^2 = 0.8754 \]

\[ y = 3.4233x - 44.188 \]
\[ R^2 = 0.9817 \]

Meta analysis, five large midwestern farms, groups based on quartiles
Association Among Pattern of Rumination and Prevalence of Stillbirth and 90d Milk Yield

\[ y = 0.8143x - 10.872 \]
\[ R^2 = 0.5777 \]

\[ y = -0.417x + 110.17 \]
\[ R^2 = 0.9441 \]

Meta analysis, five large midwestern farms, groups based on quartiles
### Health Index Report

<table>
<thead>
<tr>
<th>Cow Number</th>
<th>Group</th>
<th>Lactation Status</th>
<th>Days in Lactation</th>
<th>Days from Last Breeding</th>
<th>Activity Peak</th>
<th>Ruminations Peak</th>
<th>Daily Ruminations</th>
<th>Amount Of Evaluation</th>
<th>Health Index for Non</th>
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Evaluate the ability of **Health Index (HI) score** to identify cows with health disorders.
# Ability of HI Score to Identify Cows with Health Disorders

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Cows detected Se, % (95% CI)</th>
<th>HI &lt;86 to DCD (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA (n = 41)</td>
<td>98 (93-100)</td>
<td>-3 (-3.7 to -2.3; P&lt;0.01)</td>
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<tr>
<td>Ketosis (n = 54)</td>
<td>91 (83-99)</td>
<td>-1.5 (-2.3 to -1.0; P&lt;0.01)</td>
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<tr>
<td>Indig. (n = 9)</td>
<td>89 (68-100)</td>
<td>-0.5 (-1.5 to 0.5; P=0.28)</td>
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<tr>
<td>All metabolic &amp; dig. (n = 104)</td>
<td>93 (89-98)</td>
<td>-2.1 (-2.5 to -1.6; P&lt;0.01)</td>
</tr>
</tbody>
</table>
Rumination is a Proven Sensitive Health Indicator

Use of Rumination and Activity Monitoring for the Identification of Dairy Cows with Health Disorders

M.L. Stangaferro, R. Wijma, C.E. Quinteros, M.B. Medrano, M. Masello, and J.O. Giordano
Dairy Cattle Biology and Management Laboratory
Cornell University
Department of Animal Science

Health Index Score Performance

<table>
<thead>
<tr>
<th></th>
<th>% (n/n)</th>
<th>95% CI</th>
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<tr>
<td>False positives</td>
<td>2.4</td>
<td>2.6-2.8</td>
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<td></td>
<td>(1,955/72,423)</td>
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<tr>
<td>Specificity</td>
<td>97.6</td>
<td>97.2-97.4</td>
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<tr>
<td></td>
<td>(70,695/72,423)</td>
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<tr>
<td>Accuracy</td>
<td>95.6</td>
<td>95.4-95.7</td>
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<tr>
<td></td>
<td>(73,111/76,519)</td>
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</table>

- Each day was considered a new test
- Total number of days in the study was determined for individual cows until 80 DIM or DIM at which cows left the herd (sold or died)
Knowing the Onset of Estrus and a Heat Index

Allows for insight into success using embryos, sexed semen on cows, and beef on dairy choices. This information is displayed in a Cows to Breed Report.
Insight into Early Lactation Estrus Health Events Meaning

Allow for early intervention into animals needing reproductive treatment

<table>
<thead>
<tr>
<th>Cow Number</th>
<th>Group</th>
<th>Days in Lactation</th>
<th>Lactation Status</th>
<th>For Breeding</th>
<th>Lactation Number</th>
<th>Daily Production</th>
<th>System Health Events in Current Lactation</th>
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</table>
Daily Usage—Using Dashboard for Setting your Day...

Monitoring from another device:

<table>
<thead>
<tr>
<th>Health Report</th>
<th>Cows in Heat</th>
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<tr>
<td>Health</td>
<td>92%</td>
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### Health Report

<table>
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<tr>
<th>Cow ID</th>
<th>Health Index</th>
<th>Daily Ruminations</th>
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### Cow Card

<table>
<thead>
<tr>
<th>Cow ID</th>
<th>Details</th>
<th>Graphs</th>
<th>Notes</th>
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<tr>
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### Activity & Rumination Change

- Activity
- Rumination

DAILY RUMINATION

Allflex
Livestock Intelligence
Active Transponder Sorting

Allows for...

- Optimize herd person effectiveness
- Can eliminate lock up time and streamline animal examination and treatments
- High sorting accuracy
- Left/right and three-way sorting models available
- Little disruption of cows in their own pens
Problem Solving Dry and Fresh Cow Issues

Toxin or other dry cow feed issues cause health issues later

Real Life Group Use Cases
Delivering a Calm and Consistent Daily Experience

Nervous

Relaxed
The Effect of Human Interaction on Cows

*Excessive lock up time, and work within the pens--increases variation and stress. Work towards consistent rumination with little variation from cow to cow.*
Incredible Herd Consistency

Consistent ration, delivered the same time, results in consistency of rest times and feed desired by a cow day after day—week after week.
Group Heat Stress Graph

- This graph presents the Real Time situation of the group over a 2 day period.
- The data is being updated every 5 minutes.
- **X Axis** = Time of the day
- **Y Axis** = Percentage of cows in the group that are Eating / Panting / Ruminating
- We can see that when the group is being cooled, the percentage of cows panting is reduced, and the percentage of cows ruminating is increased.
- The 10% line is presented in bold since this represents the threshold for considering the group to be under heat stress.
Fine Tuning Group Management

Normal is 50-60% of animals ruminating in the evening and during rest...
Case Study Using Sprinklers at Night in Extreme Heat

How does heat build up in individual animals...

Historically, this farm did not turn on water sprinklers during the night, until they saw they had more heat stress than expected.

The next day the soakers run throughout the night, the temperature is approximately the same, and the cows have a chance to recover from the heat of the day.
iCool & WISE Model

Ideas for a More Sustainable Future

Manual Model
The Water Saving Impact

Amount: 58 groups, 153 positions
Setting: 24h running, 1+5 model

Ordinary spray per nozzle daily average shower time: 240mins/d
Precisely spray per nozzle daily average shower time: 39.5mins/d

Ideas for a More Sustainable Future
Fischer-Clark Dairy Inc., Hatley, WI
Reproductive Mindset...

No Hormones until 90 (LACT1+2) 100 DIM (LACT3+)
High Percentage Natural Breeding
Less Stress on Cows
MORE, HIGHER QUALITY MILK

User Stories
Fischer-Clark Dairy Inc., Hatley, WI
Reproductive Mindset...

Production Parameters | Statistics
--- | ---
RHA | 34515
Average Pounds per Cow | 99.2
Energy Corrected Milk | 106.3
% Butterfat | 4.2
% Protein | 3.1
Combine Fat and Protein shipped/day | 7.3
Total # of cows | 962
Bulk tank SCC | 82

Natural vs. Timed

<table>
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<th>Natural vs. Timed</th>
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<tr>
<td>LACT1</td>
<td>85% - 15</td>
</tr>
<tr>
<td>LACT2</td>
<td>80% -20</td>
</tr>
<tr>
<td>LACT3+</td>
<td>70%-30</td>
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<tr>
<td>SPC</td>
<td>2.3</td>
</tr>
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</table>
Reuter Dairy, Inc., Peosta, Iowa

- 830 Milking
- 105 lbs. Milk/day
- 4.0% fat, 3.2% Protein, SCC 80,000
- Dan’s comments:
  - Reduces human error and shows how cows respond to treatment
  - Helped eliminated post fresh group and group changes
  - If she is ruminating leave her alone
  - Let cows be cows and try to breed off a natural heat
  - Trust the system—makes better cow people out of everyone
  - Great tool to work with your female genetics program on your farm
  - Labor savings
Pagel’s Ponderosa Dairy, Kewaunee, WI

- 86 lbs. Milk/day, 4.2% fat, 3.5% Protein
- Benefits Include:
  - Reducing labor and lock up time in the fresh group
  - More successful transition as they move animals at 14DIM to larger pens
  - Better heat detection than tail paint resulting in 100 more pregnancies in the first cycle fully on the system
  - Sensor information is great for upgrading protocols
  - Becoming less reliant on antibiotics and hormones
- Talk to Herd Manager, Chris Syzdel, after the session or tomorrow
Using Sensor Information to *Move* from Checking all Cows to...Increasing Cow Comfort and Spending more time on Problem Prevention

Transformation

- Majority of time checking and identifying cows that need attention
- Percentage of time attending to sick and challenged cows, and problem prevention
- Sensor identifying cows needing attention and setting action items
- Attending to 1-5 % of cows needing attention and leaving the remaining to rest
- Time transitioned toward other higher value activities like problem prevention and immediate needs
## Costs of Operating into the Future

<table>
<thead>
<tr>
<th>Reproductive Hormones and Antibiotics</th>
<th>Permitting/Regulatory</th>
<th>Feed Cost and Cow Care</th>
<th>Consumer/Processing Expectations</th>
<th>Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives you choices to reduce blanket treatments. Use real time cow metrics</td>
<td>Managing to the specific number of replacements needed—of the highest value</td>
<td>Find feed and toxin issues more quickly. Tools to reduce cow stress and increase her feed efficiency and health</td>
<td>Wanting more transparency and Sustainability. Lower lock up times</td>
<td>Better tools to manage more with less—using visual examples and teaching tools</td>
</tr>
</tbody>
</table>
THANK YOU