New Tools and Technologies for Monitoring Transition Cows

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Precision Dairy Monitoring

- Technologies to monitor
  - Physiology
  - Behavior
  - Milk content

- Focus on preventive health and performance at the cow level

- Make more timely and informed decisions
Areas to Monitor a Dairy Cow

Ideal Technology

- Explains an underlying biological process
- Can be translated to a meaningful action
- Cost-effective
- Flexible, robust, reliable
- Simple and solution focused
- Information readily available to farmer
Precision Dairy Benefits

- Improved animal health and well-being
- Early detection
- Increased efficiency
- Improved product quality
- Minimized adverse environmental impacts
- More objective measures
Disease Detection Benefits

- Early Disease Detection
- Early Treatment
- Improved Prevention Program

- Improved Treatment Outcome
- Less Production Loss
- Less Economic Loss
- Improved Animal Well-Being

SCR HR Tag for Milk Fever Detection

Amanda Stone et al., Unpublished Data
SCR Rumination Time

Klebsiella Mastitis Identified on 11/7/12

Minutes Ruminating per Day

Date

Amanda Stone et al., Unpublished Data

Agis Health Alert


Stone et al., Unpublished Data
What Are the Limitations of Precision Dairy Farming?

• Maybe not be #1 priority for commercial dairy producers (yet)
• Many technologies are in infancy stage
• Not all technologies are good investments
• Economics and people factors
Technology Pitfalls

- “Plug and play,” “Plug and pray,” or “Plug and pay”
- Technologies go to market too quickly
- Not fully-developed
- Software not user-friendly
- Developed independently without consideration of integration with other technologies and farmer work patterns
Technology Pitfalls

• Too many single measurement systems
• Lack of large-scale commercial field trials and demonstrations
• Technology marketed without adequate interpretation of biological significance of data
• Information provided with no clear action plan

PDF Reality Check

• Maybe not be #1 priority for commercial dairy producers (yet)
• Many technologies are in infancy stage
• Not all technologies are good investments
• Economics must be examined
• People factors must be considered
Lessons learned

• Be careful with early stage technologies
• Need a few months to learn how to use data
How Many Cows With Condition Do We Find?

80 Estrus Events Identified by Technology

20 Estrus Events Missed by Technology

Example: 100 estrus events

How Many Alerts Coincide with an Actual Event?

90 Alerts for Cows Actually in Heat

10 Alerts for Cows Not in Heat

Example: 100 estrus events
What’s the Sweet Spot?

• Cost of missed event
  – High for estrus
  – Lower for diseases?

• Cost of false positive
  – Low for estrus
  – High for mastitis

• Farm dependent

The Book of David:
Cow People Benefit Most
Why Have Adoption Rates Been Slow?

Rebecca Russell, 2013

Reason #1. Not familiar with technologies that are available (N =101, 55%)
Reason #2. Undesirable cost to benefit ratio
(N =77, 42%)
Reason #4. Not enough time to spend on technology (N =56, 30%)

Reason #5. Lack of perceived economic value (N =55, 30%)
Reason #6. Too Difficult or Complex to Use (N =53, 29%)

Reason #7. Poor technical support/training (N =52, 28%)
Reason #8. Better alternatives/easier to accomplish manually (N =43, 23%)

Reason #9. Failure in fitting with farmer patterns of work (N =40, 22%)
Reason #10. Fear of technology/computer illiteracy (N =39, 21%)

Reason #11. Not reliable or flexible enough (N =33, 18%)
Precision Dairy Technologies: A Producer Assessment

Matthew R. Borchers and Jeffrey M. Bewley
University of Kentucky
Department of Animal and Food Sciences

What do producers consider before purchasing one of these technologies?

Matthew Borchers, 2014
Consideration #1.
Benefit: cost ratio
\((4.57 \pm 0.66)\)

Consideration #2
Total investment cost
\((4.28 \pm 0.83)\)
Consideration #3. Simplicity and ease of use (4.26 ± 0.75)

What parameters do producers find most useful in technologies?
Important Parameter #1. Mastitis
(4.77 ± 0.47)

Important Parameter #2
Standing heat
(4.75 ± 0.55)
Important Parameter #3 Daily milk yield

(4.72 ± 0.62)

Matthew Borchers, 2014

Economic Considerations

• Need to do investment analysis
• Not one size fits all
• Economic benefits observed quickest for heat detection/reproduction
• If you don’t do anything with the information, it was useless
• Systems that measure multiple parameters make most sense
• Systems with low fixed costs work best for small farms
Purdue/Kentucky Investment Model

- Investment decisions for PDF technologies
- Flexible, partial-budget, farm-specific
- Simulates dairy for 10 years
- Includes hundreds of random values
- Measures benefits from improvements in productivity, animal health, and reproduction
- Models both biology and economics

Tornado Diagram for Deterministic Factors Affecting NPV

NPV establishes what the value of future earnings from a project is in today’s money.
Investment Analysis of Automated Estrus Detection Technologies

K.A. Dolecheck, G. Heersche Jr., and J.M. Bewley
University of Kentucky
Investment Analysis of Heat Detection Technologies

Heat detection is a major concern on many dairies today. Recently, technologies used to monitor activity levels and other cow parameters have been applied to manage heat detection.

This net present value tool can be used to compare up to 3 different heat detection technologies in order to determine which might work best economically on a specific dairy.

To use, change herd and technology information in the input tabs and then review the outcome in the “Results” and “Before vs. After” tabs.

Developed by Karmella Dolecheck and Jeffrey Bewley
Animal & Food Sciences Department
University of Kentucky College of Agriculture

Dashboard available at: www2.ca.uky.edu/afsdairy/HeatDetectionTechnologies
Customer Service is Key

- More important than the gadget
- Computer literacy
- Not engineers
- Time limits
- Failure of hardware and software

*Can I return these?...They're nice and all, but they just scare the snot out of me.*
Cautious Optimism

- Critics say it is too technical or challenging
- We are just beginning
- Precision Dairy won’t change cows or people
- Will change how they work together
- Improve farmer and cow well-being

Path to Success

- Continue this rapid innovation
- Maintain realistic expectations
- Respond to farmer questions and feedback
- Never lose sight of the cow
- Educate, communicate, and collaborate
Future Vision

• New era in dairy management
• Exciting technologies
• New ways of monitoring and improving animal health, well-being, and reproduction
• Analytics as competitive advantage
• Economics and human factors are key

Mark your calendars!

CONFERENCE & EXPO ON
PRECISION DAIRY FARMING
Mayo Civic Center, ROCHESTER, MN
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Questions?

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