Nutritional Reasons to Feed Grass with Corn Silage and Alfalfa

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Why incorporate some grass into dairy rations?

**Agronomic**
- Shorter alfalfa rotations, need for higher yields in establishment year
- Faster drying
- Less risk of winterkill

**Nutrition**
- Higher total fiber with grass/legume mixtures than alfalfa
- Higher proportion of digestible fiber than alfalfa or CS
- Possible good fit with high NFC, low fiber diets (ie high corn silage diets)?
Effect of Italian Ryegrass Seeding Rate on Forage Yield

Ryegrass seeded at 2, 4, 8, and 16 lbs.

Note that rates above 4 lbs/a reduced alfalfa stand

Undersander, 2006
Quality changes in Alfalfa-Grass mixtures with Maturity - Marshfield NDF

Undersander, 2006

*Improve forage yields in first year alfalfa stands*

*Reduce risk of winterkill*

*Manure management*
Utilization of Grass/Legume Silages by Dairy Cattle
Typical composition of high quality grass forages

<table>
<thead>
<tr>
<th>Forage</th>
<th>% CP</th>
<th>% NDF</th>
<th>NDFD</th>
<th>% NFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reed Canarygrass</td>
<td>20</td>
<td>55</td>
<td>68</td>
<td>12.5</td>
</tr>
<tr>
<td>Perennial Rye</td>
<td>18</td>
<td>47</td>
<td>65</td>
<td>22.5</td>
</tr>
<tr>
<td>Tall Fescue</td>
<td>17</td>
<td>56</td>
<td>60</td>
<td>14.5</td>
</tr>
<tr>
<td>Annual Rye</td>
<td>20</td>
<td>55</td>
<td>60</td>
<td>12.5</td>
</tr>
<tr>
<td>Orchardgrass</td>
<td>16</td>
<td>60</td>
<td>55</td>
<td>11.5</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>20</td>
<td>40</td>
<td>48</td>
<td>27.5</td>
</tr>
<tr>
<td>Corn Silage</td>
<td>9</td>
<td>41</td>
<td>68</td>
<td>37.5</td>
</tr>
</tbody>
</table>
Production response to perennial ryegrass silage
Hoffman et al. JDS, 1998

<table>
<thead>
<tr>
<th>Item</th>
<th>60% Ryegrass TMR</th>
<th>70% Alfalfa TMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM intake, lb/d</td>
<td>45&lt;sup&gt;b&lt;/sup&gt;</td>
<td>50&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>FCM yield, lb/d</td>
<td>64</td>
<td>66</td>
</tr>
</tbody>
</table>

Ryegrass silage: 18% CP, 47% NDF
Alfalfa silage: 20% CP, 44% NDF
Summary: Utilizing Grass

Grasses:
✓ Contain higher NDF levels than alfalfa or corn silage
✓ Have higher NDFD than alfalfa

Research:
✓ Most trials have compared grasses to alfalfa, results difficult to interpret because of confounding effects of fiber level or F:C levels of treatment diets
✓ Need for evaluating potential of grass/legume mixtures for high NFC, low fiber diets (ie high corn silage rations)
A “New” Opportunity for Incorporating Grass

Good fit with high corn silage (high NFC/low NDF) diets

*Excellent source of digestible fiber*
*Reduce laminitis?*
Fiber and NFC for Dairy Cows

Typical analysis of high group TMR for high producing herds
WI High herds* NRC(2001)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDF, %</td>
<td>27-30</td>
<td>&gt;25</td>
</tr>
<tr>
<td>NDF from forage</td>
<td>19-22</td>
<td>&gt;19</td>
</tr>
<tr>
<td>NDFD (% of NDF),</td>
<td>53-67</td>
<td></td>
</tr>
<tr>
<td>NFC, %</td>
<td>38-43</td>
<td>&lt;44</td>
</tr>
</tbody>
</table>

*Kaiser and Shaver, 2004 Wisconsin high herd summary, UW extension*
Alfalfa vs Corn Silage: with herd expansion, more CS

Improving yield and quality of CS hybrids
- 20-25% more DM/acre with corn silage than alfalfa
- Recent advances in development of corn silage hybrids

Less harvest risk
- Winterkill
- Weather: rain damage and ‘window of harvest’

Manure management
- 4 ton alfalfa => 60 lb P$_2$O$_5$, 220 lb K$_2$O
- 7 ton corn silage => 60 lb P$_2$O$_5$, 120 lb K$_2$O, + Nitrogen
Alfalfa vs Corn Silage: nutritional considerations

Alfalfa upper limit: ? 75% of Forage
✓ High CP, RDP, Ca
✓ Low RUP, NFC
✓ Need for high starch/NFC supplements?

Corn silage upper limit: 65 - 75 % of Forage
✓ High Starch, Moisture, Acid
✓ Low CP, Ca, peNDF
✓ Supplements with high CP, lower NFC fit well
Lameness in Dairy Cattle

Midwest United States: (Cook, Oetzel and Nordlund, 2003)
Overall 20-25% of cows are mildly to seriously lame.
Causes: 58% due to disease or trauma, 42% due to nutrition (excessive grain/inadequate fiber)
Severity: influenced by diet, stall design and bedding, stocking density, time in parlor holding area, etc.
### Potential Losses Due to Lameness

<table>
<thead>
<tr>
<th>Locomotion Score</th>
<th>2 (Mild)</th>
<th>3 (Moderate)</th>
<th>4 (Severe)</th>
<th>5 (Severe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM intake reduction, lb</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Milk Yield Loss, lb</td>
<td>0</td>
<td>5</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>

Adapted from P. Robinson. UC-Davis Cooperative Extension
Lameness triggered by too much NFC, and not enough effective Fiber

- Fiber: Less than 28% NDF
- NFC: More than 40% NFC
- Particle Size: Finely processed TMR, use of feed co-products.
- Sorting: Coarse forage, low TMR moisture
- ‘Slug’ feeding: Top dressing, overcrowding
Effects of varying ratios of alfalfa silage to corn silage on milk production and intake (Brito and Broderick JDS 2006)

Alfalfa Silage: 38% NDF, Corn Silage: 41% NDF
TMR’s: 23-25% NDF, 48-49% NFC: Cows 93 DIM at start of experiment
Corn Silage Energy (70% TDN)

Alfalfa Silage Energy (64% TDN)

Italian Ryegrass Silage Energy (67%TDN)
Corn Grain

Corn Silage

Italian Rye

TMR Energy
Substituting Annual Rye for Corn Silage Increased Intake and Milk Yield

Bernard et al. 2002, JDS
Incorporating Grass with Corn Silage Diets

Grasses:
- Contain higher NDF levels than alfalfa or corn silage
- Have higher NDFD than alfalfa
- Need for evaluating potential of grass/legume mixtures for high NFC, low fiber diets (ie high corn silage rations)
Potential for Grass in Dairy Rations

Agronomic Reasons

*Improve forage yields in first year alfalfa stands*
*Manure management*
*Reduce risk of winterkill*

Nutritional Reasons

*Good fit with high corn silage (high NFC/low NDF) diets*

*Excellent source of digestible fiber*
*Reduce laminitis?*
Web Resources

UW Extension Forage Resources
www.uwex.edu/ces/crops/uwforage/uwforage.htm

UW Extension Corn Agronomy
http://corn.agronomy.wisc.edu/Extension.htm

UW Department of Dairy Science
http://www.wisc.edu/dysci/