Hay

Suitable for long term storage
More readily transported than silage
More marketable than silage
Components of Hay Losses:

Field curing
Harvesting
Storage
Feeding
Losses during Hay Harvest & Storage

LOSS ACCUMULATE WITH EACH STEP

(71% LOSS)
If maximum losses occur only 29% of the crop gets to the animal

Field curing
25% loss

Harvesting
15% loss

Storage
35% loss

Feeding
30% loss
Losses during Hay Harvest & Storage

SAVINGS ARE POSSIBLE FOR EACH STEP

(23% LOSS)
With good management each loss can be reduced so 77% of the crop DM is consumed

Field curing 12% loss
Harvesting 8% loss
Storage 5% loss
Feeding 8% loss
Inside Storage of Hay

Covered storage reduces dry matter losses from 30% or more down to about 7%

- The >30% figure represents outside-stored bales tied with sisal twine.
- The 7% figure is the normal respiration loss that hay incurs as it dries from baling moisture down to equilibrium moisture of about 15%.

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<table>
<thead>
<tr>
<th>Storage Method</th>
<th>Weathered Depth (in.)</th>
<th>Weathered Loss (%)</th>
<th>DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twine</td>
<td>4.4</td>
<td>18.2</td>
<td></td>
</tr>
<tr>
<td>Netwrap</td>
<td>2.1</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
<td>Solid plastic</td>
<td>0.6</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Shed</td>
<td>0.5</td>
<td>5.7</td>
<td></td>
</tr>
</tbody>
</table>
## Round Bale Storage

<table>
<thead>
<tr>
<th>Density</th>
<th>LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 lb/cf</td>
<td>26.4</td>
</tr>
<tr>
<td>12 lb/cf</td>
<td>19.4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Binding</th>
<th>LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netwrap</td>
<td>19.0</td>
</tr>
<tr>
<td>Twine</td>
<td>26.8</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Surface</th>
<th>LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground</td>
<td>26.7</td>
</tr>
<tr>
<td>Rock</td>
<td>19.2</td>
</tr>
</tbody>
</table>

Alfalfa/Smooth bromegrass hay in Iowa

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## Southern Indiana data with tall fescue

<table>
<thead>
<tr>
<th>Bale location</th>
<th>DM Loss</th>
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</thead>
<tbody>
<tr>
<td>Outside</td>
<td></td>
</tr>
<tr>
<td>On the ground</td>
<td>23.2%</td>
</tr>
<tr>
<td>On crushed rock</td>
<td>14.5%</td>
</tr>
<tr>
<td>Inside</td>
<td>8.0%</td>
</tr>
</tbody>
</table>

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Weathered hay on outside bales was very low in quality.

DM Digestibility*

Storage Options

Pyramid Stacks
Hay Sheds
Hoop Structures
Hoop Structures for Hay Storage

Specifications for this structure:
30 feet x 102 feet
  (widths range from 24 to 70 feet)
  (lengths in 10-foot increments)
UV-treated polyethylene cover
Clearance: 11’4” + wall height
  (11’4” + 6’ = 17’4”)
Hoop Structures for Hay Storage

Cost:
Package (hoops, cover) $6,000
Posts 42 = $750
Plus concrete for posts & lumber for side walls
   (cut on farm in this case)
Materials Cost = Approximately $7,500
Hoop Structures for Hay Storage

For these 5’ x 4’ Bales:

5 + 4 + 3 = 12 bales per row

(could have 6 + 5 + 4 depending on exact size of bales)

25 rows x 12 bales/row = 300 bales total

Assuming 10-year structure life

(prorated 16-year warranty on cover)

$7,500/10 yr = $750 per year

$750/300 bales = $2.50 per bale

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Hoop Structures for Hay Storage

Wall:
6 inch treated posts, 10 feet long
  4 feet below ground
  6 feet above ground
5 foot spacing (42 posts total)

Floor:
4-inch layer of gravel
Hoop Structures for Hay Storage

Adjustable tension to keep cover tight
Hoop Structures for Hay Storage

Advantages:
- Easier feeding than pyramid stacks
- Can be used for equipment etc.
- Protects hay yield and quality well

Disadvantages:
- Location is fixed whereas pyramid stacks can be placed in several locations
- Costs more than pyramid stacks
Hay Moisture & Inside Storage

Larger & denser bales heat more at a given moisture level

Stacking further restricts heat and moisture loss
In moist environments, hay must lose moisture after baling.

This slight elevation in temperature serves to dry the hay, making it stable during storage.

Stacking further restricts heat and moisture loss

Hay Moisture & Inside Storage

Moisture Recommendations for Inside Storage

Small square
Round
Mid-size & large square

18% Moisture
16% Moisture
20% Moisture

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Managing Moist Bales for Inside Storage

Dry round-baled hay (18% or less) can be stacked immediately. Moist round-baled hay (19-25%) should be left outside for 2 to 3 weeks to “sweat”, then moved inside. (Rain normally has little effect on bale moisture but heavy rain may prevent inside storage). Wet hay (>25% moisture) may continue heating for a longer period. Monitor temperatures to determine when this hay has cooled.
SPONTANEOUS HEATING

Protein Digestibility

Baling Moisture  
26% Moisture  
Very wet  

CP Digestibility  
63%  
27%
Preservatives

Organic acids
   Propionic acid
Buffered acids
   Ammonium propionate
   pH 6.0, not corrosive
      Less volatile
Ammonia, Urea

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## Preservative

Buffered Ammonium Propionate

<table>
<thead>
<tr>
<th></th>
<th>Dust</th>
<th>Color</th>
<th>NDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet control</td>
<td>4.0</td>
<td>4.9</td>
<td>50.5</td>
</tr>
<tr>
<td>Buffered prop.</td>
<td>2.6</td>
<td>4.9</td>
<td>48.7</td>
</tr>
<tr>
<td>80:20</td>
<td>2.3</td>
<td>5.1</td>
<td>48.5</td>
</tr>
<tr>
<td>Dry control</td>
<td>1.7</td>
<td>2.9</td>
<td>45.9</td>
</tr>
</tbody>
</table>

20-25% moisture hay
Hay Quality Testing

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