From Field to the Barn: 40k Robots Later

Steve Sweet, Senior FMS/Dairy XL: Lely, NA
Lely
A family run company with farming in its DNA
From the Field to the Barn (Lely Timeline)

- Started in the Hayfield in 1948 with the Finger Wheel Rake
  - Evolved to other forage tools: Fertilizer Spreader, Tedders, Rakes, Balers, Power Harrows
- 1992 was the introduction of the Astronaut Milking Robot
- 1995 was the commercial launch of the Astronaut
- 2005, 2010, 2018: was a launch of a new version of the Astronaut
- 2005: Discovery – robot barn cleaner
- 2008: Juno – robot feed pusher
- 2012: Vector – robot feed mixer
- 2014: 20,000th Astronaut was installed
- 2017: 25th Anniversary of the Astronaut, the Lely Forage Line was sold to Agco to be fully committed to the milking equipment line
- 2019 – Present: Continued Dedication to the Milking Barn
Dairy Farm Evolution
“If we would have asked the people what they wanted, they would have said faster horses”
Driving Force for Change

- Labor
- Efficiency
- Animal Welfare
- Consumer Opinion
- Governmental Regulation
- “Next” Generation
Agriculture
A dynamic sector with an essential role: to feed a growing population in a sustainable way.

By 2050 there will be 9 Billion people to feed, we need to increase our food production by 70%!
In the beginning we harvested just milk
But with a Robot we can Harvest more
More than 120 Values/cow/day from the robot:

- Feed intake
- Activity*
- Rumination*
- Weight*
- Milk Yield
- Milk Fat*
- Milk Protein*
- Milk Lactose*
- Milk Speed
- Milk Temperature*
- SCC *
- Robot visits
- Box times
- Per Quarter:
  - Yield contribution
  - Teat position
  - Pre Milk Time
  - Milk Time
  - Conductivity
  - Color

+ combinations of all of the above...
+ combinations with calendar + health events.

* = option
So what have we learned so far??
(using data)
Robotic vs. Conventional milking

The differences are in the information we gather and how we manage the results.

“The Herd” vs. “The individual cow”
### Conventional vs. Robot

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 2x, 3x, 4x Milking Frequency</td>
<td>• Individualized Milk Access</td>
</tr>
<tr>
<td>• “Mob” herd mentality</td>
<td>• Milked when she wants</td>
</tr>
<tr>
<td>• We all get milked together,</td>
<td>• Quieter Barns, not a “mob” mentality.</td>
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<tr>
<td>eat together, lay down together</td>
<td>• Rule of “3”</td>
</tr>
<tr>
<td>• Culling</td>
<td>• Culling (more dairy sales)</td>
</tr>
<tr>
<td>• Repro, Lameness, Production</td>
<td>• Production</td>
</tr>
<tr>
<td></td>
<td>• Milk Speed</td>
</tr>
<tr>
<td></td>
<td>• Tighter control of Feed Dollars</td>
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</table>
Evolution of Robotic “Attraction”

Free Flow (Latest)

- Animal can enter when she desires to be milked
- She can be fed and milked according to her production
- Potential for Smaller Barn Footprints
- Tighter control of Feed Dollars

Guided Flow (Original Thought)

- Animal must be milked before being able to eat/laydown/etc (controlling an animal event)
- Feed in the robot is a “treat”
- We need to “push” animals to the robots to be milked (still true for Rotary Robots)
Shared Producer Goals of Robot Milking

• Consistency
  • For the Animal
  • For the Management
• Reduced Labor Costs (lbs of milk/man-hour)
  • Increase in Profitability?
• Flexibility
• **Allowing Animals to express their true potential**
• Animal Welfare
Animal Production

Trending upwards...

Total Lactations

Lifetime production
Gap Analysis – What are we looking at?

Mature Cows Only, 88 lb. (40kg) current production compared to a 100 lb. (45kg) Standard Curve.
How we feed a cow

Conventional
- Feeding a target group/pen
  - Feeding to the Average
- Possibly “Lead Feeding”
  - Potential for “Over Feeding Animals”
- We can limit a animal’s potential due to feeding to an average

Robotic (Free Flow)
- Feed Specifically to an individual animal and her production, regardless of group/pen size
- We are partitioning Energy from Feed to create a “drive” to get her feed from the robot
- Individual animal data to reflect feed performance
- Well Managed Feed Dollars
### Univ. of MN, Fin Pak – Fin Bin Results 2014-2017
### Conventional Dairies versus Robotic, (non-organic, non grazing)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of farms</th>
<th>Cost of Production per CWT of Milk</th>
<th>Estimated hours per unit</th>
<th>Number of cows</th>
<th>Milk production per cow</th>
<th>Total Milk sold</th>
<th>Total Milk sold per FTE</th>
<th>Culling percentage</th>
<th>Turnover rate</th>
<th>Cow Death Loss Percent</th>
<th>Percent of barn capacity</th>
<th>Feed Cost per day</th>
<th>Feed Cost per CWT Milk</th>
<th>Feed Cost per Cow</th>
<th>Hired Labor per Cow</th>
<th>IOFC</th>
<th>Milk Price per pound</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>465</td>
<td>$18.79</td>
<td>$18.72</td>
<td>$16.93</td>
<td>$16.86</td>
<td>$15.45</td>
<td>$15.18</td>
<td>$15.28</td>
<td>$15.20</td>
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<tr>
<td>2016</td>
<td>464</td>
<td>$19.80</td>
<td>$19.53</td>
<td>$17.55</td>
<td>$17.76</td>
<td>$16.80</td>
<td>$16.50</td>
<td>$16.32</td>
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<td>2017</td>
<td>394</td>
<td>$19.85</td>
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</table>

- **Number of cows**: 199.7
- **Milk production per cow**: 23624
- **Total Milk sold**: 4692319
- **Total Milk sold per FTE**: 1611763
- **Culling percentage**: 29.40%
- **Turnover rate**: 35.60%
- **Cow Death Loss Percent**: 5.70%
- **Percent of barn capacity**: 107.70%
- **Feed Cost per day**: $6.90
- **Feed Cost per CWT Milk**: $10.66
- **Feed Cost per Cow**: $2,517.57
- **Hired Labor per Cow**: $440.77
- **IOFC**: $3.46
- **Milk Price per pound**: 0.1600
Sound Data brings Sound Data Partners

- DRMS
- Valley AG Software
- Amelicor
- Valacta/Can West
- DSAHR
- Vampp
- Zoetis
- Academia
- ...and others...
The cow as center point
So What is Next?

Dairy Today, February 1989

Been there, done that

We still fight this today!! WHY???
Expansion into other areas of the dairy
Concluding Thoughts

- Robotic Milking is not an excuse to stay out of the barn
  - It requires a different type of management
- Can we challenge what we perceived to be true with our new data findings on animal biology?
  - Or can we just “validate” it?
- Identify the true genetic potential of our animals
- Capability to be more efficient with feedstuffs and manure management
- Opportunities for More Automation
- It is not just for the smaller operator
Thanks...

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