Supplementing Lactating Cows Requires Different Thinking

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Why Graze?

- Low cost feed source for seasonal dairy
- Least cost way to begin dairying
- Protein source for conventional dairy

Grazing when grazing wasn’t cool!! WHY?

- Blaser Resources available
- Turn off the mix wagon and graze 8-12 weeks
- Plant the corn, get the forage crops in
- Fun to do — did not over shadow major research
- Seasonal grazing not on radar screen

Good Pasture – WVU Circular 379 – Early ‘50s

- Young and growing – more concentrated nutrients
- Dense and abundant (150 lb/d)
- Proper height – 6 in. ideal
- Palatable and digestible – species important
- Even growth all season
What factors affect supplementation

- Composition of cool-season swards
- Limits on intake of pasture
- Pasture protein: asset or liability

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein %</td>
<td>23.0</td>
<td>20.0</td>
</tr>
<tr>
<td>RUP, % of CP</td>
<td>22.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Sol P, % of CP</td>
<td>32.0</td>
<td>28.0</td>
</tr>
<tr>
<td>ADF %</td>
<td>26.0</td>
<td>31.0</td>
</tr>
<tr>
<td>NDF %</td>
<td>42.0</td>
<td>52.0</td>
</tr>
<tr>
<td>NE, Mcal lb⁻¹</td>
<td>0.75</td>
<td>0.72</td>
</tr>
<tr>
<td>Non-fiber CHO (NFC)</td>
<td>18.0</td>
<td>14.0</td>
</tr>
</tbody>
</table>

Modified Muller and Fales (1998)

- Recommended NEₙ for heavily lactating cow is 0.78
- NEₙ of corn silage is 0.72

Limits on Intake

<table>
<thead>
<tr>
<th></th>
<th>Grazed ryegrass</th>
<th>TMR</th>
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</thead>
<tbody>
<tr>
<td>Milk Yield</td>
<td>65</td>
<td>97</td>
</tr>
<tr>
<td>DM Intake (3.4% BW)</td>
<td>41.8</td>
<td>51.5 (3.9% BW)</td>
</tr>
<tr>
<td>~20 lb grain</td>
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</tbody>
</table>

(Kolver and Muller, 1998)

- High producing cows drop a lot in milk when moved from TMR to pasture
- Voisin – eat (work) no more than 8 h/d
- Intake depends on biting rate and sward density and height
  - Intake decreases in lower density stands as height decreases (Mayne, 1997)
- On pasture only, milk yield limited to 50-55 lb/d
Pasture protein: asset or liability

PLUS
- Crude protein intake good if captured in rumen
- Fermentable carbohydrates drive microbial growth and N capture
- Corn increases microbial yield 1.4 fold in continuous culture fermenters

How much grain?
• Responses in milk yield are small with increments above 10 lb grain (Fat test ↓).
• In 1995, Holsteins produced more milk (67.8 vs. 61.4) when fed 20 vs 12 lb of corn, brewers grains and whole cottonseed (Table 2). Jersey response was 1.4 lb milk.

Pasture protein: asset or liability

MINUS
- Excess NH₃ in blood costs energy, 3 to 6 lb milk (Kolver, 1997)
- Excess NH₃ may adversely affect reproduction (MUN above 15-16 mg/d)

How much grain?
• Milk yield (55.2 lb) was not different due to CP (12 vs 16%) or amount of supplement (14 or 21 lb). (Jones-Endsley et al., 1997).
• When corn-based (12% CP) grain was supplemented at 0, 11, and 22 lb, milk yield was 48, 59, and 67 lb. DMI increases with supplementation. (Reis and Combs, 2000)
How much grain?

- Penn State (Muller, 1998) developed a table of feeding guidelines for grass-based dairying. Table 3 in Proceedings.
- Penn State has not shown grain amounts are effective for milk yield response. However, increments in grain increases intake in high-yielding cows and improves body condition with possible improved conception.
- Grain feeding follows the law of diminishing returns.

Synchrony

- Synchronizing N and fermentable energy in rumen may be useful (Kolver, 1997).
- Grain several x daily, grain after a period of grazing, or grains with different rates of fermentability have not shown promise.
- Feeding a partial TMR before rather than after grazing captured more ruminal N, but no effect on milk yield or components.

Substitution

- For each unit of grain fed, pasture DMI decreases 0.5-0.8 lb (Muller and Fales, 1998).
- With more grain, total DMI will likely increase (Reis and Combs, 2000).
- Feeding more grain extends supply of grass (has advantages).
- With silage or TMR, substitution rate is 1:1.

Supplementing with mixed diets (TMR)

- Provides intake adjustments with variation in pasture.
- Stable base diet with less animal adjustment.
- Extra job to mix. Silage may spoil.
- Our data – no advantage over corn supplementation.
- Makes sense if it supplies 60% or more of DMI (no data).
Protein supplementation

- Protein in grain (14-16%) may enhance intake
- Positive response (2.5 lb) in milk yield by replacing corn with soybean meal (18% CP) and additional milk yield (4 lb) by replacing SBM with dried brewers and corn gluten meal (Table 4, Proceedings)

- In other studies with bypass sources, including fishmeal, we have gotten no response.
- My opinion – take care to capture rumen N with carbohydrates and not be concerned about bypass sources.
- Energy is still first-limiting.

Conclusions

- Intake can be increased by grain supplementation.
- Microbial protein synthesis will be increased.
- Reproductive disturbances and costs from excess N may be reduced.

- Amounts of grain would usually be from 10 to 20 lb. 1:4 ratio usually makes sense (>40 lb milk)
- 12% CP (with minerals) adequate; should be readily fermentable.
- Expect fat test to drop as starch increases in diet