The Changing Nature of Dairy Rations and How it Affects Forage Demand

Gerald E. Higginbotham, Ph. D, P.A.S.,
UCCE Dairy Advisor, Fresno/Madera County

Joel Karlin, P.A.S., Commodity/Market Analyst,
Western Milling, Goshen, CA
If you don't like something change it; if you can't change it, change the way you think about it.

Mary Engelbreit
Total Feed Cost Per Cow, Per Month \( ^1 \)
California, 2004 - 2008

\[\text{Costs:} \quad \begin{align*}
2004: & \quad \text{Concentrate:} \quad $17.64, \quad \text{Dry Roughage:} \quad $30.17, \quad \text{Wet Roughage:} \quad $31.64, \quad \text{Pasture:} \quad $0.42 \\
2005: & \quad \text{Concentrate:} \quad $64.91, \quad \text{Dry Roughage:} \quad $29.18, \quad \text{Wet Roughage:} \quad $32.60, \quad \text{Pasture:} \quad $0.49 \\
2006: & \quad \text{Concentrate:} \quad $176.33, \quad \text{Dry Roughage:} \quad $23.16, \quad \text{Wet Roughage:} \quad $21.71, \quad \text{Pasture:} \quad $0.47 \\
2007: & \quad \text{Concentrate:} \quad $120.33, \quad \text{Dry Roughage:} \quad $0.49, \quad \text{Wet Roughage:} \quad $37.02, \quad \text{Pasture:} \quad $0.50 \\
2008: & \quad \text{Concentrate:} \quad $140.55, \quad \text{Dry Roughage:} \quad $44.32, \quad \text{Wet Roughage:} \quad $76.28, \quad \text{Pasture:} \quad $1.35 \\
\end{align*}\]

\( ^1 \text{Includes Feed costs for both milk cows and dry cows} \)

\( ^* \text{For the Six Months Ended June 30, 2008} \)
Total Feed Costs (Percent of total Cost of Production)
January 2003 through June 2008

Source: CDFA Dairy Marketing Branch
What have been the reasons for the high feed costs?

1. Ethanol production
Ethanol background

- The passage of The Clean Air Act of 1990 required use of oxygenated fuel for reformulated gasoline for utilization in areas where ozone problems exist.

- The Energy Policy Act of 2005 established a renewable fuels standard (RFS) that mandated the use of ethanol and other renewable fuels in gasoline. The RFS requires use of 11.5 billion gallons of ethanol by year 2012.

- The latest development was the 2007 State of the Union address which highlighted the need to reduce gasoline consumption by 20% over the next 10 years and to increase renewable and alternative fuels by up to 35 billion gallons which is at least five times the present mandate by the year 2017.
Ethanol Issues

- Ethanol has come under heavy criticism for a number of reasons.
  1. Foremost has been the huge escalation in food costs being blamed on high corn prices due to greater ethanol output.
  2. The livestock, dairy, and poultry industries have been in an uproar over the rise in what is their largest expenditure.
  3. In this election season, there has been increased scrutiny over Federal and state subsidy payments to the ethanol industry along with the onerous import tariff that prevents cheaper foreign product from coming into the U.S.
  4. Finally, talk of shifting feedstock from corn to other sources being blunted by reports that commercially feasible cellulosic ethanol production is still years away.
U.S. corn used in production of ethanol in million bushels and as % of production

Red columns are forward projections given by consulting firm PRX.
Let’s all get on the bandwagon!
Ethanol plants currently in use or under construction
What have been the reasons for the high feed costs?

2. Pressures from reduced cottonseed production
Pima and Upland Cotton Production - CA

![Graph showing Pima and Upland Cotton Production across years from 1998 to 2008. The graph displays the number of acres planted for each type of cotton, with Pima in green and Upland in red. The production for both types of cotton decreased significantly after 2002.](image-url)
2008 Upland Cotton Harvested Acres
Acres (1,000) and change from previous year
How Will We Feed Cows in the Future?

• Future Trends
  - Forages
  - Byproduct feeds
Forage Feeding Trend

• Feeding more corn silage and fewer legumes and grass forages

• Corn Silage
  – Fiber source
  – Starch Source
  – Decreases corn grain in the diet.
Robinson, 2008
Robinson, 2008
Production Response to Corn Silage Multiparous Cows – Early Lactation

Milk lb/day

Corn grain, % 28 22 16 15 6 0
Alf hay % 15

Allen (2001), Univ. of Minnesota
Why the Trend for Increased Corn Silage Feeding?

Agronomic Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Alfalfa</th>
<th>Corn Silage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting</td>
<td>Tri-annual?</td>
<td>Annual</td>
</tr>
<tr>
<td>Harvest</td>
<td>6-8/year</td>
<td>1/year</td>
</tr>
<tr>
<td>Process</td>
<td>Cut</td>
<td>Cut/chop</td>
</tr>
<tr>
<td></td>
<td>Rake</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chop/bale</td>
<td></td>
</tr>
<tr>
<td>Yield</td>
<td>7.2 Ton/acre(^1)</td>
<td>27 Ton/acre(^1)</td>
</tr>
</tbody>
</table>

\(^1\)As fed basis - NASS, 2008
Corn silage advantages

- More consistent rations
- More palatable ration
- More Mcal of energy per acre
- Corn ground can handle heavy levels of manure
CHALLENGES WITH HIGHER CORN SILAGE LEVELS

- Increased purchased proteins
- May require dry hay or straw for proper effective fiber
- Particle size can be important. Processed corn silage has definite advantages over unprocessed corn silage.
- Eggs are in “one basket” to a great degree. That’s good if you harvest high quality corn silage but bad if corn silage digestibility is low.
- Need to have two to three months of additional inventory. Corn silage fermented less than two months doesn’t perform as well as fully fermented corn silage.
- Greater risk of acidosis if effective fiber is not managed properly.
The national dairy herd of approximately 9 million cows would need to consume 7.2 lb of DG per day over a 305 d lactation to balance the supply.
Ethanol Production Process
• **Wet Distillers Grains**
  - Corn is processed, mixed with yeasts that converts the starch into ethanol and CO\textsuperscript{2}. The ethanol is distilled off and the remaining liquid is spun off to remove water. Residue is called wet distillers grains. Around 35% dry matter.
• Condensed Distillers Solubles
  – Liquid removed by centrifuging is usually dried and becomes condensed distillers solubles. The solubles are added back to the wet distillers grains, making wet distillers grains with solubles. The wet products are either fed as is or are heat dried, producing dried distillers grains with solubles.
Limitations to Feeding Byproducts

- **Starch**
  - Highly fermentable by rumen bugs. Produces propionic acid. Converted to glucose by liver. Used to make milk.
  - ~25% diet DM for high milk production.
  - Most byproducts have little to no starch but they do contain significant quantities of sugars, organic acids, fructans, glucans and pectins. Provide energy to rumen microbes.
Limitations to Feeding Byproducts

- Phosphorus
  - Most by-products 2-3x corn.
  - Increased P excretion in manure.

<table>
<thead>
<tr>
<th>Feed</th>
<th>% P (as fed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>0.27</td>
</tr>
<tr>
<td>Corn Gluten Feed</td>
<td>1.00</td>
</tr>
<tr>
<td>Cottonseed</td>
<td>0.60</td>
</tr>
<tr>
<td>Distillers Grains</td>
<td>0.70</td>
</tr>
<tr>
<td>Soybean hulls</td>
<td>0.10</td>
</tr>
<tr>
<td>Millrun</td>
<td>0.80</td>
</tr>
</tbody>
</table>
Limitations to Feeding Byproducts

- **Protein**
  - Most byproducts 2-3x corn.
  - Increased N excretion.
  - May cause issues in the waste management area.

<table>
<thead>
<tr>
<th>Feed</th>
<th>% CP (as fed)</th>
</tr>
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<tbody>
<tr>
<td>Corn</td>
<td>9</td>
</tr>
<tr>
<td>Corn Gluten Feed</td>
<td>24</td>
</tr>
<tr>
<td>Cottonseed</td>
<td>24</td>
</tr>
<tr>
<td>Distillers Grains</td>
<td>28</td>
</tr>
<tr>
<td>Soybean hulls</td>
<td>10</td>
</tr>
<tr>
<td>Millrun</td>
<td>19</td>
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</table>
Robinson, 2008
Studies examining levels of dried distillers grains for lactating cows.

<table>
<thead>
<tr>
<th>n(^1)</th>
<th>DG, (% of DM)</th>
<th>DMI, (lb/d)</th>
<th>Milk, (lb/d)</th>
<th>Fat, (%)</th>
<th>Protein, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>0</td>
<td>48.9b</td>
<td>72.8ab</td>
<td>3.39</td>
<td>2.95a</td>
</tr>
<tr>
<td>13</td>
<td>4 to 10</td>
<td>52.2a</td>
<td>73.6a</td>
<td>3.43</td>
<td>2.96a</td>
</tr>
<tr>
<td>34</td>
<td>10 to 20</td>
<td>51.6ab</td>
<td>73.2ab</td>
<td>3.41</td>
<td>2.94a</td>
</tr>
<tr>
<td>15</td>
<td>20 to 30</td>
<td>50.3ab</td>
<td>73.9a</td>
<td>3.33</td>
<td>2.97a</td>
</tr>
<tr>
<td>7</td>
<td>&gt;30</td>
<td>46.1c</td>
<td>71.0b</td>
<td>3.47</td>
<td>2.82b</td>
</tr>
</tbody>
</table>

\(^1\)=# of treatment comparisons included in meta-analysis (24 total studies). Kalcheur et al., 2005

abMeans in columns with different superscripts differ (P<0.05)
What are Distillers Grains Worth?

- Generally replaces corn and soybean meal

- CP (28%) and Energy 0.80 Mcal/lb) ~same as a 50:50 mix of corn and 47% soybean meal

- Therefore, on an energy and CP basis:
  
  1 lb distillers grains replaces:
  
  0.5 lb corn and 0.5 lb SBM

- Break-even price of DDGS ($/ton):
  
  \[ \text{Corn ($/bu) x 17.85} + \text{SBM ($/Ton) x 0.5} \]

Example: ($7 x 17.85) + ($275 x 0.5)

Distillers Price = $263
Summary

• Increased growth of ethanol plants across the U.S. has increased the demand for corn grain.

• This has resulted in historically high corn prices.

• By increasing forages such as corn silage, partial replacement of corn can be achieved.

• Use of distillers grains or other by-products in dairy rations can also be utilized to offset higher grain prices.

• Milk production caps from creameries will also dictate to some degree what feedstuffs are utilized in dairy rations.