Feeding Strategies With Today’s Feed and Milk Prices
2012 IMPA Dairy Summit

Mike Hutjens
Extension Dairy Specialist
University of Illinois Extension

Looking Back to 2009
• Illinois milk production was up 5.1% with no change in cow numbers
• The “Illinois advantage”
  – Ample supplies of forages and corn (no out-of-pocket costs)
  – Limited expansion and small debt load
  – Average herd size was 106 cows
  – Family labor
  – Government programs (< 150 cows), rBST payment, and coop advanced patronage

Looking Back to 2011
• All milk average was $20.12
• 13% of all U.S. milk solids were exported
• Record high milk production as 196.1 billion pounds of milk
• Butter production up 17%, NDM up 7%, and cheese production up 1.6%
• CME contract interest up 70% from 2010

CME Class 3 Milk Futures
(Dec 26, 2011)

<table>
<thead>
<tr>
<th>Date</th>
<th>$/cwt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan, 2012</td>
<td>17.22</td>
</tr>
<tr>
<td>Mar, 2012</td>
<td>17.20</td>
</tr>
<tr>
<td>July, 2012</td>
<td>17.19</td>
</tr>
<tr>
<td>Dec, 2012</td>
<td>16.95</td>
</tr>
</tbody>
</table>

Feed Futures
(Dec 26, 2011)

<table>
<thead>
<tr>
<th></th>
<th>Corn ($/bu)</th>
<th>SB Meal ($/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>March, 2012</td>
<td>6.16</td>
<td>303</td>
</tr>
<tr>
<td>May, 2012</td>
<td>6.25</td>
<td>306</td>
</tr>
<tr>
<td>July, 2012</td>
<td>6.32</td>
<td>310</td>
</tr>
</tbody>
</table>

Corn Prices in the U.S
(Cost per bushel, Dec 26, 2011)

<table>
<thead>
<tr>
<th>Location</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zumbrota, MN</td>
<td>$6.00</td>
</tr>
<tr>
<td>Madison, WI</td>
<td>$5.89</td>
</tr>
<tr>
<td>North Java, NY</td>
<td>$7.50</td>
</tr>
<tr>
<td>Friona, TX</td>
<td>$6.98</td>
</tr>
<tr>
<td>Turlock, CA</td>
<td>$7.20</td>
</tr>
</tbody>
</table>
Rethink Your Ration Strategies

Hutjens 50: 35: 15 Rule
- 50% of ration dry matter is forage
- 35% of the ration dry matter is concentrate
  - Cereal grains
  - Protein sources
  - Mineral, vitamins, and additives
- 15% of the ration is the “swing” dry matter
  - More forage (available and economic)
  - Add by-products (cheaper nutrient source)
  - Add more concentrate (poor forage quality)

Increasing Forage Intake (60 to 70% to ??? Total DMI)
- Reduce feed costs
- Sustainable on-farm resource
- Quality controlled by the dairy manager
- Healthy rumen environment
- Selection of high yield and high NDF digestible forage hybrids
- Reduce cereal grain use (human and fuel competition)

Making Correct Decisions
- Maintain a solid mineral program
- Holstein heifers must gain 1.6 – 1.8 lb / day
- SCC must be below 200,000
- Days open must by under 120 days
- Accelerated calf program is a must
- Select additives that pay
- Consider a low group TMR

Forage Alternatives
Forages: Tight Supply and $$$

- Reduced acreage; more acres go into corn
- Texas and Oklahoma had a major drought
  - Need to import forage
  - Less fuzzy cottonseed
  - Distillers grains are ralling south
- First crop experienced rain delays
- Dry weather reduce 2nd and 3rd cut yields
- Killing frost in early Sep MN and WI

How Low Can You Go With Forages?

- 1% of your cow’s body weight (13 lb DM for a 1300 Holstein herd)
- 19% forage NDF (21% optimal)
- 5 pounds of forage particles over 1 inch
- > 50% top two Penn State Particle Box
  - >10% in the top box
  - > 40% in the middle box
- One pound of straw replaces 2 to 3 lb hay

Can I Afford $250 a Ton Hay?

- Alfalfa hay increases from $140 to $250 / ton which 5 cents / lb DM
  - Cows consume 30 lb forage DM times 5 cents
  - $1.50 higher forage costs /day
  - Cows consume 50 lb DM, 3 cent / lb DM ($1.50 / 50 lb)
- Cost is $1.44 per point of relative forage quality
- Target 5 lb of high quality hay and monitor cow response cost 63 cents; 3 lb more milk recovers 57 cents @ $19/cwt milk

Sesame Comparison (Nov 1, 2011)

<table>
<thead>
<tr>
<th>Feed</th>
<th>Actual</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn grain</td>
<td>$233</td>
<td>$240</td>
</tr>
<tr>
<td>Corn silage</td>
<td>$60</td>
<td>$85</td>
</tr>
<tr>
<td>Alfalfa hay (180 RFV)</td>
<td>$220</td>
<td>$249</td>
</tr>
<tr>
<td>Cottonseed, fuzzy</td>
<td>$315</td>
<td>$303</td>
</tr>
<tr>
<td>Soybean meal 48%</td>
<td>$333</td>
<td>$375</td>
</tr>
<tr>
<td>Distillers grain</td>
<td>$230</td>
<td>$304</td>
</tr>
</tbody>
</table>

If Your Alfalfa/Grass Is < 130

- Blame your spouse, children, Obama, etc.
- Sell it to your neighbor
- Reduce the level to < 5 lb DM/cow/day for high producing cows
- Shift the low quality forage to lower production group or heifers
- Dilute down with quality corn silage
- Replace with corn gluten or wheat midds

Monitoring Cow / Herd Responses
“Listening” To Your Herd

- MUN levels: 8 to 12 mg/dl
- Milk protein test: > 3.1% / > 3.8%
- Milk fat test: > 3.7% / > 4.6%
- MLM/150 day milk: Increasing
- Fecal scores: > 70% at 3

Feeding Metrics

Feeding Metrics for 2012

- Feed costs per day (limited value)
- Feed costs per cwt (reflects milk yield, shrink, and feed costs)
- Feed costs per pound of dry matter (reflect feed ingredients selection)
- Income over feed costs (reflects profit margin)
- Feed efficiency (evaluates feed conversion to milk yield)

Feed Prices Used

<table>
<thead>
<tr>
<th>Feeds</th>
<th>$/ lb DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn silage ($60 per ton)</td>
<td>0.086</td>
</tr>
<tr>
<td>Alfalfa ($230 per ton)</td>
<td>0.128</td>
</tr>
<tr>
<td>Corn grain ($5.90/bushel)</td>
<td>0.105</td>
</tr>
<tr>
<td>Fuzzy cottonseed ($340/ton)</td>
<td>0.188</td>
</tr>
<tr>
<td>Corn gluten feed ($190/ton)</td>
<td>0.106</td>
</tr>
<tr>
<td>Soybean meal ($370/ton)</td>
<td>0.206</td>
</tr>
<tr>
<td>Corn distillers grain ($190/ton)</td>
<td>0.106</td>
</tr>
</tbody>
</table>

Feed Benchmarks--2012

<table>
<thead>
<tr>
<th>Lb DM</th>
<th>$ / lb DM</th>
<th>$ / day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forages</td>
<td>28</td>
<td>0.10 (.07)</td>
</tr>
<tr>
<td>Grain energy</td>
<td>10</td>
<td>.105</td>
</tr>
<tr>
<td>By-product</td>
<td>6</td>
<td>.14 (.12)</td>
</tr>
<tr>
<td>Protein supp</td>
<td>5</td>
<td>.156</td>
</tr>
<tr>
<td>Min/vit/additive</td>
<td>1</td>
<td>.50</td>
</tr>
<tr>
<td>Consulting</td>
<td></td>
<td>0.10</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td></td>
</tr>
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</table>

Feeding Economics--2012

<table>
<thead>
<tr>
<th>Feed costs per cow per day</th>
<th>$6.07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed cost per lb DM</td>
<td>$0.121</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milk Production</th>
<th>Milk Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 lb</td>
<td>70 lb</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feed cost per cwt (80 lb)</th>
<th>$7.59</th>
<th>$8.67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income over feed costs ($20)</td>
<td>$12.41</td>
<td>$11.37</td>
</tr>
<tr>
<td>Feed efficiency (lb milk/lb DM)</td>
<td>1.60</td>
<td>1.40</td>
</tr>
</tbody>
</table>
Economics of Feed Efficiency
(70 lb milk, 13 cent lb DM)

<table>
<thead>
<tr>
<th>Feed efficiency (lb milk/lb DM)</th>
<th>DMI (lb/day)</th>
<th>Difference (savings/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.20</td>
<td>58</td>
<td>$1.04</td>
</tr>
<tr>
<td>1.40</td>
<td>50</td>
<td>$0.78</td>
</tr>
<tr>
<td>1.60</td>
<td>44</td>
<td></td>
</tr>
</tbody>
</table>

Corn Alternatives

Carbohydrates

Cell Wall (cud chewing/rumen function)
- Neutral Detergent Fiber (NDF) 28-32%
- Acid Detergent Fiber (ADF) 19-21%
- Lignin 3-4%

Rumen Fermentable Carbohydrates (microbes)
- Starch 22-26%
- Sugar 4-6%
- Soluble fiber 10-12%

Feeding Wheat
- Current price in IL is below corn price
- Guideline is wheat is worth 10% more than corn due to protein content
- Starch in wheat is more soluble depending on processing
- Substitute 10 to 15% for corn and monitor cow response (milk, DMI, fecal score)
- Consider up to 30 to 35% corn replacement

Snaplage Alternative
- Includes ear, husk, and parts of the plant
- Contain 25% NDF and 50 to 60% starch
- Increase yield by 15 to 25% dry matter / acre
- 80 to 90% energy value of shelled corn
- Harvest at 40 to 45% dry matter (at black layer)
- Inoculate with L. buchneri
- Cost $50 an acre to harvest and pack

Nutrient Comparison of HMC

<table>
<thead>
<tr>
<th></th>
<th>Shelled</th>
<th>Ear</th>
<th>Snaplage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter</td>
<td>28-32</td>
<td>32-36</td>
<td>38-45</td>
</tr>
<tr>
<td>Starch</td>
<td>70-72</td>
<td>60-65</td>
<td>50-60</td>
</tr>
<tr>
<td>NDF</td>
<td>9</td>
<td>20</td>
<td>16-23</td>
</tr>
<tr>
<td>Protein</td>
<td>10</td>
<td>8</td>
<td>8-10</td>
</tr>
</tbody>
</table>
Corn / Starch Guidelines

- 22-26% starch
- 1000 microns for dry corn, 3000 microns for high moisture corn (> 28% moisture)
- 300 to 450 mg of Rumensin / cow /day
- Fecal starch below 5 to 6%
- Relative corn index > 180
- Starch rumen availability

Relative Grain Quality (RGQ) University of WI Index

- Particle size
- Moisture content (wet corn)
- Nutrient analysis
  - Starch analysis
  - Invitro starch digestibility (7 hours)
  - Prolamin

Interpretation of IVSD 7 (hours)

<table>
<thead>
<tr>
<th>Rating</th>
<th>H.M. Corn</th>
<th>Corn Silage</th>
<th>Dry Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>&gt; 88%</td>
<td>&gt;82%</td>
<td>&gt;68%</td>
</tr>
<tr>
<td>Medium</td>
<td>79-87%</td>
<td>62-81%</td>
<td>52-67%</td>
</tr>
<tr>
<td>Low</td>
<td>&lt; 78%</td>
<td>&lt; 61%</td>
<td>&lt; 51%</td>
</tr>
</tbody>
</table>

An Example: 175 RGQ

- 28% moisture
- 5% prolamin
- 68.9% starch
- 2000 microns (mean particle size)
- 175 RGQ (Relative grain quality)
- 88.9% TDN; 0.93 NE lact at 3X
  - 1650 micron 183 RGQ 89.7% TDN
  - 1200 micron 195 RGQ 90.5% TDN
  - 800 micron 206 RGQ 91.3% TDN
  - 600 micron 211 RGQ 91.7% TDN
- $47 for RQQ analysis; $23.50 NIR

Levels of Rumensin

<table>
<thead>
<tr>
<th>Level (mg/day)</th>
<th>Cont</th>
<th>300</th>
<th>450</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM intake (lb)</td>
<td>41.8</td>
<td>44.9</td>
<td>48.2</td>
<td>46.2</td>
</tr>
<tr>
<td>Milk (lb)</td>
<td>91.4</td>
<td>95.8</td>
<td>108.5</td>
<td>95.0</td>
</tr>
<tr>
<td>Milk (3.5%lb)</td>
<td>94.3</td>
<td>93.9</td>
<td>108.4</td>
<td>91.0</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>3.8</td>
<td>3.5</td>
<td>3.4</td>
<td>3.1</td>
</tr>
<tr>
<td>Fat (lb)</td>
<td>3.4</td>
<td>3.2</td>
<td>3.8</td>
<td>3.1</td>
</tr>
<tr>
<td>Ketone (mg/dl)</td>
<td>7.1</td>
<td>1.9</td>
<td>3.1</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Apparent digestibility of feed starch and fecal starch (%DM)

\[ y = -0.0176x + 0.9872 \]

Source: Schroeder et al, 2009 JDS abstract T279
Illinois Herd Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starch dig (%)</td>
<td>84.6</td>
<td>7.0</td>
<td>70-96</td>
</tr>
<tr>
<td>Fecal starch (%)</td>
<td>6.0</td>
<td>1.6</td>
<td>3.9-9.9</td>
</tr>
<tr>
<td>Fecal lignin (%)</td>
<td>7.2</td>
<td>4.4</td>
<td>3.7-19.2</td>
</tr>
<tr>
<td>Fecal NDF (%)</td>
<td>55.5</td>
<td>4.1</td>
<td>14.0-30.3</td>
</tr>
<tr>
<td>Feed starch (%)</td>
<td>22.4</td>
<td>2.0</td>
<td>19.9-26.4</td>
</tr>
<tr>
<td>Feed NDF (%)</td>
<td>32.6</td>
<td>1.6</td>
<td>29.8-34.8</td>
</tr>
<tr>
<td>Feed lignin (%)</td>
<td>3.4</td>
<td>0.4</td>
<td>2.5-4.1</td>
</tr>
</tbody>
</table>

Milk response

- Fecal starch should be less than 4.5% represents total tract apparent digestibility of 90+ percent.
- If fecal starch can be reduced 1 unit (absolute decrease from 10% to 9%), milk production could increase 0.67 pound (dry matter intake remains constant).

By Product Choices

Feed Val 3 - U of WI

- Corn is the base price for energy ($6.50/bu)
- Soybean meal is the base price for rumen undegraded protein ($338/ton)
- Tallow is the base price for fat/oil ($44/cwt)
- Limestone is the base price for calcium ($7/cwt)
- Dicalcium phosphate is the base price for phosphorous ($30/cwt)

By-Product Feeds To Consider

<table>
<thead>
<tr>
<th>By-Product Feeds To Consider</th>
<th>Breakeven</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soy hull (10% ration DM)</td>
<td>$208</td>
<td>$275</td>
</tr>
<tr>
<td>Cotton seed, fuzzy (10% ration DM)</td>
<td>$341</td>
<td>$360</td>
</tr>
<tr>
<td>Corn gluten feed (25% ration DM)</td>
<td>$240</td>
<td>$190</td>
</tr>
<tr>
<td>Wet brewers grain (15 to 20% of ration DM)</td>
<td>$93</td>
<td>$60</td>
</tr>
<tr>
<td>Distillers grain (10 to 20% of ration DM)</td>
<td>$327</td>
<td>$215</td>
</tr>
</tbody>
</table>

Sesame Program

- 30 feed commodities
- Nutrients:
  - NEL
  - RDP
  - d-RUP
  - e-NDF
  - ne-NDF
  - MP (Metabolizable Protein)
Sesame Comparison
(Sept 30, 2011)

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<td>$328</td>
</tr>
<tr>
<td>Soybean meal 48%</td>
<td>$338</td>
<td>$426</td>
</tr>
<tr>
<td>Distillers grain</td>
<td>$215</td>
<td>$317</td>
</tr>
</tbody>
</table>

In Summary
• High producing cows will be a key solution the question feeding cows with today's milk prices
• Know your dairy metrics—can you compete?
• Do not cheat the rumen fermentation
• Looks at alternative feeds: forages, by-products, and additives