Reduced Lignin Alfalfa with Grasses

1st Production year
Hi-Gest 360 alfalfa + grasses

Seeding year
HarvXtra alfalfa + grasses

J.H. Cherney and D.J.R. Cherney, Cornell University
2016 Production year data:
Oneida & Wyoming Counties

Alforex *Hi-Gest360* reduced-lignin
Pioneer *55H94* highest yielding in Cornell trials.

Adequate moisture vs. Drought

5 cuts in 2016
10 Grasses sown with Alfalfa

Tall Fescue

*Bariane* late maturing
*Kora* very high yielding

Meadow Fescue

*Pradus* late maturing
*Liherold* early maturing, high yield
*BAR FpF32* high quality
10 Grasses sown with Alfalfa

Festulolium
- *Perseus* ryegrass x meadow fescue

Orchardgrass
- *Barlegro* late maturing
- *Command* late maturing
- *Dividend VL* very late maturing
- *DfIF47* sparse-heading type
2016 DM Yield

5 Harvests: May 24, June 30, July 30, Sept. 3, Oct. 10

Oneida = 1.7 + 2.1 + 1.7 + 1.8 + 0.9 = 7.5 tons/a

WNY = 1.9 + 2.0 + 0.3 + 0.6 + 0.5 = 5.3 tons/a

Tall fescue
Meadow fescue
Orchardgrass
Festulolium
Yield is correlated with grass%, under normal growth conditions. Oneida County, 5 cuts, 2016

For 10% unit increase in grass, Yield increases 0.4 ton.

$r = 0.84$
Visual Estimation of Grass %
Alfalfa-Grass Estimation
NIRS Grass% - DairyOne

R^2 = 0.9914
Estimating stand composition of mixtures pre-harvest.

Take photo of mixed stand.
Analyze photo with AI software.
Estimate alfalfa %. 
Grass %

Wyoming County

Cut 1 (black), Cut 2 (red), Cut 3 (green), Cut 4 (yellow), Cut 5 (blue)

(% are weighed averages)

Grass %
Bariane Kora BarFpF32 Liherold Pradus Command DflF47 Dividend Barlegro Perseus
Grass, %

Oneida County, 2016
Cut 1 (black), Cut 2 (red), Cut 3 (green), Cut 4 (yellow), Cut 5 (blue)

Somewhat dry (% are weighed averages)

Grass %
Grass Fiber Digestibility (NDFD)  

Wyoming, 2016

Festulolium regrowth headed out
HiGest360 5% higher in NDFD and 5% lower in Lignin (Oneida)
7% higher in NDFD and 7% lower in Lignin (Wyoming)
2016 Oneida County, Cuts 1-5, Total NDFD of mixtures

- 2.2% units increase in NDFD per 10% units grass
- 30% grass will give you 7-8% units higher NDFD

Regression lines for all data in each cut
1%unit NDFD = 0.5 lb milk/cow/day
Impact of Variety selection on Fiber Digestibility of Mixtures (If 1% unit NDFD in a mixture is significant)

Alfalfa selection important
Grass selection important

Grass % in mixed stand

As low as 5% (any) grass will increase NDFD of an alfalfa-grass mixture 1% unit.

Alfalfa 50% NDFD, Grass 75% NDFD
Lewis County, 2016 seeding

Entries - Alfalfa

- HarvXtra
- Hi-Gest 360
- LegenDairy XHD
- Pioneer 55H94

Entries - Grass

- Bariane TF
- Fojtan festulolium (TF x ryegrass)
- BAR FpF32 MF
- Dividend VL OG
- DgLf47 OG

2 Cuts but pitiful 1st cut
HarvXtra lower lignin than rest, similar in NDFD to Hi-Gest

Alfalfa, Lewis Co., Cut 2

Entry

HarvXtra
LegenDairy
Hi-Gest
P55H94

NDFD, %
42
45
48
51

Lignin, %
50
46
48
45
Grass, Lewis Co., Cut 2

Grass% in stand, end of seeding year

<table>
<thead>
<tr>
<th></th>
<th>20%</th>
<th>15%</th>
<th>8%</th>
<th>30%</th>
<th>33%</th>
</tr>
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<tbody>
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<td>MF higher NDFD than rest.</td>
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Grass% in stand, end of seeding year

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Ithaca, 2016 seeding (USDA)

Alfalfa Entries

*Hx2017* 2017 ‘HarvXtra’

*WL355RR* (High quality check)

Grass Entries

*BARFpF32* MF

*Fojtan* Festulolium

*Dividend* OG

Same study seeded in KY & MN
White flags in the middle of both 6' wide plots.

Interaction of cultivar and drought
Alfalfa cultivars looked similar, WL yielded 10% more than Hx.

Fall 2016

Spring seeding
Ithaca, 2016
Severe drought
WL355RR yielded about 10% higher than HarvXtra.
<table>
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<tr>
<th>Variety</th>
<th>NDFD</th>
<th>Difference</th>
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<tr>
<td>Hx2017</td>
<td>52.7</td>
<td>7.5% higher</td>
</tr>
<tr>
<td>WL355RR</td>
<td>49.3</td>
<td></td>
</tr>
<tr>
<td>Lignin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hx2017</td>
<td>4.61</td>
<td>16% lower</td>
</tr>
<tr>
<td>WL355RR</td>
<td>5.53</td>
<td></td>
</tr>
</tbody>
</table>
Ithaca, 2016 seeding, USDA

Grass Entries, NDFD (no Cut 1 grass)

<table>
<thead>
<tr>
<th>NDFD</th>
<th>Cut 2</th>
<th>Grass%</th>
</tr>
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<tbody>
<tr>
<td>BARFpF32 MF</td>
<td>76.5</td>
<td>9% MF</td>
</tr>
<tr>
<td>Fojtan Fest.</td>
<td>74.6</td>
<td>2% Fest.</td>
</tr>
<tr>
<td>Dividend VL OG</td>
<td>70.6</td>
<td>19% OG</td>
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MF 8% higher NDFD than OG
HarvXtra vs. WL355RR, 6 states, Cut 2 of seeding year, 2015

NDFD drops 0.5% unit/day

HarvXtra

WL355RR

Ithaca, seeding year, 2016

Sulc et al. 2016
Effect of Harvest Schedules – 2016
NDFD (Ohio only)

Interaction LSD

-3.7

-5

-7

Sulc et al. 2016  Pure Alfalfa stands
How long can you delay HarvXtra harvest in alfalfa-grass mixtures?

Based on Hx 50% vs. Normal 45% NDFD at Day 0 (the day Normal gets cut)

Alfalfa 0.65% units/day
Grass 1.0% units/day
Grass 75% NDFD
<table>
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<tr>
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<th>NDFD</th>
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<tr>
<td><strong>7-state average</strong></td>
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<td><em>HX vs. Pioneer</em></td>
<td>14%↓</td>
<td>7.5%↑</td>
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<tr>
<td><strong>3-state average</strong></td>
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<tr>
<td><em>HG vs. Pioneer</em></td>
<td>5.5%↓</td>
<td>5.6%↑</td>
</tr>
<tr>
<td><strong>2-state average (FGI)</strong></td>
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<td></td>
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<tr>
<td><em>HX vs. Pioneer</em></td>
<td>22%↓</td>
<td>16%↑</td>
</tr>
<tr>
<td><em>HG vs. Pioneer</em></td>
<td>4.8%↓</td>
<td>5.5%↑</td>
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12+ separate harvests
Conclusions

30% Meadow fescue/HQ Alfalfa:
- 1/3 to 2/3 more tons/acre
- 8-11% units higher NDFD in mixture

Festulolium & orchardgrass OK for beef.

5% (any) grass significantly increases mixture NDFD.

Optimum grass%: Seeding Yr  5-15%
1st production yr  20-30%.
THE END