

## Harvesting High Quality Hay and Haylage

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Energy and protein supplements are expensive. To make a farm profitable it is important to keep costs down and productivity up. The major cost in livestock production is feed cost. A low cost ration is based on high quality pasture and conserved forage. The major feed cost is conserved forage. To produce high quality conserved forage and benefit from its production the manger needs to follow ten steps.

1. Harvest when forage is high quality
2. Use legumes to increase forage quality
3. Manage cut forage for rapid drying
4. Ted and rake hay to reduce leaf loss
5. Bale at the proper moisture content
6. Wrap haylage promptly
7. Store economically to maintain yield and quality
8. Forage test to measure hay quality
9. Know animal nutritional requirements
10. Minimize supplemental feeding

### Harvest when the forage is high quality

The first principle in making high quality hay or haylage is to harvest early. Harvest first cut hay when the grass is in the late boot to early head reproductive stage. Harvest aftermath grass-legume hay when the legume is in early flower reproductive stage. For nitrogen-fertilized grass aftermath, apply nitrogen fertilizer after the first cut is made and harvest about 6 weeks later.

There are several challenges in making early cut hay. The main one is that drying conditions in West Virginia in late May are poor compared to late June. For beef cattle not all hay needs to be of the highest quality. The key is to make some hay early, to have high quality forage for growing replacements, for cows after calving, and for use as a supplement to be feed with lower

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quality later cut hay. Rain damage will reduce hay yields and cause bleaching. However, light rain does relatively little damage to hay digestibility, crude protein, and intake compared to late cutting.

Be ready to make early cut hay by preparing the hay equipment in April or early May so that you are ready when good drying weather comes. Also, hay wrappers allow us to make haylage out of early cut hay without drying it down for hay. For large beef herds and many dairy herds this can be a cost effective option. For smaller herds, renting the machinery is possible in some areas of the state. When looking at the cost effectiveness of baled haylage make sure to count all costs, including labor, machinery, and plastic disposal, before deciding to get into it.

How much high quality hay is needed depends on the livestock management system and goals. If under current hay management cattle are in poor body condition or are not breeding back as soon or as evenly as they should or if supplemental feed costs are high, evaluate the system and see if it needs more hay harvested at an earlier date.

#### Use legumes to increase forage quality

Using legumes for fixing nitrogen reduces fertilizer cost and increases forage quality. Legumes fix nitrogen from the air and eliminate the need to purchase nitrogen fertilizers. Having about 25-50% legumes in a hay stand will provide growing season hay yields comparable to the grass fertilized with 150 lb./a of nitrogen.

Livestock will eat more hay when it has legumes in it than if it is straight grass. This allows the animal to grow faster or produce more milk when legumes are a significant portion of the hay. If the cattle eat more hay, more hay will be needed to feed the herd but less supplemental feed will be needed to maintain animal performance and health. Aftermath, mixed grass-legume hays are higher in crude protein than most straight grass hays. This allows for their use as a protein supplement when used with low protein hays or for feeding with energy supplements such as corn. Legumes harvested in the late bud growth stage will produce the highest quality forage. However, to ensure a vigorous long lived legume stand aftermath harvests should be delayed to early flower.

#### Manage cut forage for rapid drying

Delay mowing until the dew is off the forage. When mowing, lay the forage out in a wide swath to increase drying rate. Using a mower conditioner breaks the stems allowing them to dry more uniformly with the leaves. When making dry hay use a tedder to turn the hay swath. This will make drying more uniform and increase the effective drying rate. Mowing hay when the soil is dry will also help increase the drying rate.

#### Ted and rake hay to reduce leaf loss

Ted hay in the morning or late evening when the hay is tough from the dew to reduce leaf shatter. Tedding turns and fluffs up the hay, brings wetter hay to the top, allowing air to circulate around

the hay so that it will dry more uniformly and effectively faster. Rake hay into windrows before it is too dry to reduce leaf shatter. Allow the hay to finish drying in the windrow.

When tedding or raking if a lot of dust is stirred up and leaves are breaking off, the hay is too dry and the tedding or raking speed is too fast. Try to ted or rake when the hay is moist and slow down to reduce leaf loss. This is especially important when legumes are in the stand.

For both dry hay and haylage wide swaths increase drying rate and reduce respiration improving the final forage quality. Wide swath drying for haylage improves haylage fermentation and quality. This is at the added cost of raking the hay before baling.

#### Bale at the proper moisture content

Bale dry hay when it has dried to less than 17-20% moisture. Bale haylage when it has dried to 40-60% moisture.

#### Wrap haylage promptly

When baling haylage, bale the bales tight to eliminate as much air as possible. Wrap the haylage as soon as it is baled to exclude oxygen, start fermentation and stop respiration. Use adequate plastic to exclude oxygen during storage and holds in the acids formed during fermentation that preserve the silage. This management optimizes forage fermentation, quality, and storage.

#### Store economically to get the most out of your efforts

Proper hay storage will increase the amount of hay available for feeding in the winter. For maximum dry matter retention put dry hay bales on pallets or a gravel pad to protect the bales from wicking up moisture from the soil. Use a pole barn or tarp to protect the bale from rainfall and snow on the upper surface. Plastic wrap will protect dry hay from moisture damage but at a higher total long term cost than tarps and pole barns.

When using a hay baler that makes a tight bale, placing the bales in the field for winter feeding can reduce machinery and labor cost enough to justify some hay storage loss. This system also returns hay and manure organic matter to the field increasing subsequent hay yield and recycling fertilizer nutrients with no labor and machinery cost for spreading manure. On dry, well drained soils and in drier parts of the state this may be a practical cost effective system.

#### Forage test to know the hay quality

Forage testing tells us what the final forage quality is. Use a certified forage testing lab that will provide results for crude protein, acid detergent fiber, neutral detergent fiber, and major minerals. Paying the added cost for minor minerals can be of value when fine tuning a nutritional program.

Forage digestibility is not measured directly but is estimated from fiber or fiber and other nutrients in the forage. This is an estimate of the usable energy in the forage and is reported as total digestible nutrients (TDN) or net energy maintenance (NEM) and net energy gain (NEG)

and is a measure of the solar energy captured by the plant which can be used by the animal for maintenance and in making products useful to humans.

#### Know the animal's nutritional requirements

Hay of a quality that matches an animal's nutritional requirements can maintain animal performance without any supplemental feed. This is the goal in making hay in order to minimize purchased feed costs. To accomplish this, the manager needs to know what the animals' nutritional requirements are and when to cut the hay so that the hay quality will be adequate. Adjusting the production cycle so that the animals' highest nutritional requirements occur when they are on pasture and not on stored feed is one way to address this issue.

#### Minimize supplemental feeding

Hay can provide a low cost, home grown winter feed. It can provide all the energy and protein needed by cattle and sheep. Even in rations for high producing dairy cattle, hay can provide over half the feed requirement. When developing a ration we need to know the hay's content of digestible energy, fiber, crude protein, and the expected dry matter intake of the hay. Taking forage samples from different hay lots on the farm enables us to know the quality of the available hay. Then it is possible to match the hay's forage quality to the animal's nutritional need feeding only those supplements that are needed to improve animal performance, maintain animal health and farm profitability.

## Further reading

Other West Virginia University Extension Service Fact Sheets dealing with hay production and quality.

Proper Handling and Curing of Hay

<http://www.wvu.edu/~agexten/pubnwsltr/TRIM/5811.pdf>

Hay Quality - The Foundation for Low Cost Winter Feeding

<http://www.caf.wvu.edu/~forage/hayquality/lowcost.htm>

Hay Quality vs. Hay Quantity

<http://www.wvu.edu/~agexten/pubnwsltr/TRIM/5817.pdf>

Cut Hay Early To Get The Most Out Of Plastic Wrapping

<http://www.wvu.edu/~agexten/pubnwsltr/TRIM/5836.pdf>

Round Bale Storage Costs

<http://www.caf.wvu.edu/~forage/roundbale.htm>

Sampling Hay and Haylage

<http://www.wvu.edu/~agexten/forglvst/haysamplng.pdf>

Understanding Forage Analysis Important to Livestock Producers

<http://www.wvu.edu/~agexten/forglvst/analysis.pdf>

Use Forage Test to Diagnose Management Problems

<http://www.wvu.edu/~agexten/forglvst/foragtst.htm>

Using a Forage Test to Identify Improvements in Forage Management

<http://www.caf.wvu.edu/~forage/foragetest/foragetest.htm>

Forage Quality - Protein

<http://www.caf.wvu.edu/~forage/5010.htm>

Forage Quality - Fiber and Energy

<http://www.caf.wvu.edu/~forage/5012.htm>

Forage Quality – Minerals

<http://www.caf.wvu.edu/~forage/5016.htm>