Change Brings Opportunities
Don’t Sit Still

Dr. Mike Hutjens
Dairy Extension Specialist

University of Illinois at Urbana-Champaign
Change is Happening
Opportunity 1: Milk yield and projections

Average Milk Yield, Record Cow Yield and Projected Yields

Milk yield data are from USDA annual reports.
Opportunity 2: How many cows will we need in 2065?

- Milk Yield Per Cow, lbs
  - 50,000: 5,292,000
  - 40,000: 6,615,000
  - 30,000: 8,820,000

Cows needed to produce nation's milk* + 10% Export

*USA population estimate: 441 million with per capita consumption of 600 lbs/yr
Opportunity 3: Water Resources

Climate Change, Water, and Risk: Current Water Demands Are Not Sustainable  www.nrdc.org/globalWarming/watersustainability
Opportunity 4: Dairy farms will move to states with less water risk

Future:
- Four of top 10 states (CA, ID, TX, NM) that now produce 36% of US milk face water shortages
- Dairy will relocate to upper Midwest
- Midwest is in prime position for more growth
Opportunity 5: World population reaches plateau around 2065

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Opportunities
Back 40 Years Ago
Opportunities: 40 Years Ago

- Dairy farms were diversified
- Registered dairy cattle was the focus
- Dairy farms based on family labor
- Generation based dairy farms
- High moisture corn was the new feed
- Alfalfa was “queen” of the forages
- Replaced magnetic feeders (TMR/electronic)
- Cafeteria mineral feeders
Solutions in 1970’s

- Animal agriculture was “a way of life”
- Dairying in the 1970’s was “good”
- Extension was a key resource (80 meetings a year / dairy specialist in MN)
- Extension staff were local and statewide dairy leaders
- DHI was an extension program
- Computer applications beginning
Opportunities
In 2016
Opportunities: Current Economic

- Milk price is $16+ /cwt
- Milk fat is worth $2.38/lb (Oct, 2016)
- Milk protein is worth $2.74/lb (Oct, 2016)
- Feed cost is $0.08 to $0.10 per lb of dry matter
- Close up heifers $1800; cull cows at 60-80 cents a pound
- Bull calves worth $100
- Export down 11 percent
- Strong U.S. dollar, China out of market, and Russia boycott
Solution: Bur-Wall Buckeye Gigi

365-day Milk
74,650 pounds

Fat
2,126 pounds

Protein
2,142 pounds

Bred and owned by the Behnke family’s Bur-Wall Holsteins in Brooklyn, Wisconsin
Solution: Consumer Milk Prices (Champaign, 2016)

- Organic: $6.50
- rBST Free: $6.00
- “Green”: $3.25
Opportunity: Milk’s Carbon Footprint (Telega-2011)

- Feed production: 20%
- Milk production: 52%
- Transportation/processing: 17%
- Retail: 6%
- Consumption and Disposal: 5%
### Animal Operations Emissions (NRC 2003)

<table>
<thead>
<tr>
<th>Emission</th>
<th>Impact</th>
<th>Neighbors</th>
<th>Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>Major</td>
<td>Minor</td>
<td>Haze</td>
</tr>
<tr>
<td>Nitrogen gas</td>
<td>Signif</td>
<td>Small</td>
<td>Climate change</td>
</tr>
<tr>
<td>Methane</td>
<td>Signif</td>
<td>Small</td>
<td>Climate change</td>
</tr>
<tr>
<td>Volatile organic</td>
<td>Small</td>
<td>Minor</td>
<td>Quality of life</td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>Small</td>
<td>Signif</td>
<td>Quality of life</td>
</tr>
<tr>
<td>Particles</td>
<td>Insignif</td>
<td>Signif</td>
<td>Health &amp; haze</td>
</tr>
<tr>
<td>Odor</td>
<td>Insignif</td>
<td>Major</td>
<td>Quality of life</td>
</tr>
</tbody>
</table>
Solution: Carbon Footprint

• Continue to increase milk yield per cow
• Continue to use rBST (8% reduction)
• Continue to use Rumensin (7% reduction)
• Continue to optimize rumen fermentation
• Continue to use feed additives that enhance rumen performance (yeast culture, essential oils, buffers, etc)
• Continue to increase forage quality
Solutions: Hutjens Biased GHG

- Only high producing cows allowed
- Milk all cows 3 times a day
- Consider smaller cows
- All cows injected with rBST
- All dairy animals fed an ionophore
- Heifers calve at 23 months of age
- Only milk lower than 400,000 SCC marketed
- All cows bred artificially to superior bulls
- All cows enrolled in a milk record program
Opportunity: Making Decision

1. Do not feed GMO feeds to dairy cows
2. No antibiotics allowed period
3. Do not use rBST milk
4. New born calf remain with the dam for 48 hrs
5. Calves must have other calves in pen for social adjustment
6. No dehorning (naturally polled)
7. No genetically engineered cows
Solutions: In 2016

• Dairy farm influencers
  – Semi-load of milk (600 cows)
  – 1.2 million pounds of milk per FTE
  – More urban life style (family, vacations, etc)

• Alternative labor sources

• Emphasis on cow longevity

• Crossbreeding, genomics, and inbreeding

• Robotic milking

• Processing milk on the farm
Opportunities Ahead in the Next 10 Years
Opportunity: Dairy Farms of the Future

Typical US Dairy Cluster of 10,000 cows

- **3,500 Milk Cows Parlor-1**
- **3,500 Milk Cows Parlor-2**
- **3,500 Milk Cows Parlor-3**
- **Shared Heifers**
- **Shared Dry Cows**

**Drugs**
- Immune modulators
- Antibiotics for culture positive
- Improved vaccines
- Precision therapies

**Genetics**
- Corporate suppliers
- Primarily embryos

**Veterinary**
- On-farm veterinarian
- Digital health monitoring

**Feeds**
- Agro-ecology systems
- Enhanced digestibility (including lignin)

**Marketing**
- Milk contracts
- Water removed
- Specialty milks
- Product tracking

**Research**
- On commercial farms
- Shared university-based discovery centers

**Regulatory**
- DNA-based animal ID
- Approved & inspected welfare plans
Opportunity: Sensors

- Milk composition, & hormones
- Temperature, activity, lying, ruminating, etc
- Virus status and infection level
- Welfare markers
- Blood glucose NEFAs, BHBA BUN, etc
- Rumen pH digestion rate buffering, etc
- Immune status pregnancy status
- Mammary transcriptome activity
Solutions: Ahead 10 years

• Vertical integration (from farm to plate control)
  – Producer controlled processing
  – On-farm processing

• Apps on mobile technology

• Big data applications

• Drones and satellites

• Consumer image and impact, can we impact?

• Food safety and local sourced (raw milk for example)

• Forage and by-product based feeds (get off the human plate)
Economic Opportunities
Don’t Sit Still

#1

Never give up milk
Never Give Up Milk

• Ration dry matter is 10 to 12 cents per pound

• One pound of dry matter should support 2 to 2.5 pounds more milk

• If milk is $0.16 cents a pound, 10 cents worth of dry matter yields $0.22 more profit / income
Mature Cows (2016 DRPC)

<table>
<thead>
<tr>
<th>Level of milk</th>
<th>22,700 lb</th>
<th>28,300 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; lactation</td>
<td>76.6</td>
<td>92.3</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; lactation</td>
<td>95.7</td>
<td>116.6</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;+ lactation</td>
<td>103.0</td>
<td>125.4</td>
</tr>
</tbody>
</table>
Don’t Sit Still

#2

Building Your Milk Check

Never give up milk
## Building Your Milk Check—U of IL Dairy

<table>
<thead>
<tr>
<th>Component</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk quality premiums</td>
<td>$0.82/cwt</td>
</tr>
<tr>
<td>Milk components</td>
<td>$0.51/cwt</td>
</tr>
<tr>
<td>rBST premium (not used)</td>
<td>$0.52/cwt</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1.85/cwt</strong></td>
</tr>
</tbody>
</table>
Don’t Sit Still

#3

If it was Economical at $26 Milk; It Is Economical at $16 Milk

Building Your Milk Check

Never give up milk
## U.S. Feed Additive Use

<table>
<thead>
<tr>
<th>Additive Type</th>
<th>2006</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffers</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>Yeast/yeast culture</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Rumensin</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td>Niacin</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Probiotics</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Mycotoxin binders</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>Anionic products</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Feed bunk stabilizer</td>
<td>na</td>
<td>3</td>
</tr>
<tr>
<td>Don’t use</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

*2015 Hoard’s Market Survey*
Additives for Lactating Cows

• Rumen buffers
• Yeast culture/yeast products
• Monensin (Rumensin)
• Silage inoculants
• Biotin
• Organic trace minerals
Don’t Sit Still

#4

It’s A Dairy Business

If It Was Economical At $26 Milk; It Is Economical At $16 Milk

Building Your Milk Check

Never give up milk
Feeding Metrics for 2016

**Feed costs per 100 lb/cwt**: $6.50
*Reflects milk yield, shrink, and feed costs*

**Feed costs per lb of dry matter**: 0.10 cents / lb
*Reflects feed ingredients selection*

**Income over feed costs**: > $10 /cwt
*Reflects profit margin*

**Feed efficiency**: >1.5 lb 3.5% fat milk / lb DM
*Evaluates feed conversion to milk yield*
Being Involved
Dairy farmers and agri-business leaders

• Political—government makes decisions
• Animal welfare/rights—eliminate animal agriculture
• Environmental—expensive restriction
• Educational—finances, building design, nutrition, reproduction, milk quality, etc
• Consumer education—organic, natural, green
Take Home Messages

Increasing milk production will occur in the future to compete and to be profitable: mature cows, marginal milk, and dry matter intake

Watch for opportunities; then determine solutions

Where does your farm want to be in 2017, 2020, and 2030—are you going to “sit still”??