I started doing nutrition work on Northeast dairies in 1978

A huge “Thank You” to all of the dairies who have let me experiment with their herds and who taught me so much over the years!

Most of my work in the past 10 years has been on western dairies

Lots of highly profitable dairies
- Milk price is WAY better than where I work!

Lots of high-producing dairies
- Many things are done right

Northeast does a phenomenal job putting up quality forage
- In most cases, that’s not a limiting factor
- Control of fermentation could be better (DM)
- Kernel processing an issue – shredlage??
- Are we maximizing forage yields?
  - Optimize use of resources

The Northeast

So, what’s holding us back?
Do we have challenges with facilities in the Northeast?

Novus study

Benchmarking cow comfort on North American freestall dairies: Lameness, leg injuries, lying time, facility design, and management for high-producing Holstein dairy cows

M. A. G. von Keyserlingk,*,† A. Barrientos,*, K. Ito,‡ E. Galo,§ and D. M. Weary*

*Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, 2351 Main Mall, Vancouver, British Columbia, V6T 1Z4

†Novus International Inc., 20 Research Park Drive, St. Charles, MO 63304

Prevalence of clinical lameness

- Northeast – 55%
- California - 31%
- British Columbia – 28%

On average, 28% of cows were lame in BC, 31% in CA, and 55% in NY/PA/VT

Do you find this shocking??
Hock Injuries

Cows with at least a minor injury in BC averaged 41%, 52% in CA, and 81% in NY/PA/VT

Lying Time

Lying time was similar across regions averaging 11.0 h/d in BC, 10.4 h/d in CA, and 10.6 h/d in NY/PA/VT

Barrientos et al

Odds ratio compared to mattresses:

<table>
<thead>
<tr>
<th>Region</th>
<th>Variable</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NE/US</td>
<td>All hock injuries</td>
<td>0.96</td>
<td>0.92-0.99</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Stabilization</td>
<td>0.94</td>
<td>0.92-0.96</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Stabilizing ES (≥30.9%)</td>
<td>1.00</td>
<td>0.97-1.03</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Access to pasture (dry period)</td>
<td>1.12</td>
<td>1.03-1.22</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>Preventing mastitis (yes vs. no)</td>
<td>1.14</td>
<td>1.06-1.22</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Facilities:
If you were building a new barn today,

- Would it be a 4-row or 6-row?
  - I see better protocol adherence in 4-row
- Would you have mattresses or deep sand/solids?
- Would you over-build brisket boards?
- Would you have alley scrapers?
- How much would you overcrowd??
- HOW MUCH LAMENESS IS ACCEPTABLE??
  - By the way, Temple Grandin says 5%, and lots of consumers listen to her

Significance in contributing to lameness

- How much does lameness cost you??
  - Milk, components, repro, culling
- How much extra attention might it bring to your dairy from outsiders??
- What are you willing to do to reduce lameness?

Table 3. Univariate regression analysis probability values between prevalence of lameness and herd-level variables in 53 high-producing groups of Holstein cows housed in freestall dairy farms in Minnesota

<table>
<thead>
<tr>
<th>Variable</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herd size</td>
<td>0.68</td>
</tr>
<tr>
<td>High production group stocking density, cows/100 stalls</td>
<td>0.19</td>
</tr>
<tr>
<td>High production group stocking density, m$^2$/cow</td>
<td>0.45</td>
</tr>
<tr>
<td>Distance: pen to milking parlor, m/$^2$/d</td>
<td>0.12</td>
</tr>
<tr>
<td>Time away from pen, min/d</td>
<td>0.27</td>
</tr>
<tr>
<td>Number of cows per FTE equivalent$^1$</td>
<td>0.17</td>
</tr>
<tr>
<td>Linear feed bunk space, m/$^2$/row</td>
<td>0.42</td>
</tr>
<tr>
<td>Type of feed barrier</td>
<td>0.72</td>
</tr>
<tr>
<td>Ration CP content, %</td>
<td>0.36</td>
</tr>
<tr>
<td>Ration NDF content, %</td>
<td>0.06</td>
</tr>
<tr>
<td>Milking parlor size, number of milking units</td>
<td>0.38</td>
</tr>
<tr>
<td>Cow comfort quotient, %</td>
<td>-0.01</td>
</tr>
<tr>
<td>Cud chewing index, %</td>
<td>0.04</td>
</tr>
<tr>
<td>Hoof trimming frequency</td>
<td>0.01</td>
</tr>
<tr>
<td>Presence and use of footbath</td>
<td>0.00</td>
</tr>
<tr>
<td>Feeding frequency</td>
<td>0.31</td>
</tr>
<tr>
<td>Milking parlor type</td>
<td>0.48</td>
</tr>
<tr>
<td>Pen type</td>
<td>0.08</td>
</tr>
<tr>
<td>Brisket board height</td>
<td>-0.01</td>
</tr>
<tr>
<td>Area behind brisket board filled with concrete</td>
<td>0.06</td>
</tr>
</tbody>
</table>

$^1$FTE = Full time employee (50 h/wk).
Do we look at the right measures of financial success in the Northeast?

Milk price to feed price ratio
Feed as a percent of milk check
Feed cost/cwt
Feed for dairy efficiency

The real key:
• How big is the pile of money at the end of each day?
  ○ Not how fast did you make it
  ○ Not how you made it in relation to some other cost
  ○ It's about DOLLARS, not RATES or RATIOS

Beware of all ratios: they can be misleading

The fallacy of feed cost/cwt.
Let's say this represents 5 herds with the same feed cost/cwt.
Is highest IOFC or FE *per cow* really what you want??

- If so, you would probably feed a ration high in forage made up of top quality forage.
  - That’s what you tell your nutritionist to do, right?
- What about HERD profit?
- How many of you have excess acres for farming?
- Would herd profit be higher milking more cows with a lower forage percent???
  - Profit per cow may be lower but your pile of money is bigger.
- Don’t forget about nutrient management.

Are we too focused on feed efficiency in the Northeast?

How important is dairy efficiency? Which herd would you rather own?

<table>
<thead>
<tr>
<th></th>
<th>Herd A</th>
<th>Herd B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy efficiency</td>
<td>1.80</td>
<td>1.70</td>
</tr>
<tr>
<td>IOFC</td>
<td>$6.80</td>
<td>$7.00</td>
</tr>
</tbody>
</table>

Don’t forget the basics of biology: Dry matter intake as a function of milk production

Maintenance intake can be influenced by heat/cold/mud and stress.
TMR conversion: dairy efficiency

- Pounds of *component corrected milk* / pounds of intake
  - HEAVILY influenced by production level
  - HEAVILY influenced by repro status of the herd
- Other influencers of conversion:
  - Production
  - DIM (repro)
  - forage %
  - chew factor/length of cut
  - NDFd
  - walking distance to milking parlor
  - heat/cold stress/corral condition/stall comfort
  - ration sorting
  - rumen enhancers like Diamond V, Rumensin

Influencers of conversion:
- Stress – lameness??
- Disease: how much does it add to maintenance requirement to have an overactive immune system??

Where does benchmarking fit in?

- Two benefits of benchmarking:
  1. Identify categories that vary widely across dairies
     - Variability = opportunity
     - If everybody is the same, quit tracking that category.
  2. Help you set goals for your business

What indicators should you track?

- Feed cost/lb. of Dry Matter
- Income over feed cost
  - great for evaluating management changes
  - great for short-term decisions
  - ADJUST FOR COMPONENTS!
  - Should standardize milk and feed price
- Feed cost/cwt
  - Only as a manufacturing input cost
    - Not for comparison across dairies
  - MUST be adjusted for components
    - often not done in benchmarks or by lenders
  - should not be used to evaluate management interventions
**Key elements of financial success**

- Component corrected hundredweights sold out the door
  - Trumps milk per cow
  - Marginal milk sold/herd is highly profitable
  - Necessitates maximization of parlor utilization, overcrowding and component production
- Herd health
  - Crucial for milk production, reproduction, replacement costs, etc.
  - Repro undervalued as driver of profit
  - Allows for high cull rate at low replacement cost

**Are we properly controlling feed costs in the Northeast?**

**Feed utilization factors that can be controlled**

- Don’t pay more than you have to for ingredients, then......
- Minimize shrink and waste in storage
  - HUGE opportunities for improvement
- Minimize mixing errors
  - Don’t look at percents; look at pounds or count of errors
- Utilize any pushout in other TMRs
- Minimize maintenance cost (comfort and health)
- Optimize milk production and components
- Optimize cow health

**Controlling feed costs**

- Cull aggressively
  - Minimize hospital, sick, lame cows
- Minimize maintenance requirements
  - Excellent cow comfort
  - Good heat abatement
- Maintain a high percent of herd pregnant
- Maximize IOFC, not Feed Efficiency
Factors affecting TMR variation in Diamond V TMR Audits™

- Less than 30% of the loads are normal
- Over 20% of the loads are mixed with worn out wagons

Factors affecting TMR variation in Diamond V TMR Audits™

- Normal, no issues, 29.9%
- Worn parts, 23.2%
- Mix time last inged, 13.5%
- Hay processing/quality, 10.0%
- Liquid loading problems, 4.3%
- Unlevel, 5.1%
- Combination of issues, 5.4%
- Over-filled, 6.2%

Factors affecting TMR variation in Diamond V TMR Audits™

- Normal, no issues, 29.9%
- Worn parts, 23.2%
- Mix time last inged, 13.5%
- Hay processing/quality, 10.0%
- Liquid loading problems, 4.3%
- Unlevel, 5.1%
- Combination of issues, 5.4%
- Over-filled, 6.2%

What Is A TMR Audit™?

An on-farm evaluation of the

- Feed Storage and Preparation,
- Mixing and Delivery of the TMR
- Ingredient Variation and Shrink
- Utilization of Labor and Resources

Reduce Variation and Improve Efficiency

Use of grain premixes

- Reduce loading times and reduce shrink
- Watch outs
  - Are they getting getting mixed?
  - Watch density
  - Separation of ingredients
- Adding liquids and hay or straw helps
  - Molasses or whey products
Lowering the Density of the Premix Improves Mixing and Consistency

Coefficient of Variation
Lower is better consistency

Influence of Changing Mixer Wagon Gear Box on Milk Production

Influence of Changing Mixer Wagon Gear Box on Milk Fat and Protein

Influence of Changing Mixer Wagon Gear Box on Milk MUN
Do we have proper decision-making processes in place in the Northeast?

What’s your process for handling them?

What information sources do you use?

- Farm demo’s
- Meta analysis of peer reviewed work
- University trials
- Randomized controlled farm trials

Summary of randomized controlled farm trials

Understand the biology behind the additive
  - Can they explain how it works??

Demand a substantial body of proper research
  - I don’t care which neighbor used some crazy foo foo dust or if your brother-in-law sells it!

Be sure that you are comfortable with predictability of response

Apply current economics to predicted response to calculate IOFC

Make the decision WITH your nutritionist
First, throw out the products with little research, then evaluate the type of product:
- Fill a specific need
  - E.g., Vitamin or nutrient X
    - If you need vitamin or nutrient X, you'll see a response
    - If you don't need it, you won't
  - E.g., minerals, amino acids, etc.
- Technologies that enhance normal biology
  - Act broadly
    - may impact hormone balance (Posilac)
    - may enhance rumen function (Diamond V, Rumensin)
  - Work across a broad range of diet types
    - Don't fulfill a specific deficiency, therefore work more predictably
  - Response distribution should be bell-shaped curve

Where was it done?
- University trials are gold standard, published in peer-reviewed journal.
  - Positive AND negative results published
- Internal company research
  - No pressure for publication
  - Standards may be lower
- Private research farm trials
  - No pressure for publication of ALL results
  - Make sure the research they show you is on their product!!

New field we need to learn about
  - 1000 papers published using quantitative or systematic review in medical science in the year 2008.
  - Only 150 meta-analysis total in cattle as of 2008

Ensure that ALL of the studies on a product are included
- Be sure that a formal analysis of publication bias is run
- Begg’s funnel plot

Be sure that there is a Forest Plot
- Helps to visualize all of the studies
- Helps to visualize the weighting of studies
- Helps to visualize 95% confidence intervals and ensure that variance was properly incorporated in model
Quick comments on meta analyses from ADSA symposium

- Be sure that data are all from the same species
  - Others have included goats, water buffalo, etc.
- Be sure that all data are on a specific product, not different products.

My information hierarchy

- Meta analysis of peer reviewed studies
  - Extremely powerful if done right
- Summary of randomized controlled field studies
  - Useful if done properly
- Individual university trials
  - Limited application
- Individual randomized field trials
  - Very limited use
  - Recognize that they DO NOT represent your true response
- On-farm demo’s
  - Extremely dangerous
  - Recognize that they DO NOT represent your true response

Finally, are we controlling the controllable in the Northeast?

- Proper facility design
- Shrink and feed wastage
- Mixing errors
- Repro performance and culling \( \rightarrow \) DIM
- Fresh cow performance and health
- Energy and protein maintenance costs: comfort and health
- Use of proven additives based on sound decision-making process
- Learn to distinguish good research from bad, and then make sound decisions based on proper research
  - Don’t try to evaluate products on your dairy
Thank you