Crops, Fundamentals and Management of Silage in the Western U.S.

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Figure 1. Successful conversion of forage crops into silage.
Traditional Haylage Crops

• Perennial cool-season grass
• Alfalfa
• Grass/legume mixtures
• Small grains
• Sudangrass
• Mixed peas and oats
Fig. 1. The $\beta$-(2-6)-linked D-fructofuranose repeating unit of levan.
<table>
<thead>
<tr>
<th>Nitrogen Applied (lbs/A)</th>
<th>Forage Yield (lbs/A)</th>
<th>WSC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>2690</td>
<td>25.3</td>
</tr>
<tr>
<td>224</td>
<td>4775</td>
<td>14.3</td>
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</tbody>
</table>
Moisture Range for Storing Forages

- Direct-cut silage – > 80% +
- Wilted silage – 65%
- Haylage – 40 – 60%
- Baleage – 40 – 60%
- Dry hay - < 20%
Silage pH Scale

pH scale

Acidic

3 4 5 6 7

Neutral

excellent

good

ok small problems

more problems

big problems
General pH of Silage Crops

Smell it. Taste it. It should bite back!

Expected range of pH:
- Corn, sorghum, grains – 3.5 to 4.5
- Grasses – 4.0 to 4.8
- Alfalfa and legumes – 4.5 to 5.5

If crop pH is higher than 6 likely have malfermentation
Figure 2 (Source Pitt 1990)
Silage Acids

• Expected acid concentrations of stable, well made silage:
  – Lactic acid – 2 to 6%
  – Acetic acid – 1 to 2%
  – Propionic acid -- < 1%
  – Butyric acid -- < 0.001%

NOTE: malfermented silage results when dirt (soil) is mixed into the silage mass and LAB are defeated by clostridia and other bad bacteria!
Hay vs. Haylage

- Hay is stored dry
- Haylage is stored wet
- Excess moisture is problem with hay while too little moisture and air are problems for haylage
- Spontaneous combustion is possible when storing either hay or haylage
Silage and Haylage

- Surface molds: white, gray, black = DM loss but OK to feed, RED MOLDS – NO!
- Watch for hot spots and fire
- Watch for unexpected quality changes
- Monitor for nitrates
Figure 3 (Source: Pitt 1990)
Corn Silage Management

• Historically CS chopped on TLC and moisture content
• 20 years ago kernel processing emerged, now largely standard practice
• Currently ‘shredlage’ being investigated to maximize benefits of historical and kernel processing
Silage Do’s and Don’ts

• There are seven agronomic issues to successfully make silage:
  1. Crop variety and selection
  2. Soil testing and nutrients
  3. Seedbed preparation
  4. Crop maintenance
  5. Crop harvesting
  6. Harvest equipment
  7. Storage

Establish yields, quality and $$$$ from silage