Stored Forage
Hay vs. Baleage
Balancing Costs and Performance

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Goals for Today

• To think about hay and baleage and how they might meet a forage production gap on our operation

• To discuss potential uses for both technologies in our farm
Hay vs. Baleage

**Hay**
- 10 to 15% moisture
- Commonly: bahiagrass, bermudagrass
- Low-to-mid quality

**Baleage**
- 40 to 60% moisture
- Ensiled forage
- Commonly: annual ryegrass, small grains, some warm-season grasses
- Can be high quality if harvested at the right time
Most of Us Make/Buy Hay

• How can we improve performance of this hay in our system?

• Efficiency!
  – There is a lot of waste associated with hay making, storage, and feeding.
Hay Wrapping Technology

Twine/String
$2-3/bale

Net-Wrap
$4/bale

B-Wrap (John Deere) – also known as ‘film wrap’
$6/bale
Think About Storage

• Barn storage > outside, elevated off the ground > outside, on the ground
  – Ideas: gravel barrier, railroad crossties, pallets*, etc.

• Wrapping dry hay with plastic
  – String-tied: 2 turns of plastic
  – Net-wrapped: Little to no advantage

There is still some waste in this system – remember that hay “breathes”
Think About Storage

What?
• High density bales
• Flat ends together

Where?
• Away from the tree line
• Well-drained site

How?
• North-south facing direction
• Avoid hay-to-soil contact
Technologies to Reduce Feeding Waste

Sheeted Bottom Steel Ring: 6%
Modified Cone Ring: 13%
Open Bottom Ring: 20%

Source: The Noble Foundation, 2014
### Technologies to Reduce Bale Weight

Table 1. Number of bales needed to feed thirty 1,300 lb cows consuming 2.5% BW in dry matter per day.

<table>
<thead>
<tr>
<th>Bale Width, ft</th>
<th>Bale diameter, ft</th>
<th>Estimated bale weight</th>
<th>Hay consumed per cow per day, lb</th>
<th>Bales needed per week for 30 cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>560</td>
<td>32.5</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>880</td>
<td>32.5</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>1270</td>
<td>32.5</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>1100</td>
<td>32.5</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>1580</td>
<td>32.5</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Banta, 2012
Getting More Out of Your Hay

There is still waste in this system – but it is encouraging better nutrient distribution across the field.

Fertilizer value of hay: $20/roll

Manure contribution:

Unroll enough for cattle to consume in 1-day – “topdress” with supplement
Forage Crops for Baleage Production

**Cool-season annuals**
- Annual ryegrass, oats, wheat, rye, triticale

**Summer annuals**
- Forage sorghum, sudan grass, sorghum x sudan crosses, pearl millet, crabgrass

**Perennial forages**
- Bermudagrass, bahiagrass, dallisgrass, tall fescue
Why annual forages first and perennials second?

• High quality with proper management

• Mid- to high levels of water-soluble carbohydrates for fermentation
  • Sugar = the fuel for fermentation

• Fermentation drives the ensiling process
Increasing maturity and impacts on quality

Figure 3. Effect of plant maturity on forage intake and digestibility.

## EV Smith Study – Growing Calves (Steers and Heifers)

<table>
<thead>
<tr>
<th>Forage Type</th>
<th>Forage Use, lb/hd/day</th>
<th>CP, %</th>
<th>TDN, %</th>
<th>Gain, lb/hd/d†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryegrass baleage</td>
<td>40</td>
<td>11</td>
<td>61</td>
<td>1.5</td>
</tr>
<tr>
<td>Corn silage</td>
<td>42</td>
<td>8</td>
<td>68</td>
<td>1.6</td>
</tr>
<tr>
<td>Tifton 85 bermuda-grass hay</td>
<td>16</td>
<td>14</td>
<td>62</td>
<td>1.6</td>
</tr>
</tbody>
</table>

†RG + 50:50 soyhulls and corn gluten feed, 6 lb/hd/day
CS + corn/CSM, 5 lb/hd/day
BG + 50:50 soyhulls and corn gluten feed, 8 lb/hd/day
Systems Scenario: Fall-Calving (1,200 lb. cow)

**Feeding Baleage**
- Annual ryegrass baleage (Boot to dough stage)
  - 58% TDN
  - 16 pounds TDN consumed per day

**Months Since Calving**
- October to September

**Pounds of TDN required per day (lb/day)**

- Peak milk production
- Weaning

**Months**
- October, November, December, January, February, March, April, May, June, July, August, September
Pearl Millet

June 22\textsuperscript{nd}, 2016

July 25\textsuperscript{th}, 2016
Sorghum × Sudan

June 22\textsuperscript{nd}, 2016

July 25\textsuperscript{th}, 2016

Challenge: Sugarcane aphid pressure
Treated 3x
## Forage Quality and Costs

<table>
<thead>
<tr>
<th></th>
<th>Pearl Millet Baleage</th>
<th>Sorghum Sudangrass Baleage</th>
<th>Bermudagrass Hay</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forage Nutritive Value</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Moisture</td>
<td>56.4</td>
<td>56.4</td>
<td>12.0</td>
</tr>
<tr>
<td>% Ash</td>
<td>10.3</td>
<td>9.8</td>
<td>5.7</td>
</tr>
<tr>
<td>% CP</td>
<td>14.0</td>
<td>13.9</td>
<td>15.2</td>
</tr>
<tr>
<td>% Digestibility</td>
<td>74.0</td>
<td>78.0</td>
<td>58.9</td>
</tr>
<tr>
<td><strong>Animal Performance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial BCS</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Final BCS</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$/ton DM</td>
<td>$124</td>
<td>$136</td>
<td>$104</td>
</tr>
<tr>
<td>$/cow-calf pair/day</td>
<td>$1.97</td>
<td>$2.16</td>
<td>$1.65</td>
</tr>
</tbody>
</table>

Data from Hargaden (2017)
Forage Inoculants – Are they worth it?

In this study - Mix one gallon with 11.5 gallons of water

$3/ton cost
FEEDING CONSIDERATIONS – USING BALEAGE EFFICIENTLY
## Evaluation of Baleage Before Feeding

<table>
<thead>
<tr>
<th>Suitable</th>
<th>Undesirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Smell is acidic, bread-like</td>
<td>• Smell is rotten, pungent</td>
</tr>
<tr>
<td>• Free from excessive amounts of mold</td>
<td>• Considerable amounts of mold</td>
</tr>
<tr>
<td>• Greenish-brown in color</td>
<td>• Strong, dark color or very bright green</td>
</tr>
<tr>
<td>• Free from manure contamination</td>
<td>• Wet or extremely dry</td>
</tr>
<tr>
<td>• Barely damp to touch</td>
<td></td>
</tr>
</tbody>
</table>
Feeding Practices

• Conduct a forage analysis
  – This can be done at the time of baling/wrapping

• Provide forage on a **dry matter basis**
  – Mature cow – 2.0% BW in dry matter
Feed within a three day window after opening

Mullenix, unpublished data, 2017
Economics: Bale Wrappers

- **Individual bale wrapper:**
  - does not wrap bales as quickly (3-6 min/bale)
  - uses more plastic (20-25 bales/roll of plastic)
  - typically cost $20,000 to $25,000

- **In-line bale wrapper:**
  - wraps bales quicker (2-4 min/bale)
  - uses less plastic (30-40 bales/roll of plastic)
  - typically cost $28,000 to $33,000
Additional Options for Using Baleage

• Contract wrapping
  – $8 to 15 per bale
  – Includes cost of wrapping, use of wrapper, and time
• Purchase for transport very short distances*
• Overall, stored forages = costly
For more information, visit:

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