



Forage Management

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Harvest and Storage Management Affect Hay Quality

Pasture is the basis of livestock production in West Virginia. The best way to reduce livestock feed cost is to extend the grazing season. However, in many places in West Virginia hay feeding is required for at least part of the year because of snow or ice cover. Details about the risk of snow cover throughout the state can be found on the WVU Extension Service Web site (www.wvu.edu/~agexten/forglvst/snowcovr/index.htm).

When hay or haylage must be fed, it is important that its quality be high enough to meet the animals' nutritional needs. Hay testing is one way to determine your hay's quality. More than 1,000 hay samples were collected in the state over the last few years by WVU Extension agents, Joe Hatton of the Natural Resources Conservation Service, and B.J. O'Doherty of the West Virginia Conservation Agency. From these samples we confirmed that date of cut is the single most important management factor affecting the quality of first-cut hay.

Cool, rainy weather makes it difficult to make dry hay early in the season. But new plastic wrap technology allows farmers to cut early and make round bale haylage rather than trying to dry the hay. One problem is that many producers who use this technology do not cut much earlier than those who make dry hay.

The highest-quality hay is made when cut in late May and early June (Figure 1). As the season progresses, hay total digestible nutrients (TDN) decrease by 0.22 units a day. The hay's crude protein (CP) content is not as closely related to date of the cut because CP is affected by nitrogen fertilization rate, timing, nitrogen source, legume content, and hay-making practices.

When considering hay quality, we need to determine how good is "good enough." Cows' nutritional requirements depend on their age, growth rate, and state



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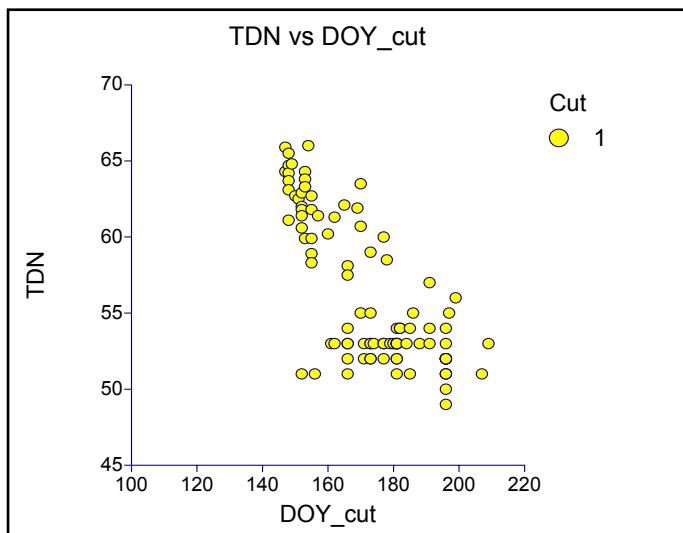


Figure 1. The effect of day of year (DOY) on first cut hay total digestible nutrient (TDN) content (May 21 is DOY 140, August 9 is DOY 220).

of pregnancy or level of milk production. Table 1 gives three different animals having different nutritional requirements. Even if hay was their only feed, these requirements could be met if the hay was of proper quality.

When you look at the TDN and CP in a hay sample, think about what type of cow can "make do" with that hay as her only feed source. Otherwise, you will have to feed supplements to meet the cow's nutritional requirements to keep her productive and healthy.

If the hay you make does not meet the needs of your livestock, consider adopting management practices that will provide hay that meets their needs. Table 2 represents 347 first-cut samples and 355 aftermath samples taken from West Virginia farms. The data are presented on a percentile basis. The 50th percentile means that half the

Table 1. Effect of the cow's stage of production on her nutritional requirements for total digestible nutrients (TDN) and crude protein (CP) expressed as a percentage of forage dry matter.

Mature cow description	Nutritional requirement	
	TDN	CP
Dry pregnant mid-third pregnancy	50%	8%
Last-third pregnancy	53%	8%
Lactating cow average milking ability	56%	10%

Table 2. Percentile ranking of hay crude protein (CP), total digestible nutrient (TDN), and the ratio of CP/TDN for first-cut and aftermath-cut hay in West Virginia.

Harvest	Measure	Percentile				
		10 th	25 th	50 th	75 th	90 th
First Cut	CP	8	8	10	12	15
First Cut	TDN	49	51	53	56	60
First Cut	CP/TDN	0.15	0.16	0.18	0.21	0.25
Aftermath	CP	8	9	11	14	17
Aftermath	TDN	50	52	54	58	62
Aftermath	CP/TDN	0.15	0.17	0.20	0.25	0.28

samples were less than that value and half were greater than that value. We often think of this as the average. The 75th percentile means that 75 percent of the samples were less than or equal to this level and 25 percent were greater than this level.

Let's use the lactating cow of average milking ability as an example. This cow requires 56 percent TDN and 10 percent CP in her ration. To meet her nutritional needs, the hay must be at the 75th percentile level, which gives us 56 percent TDN and 12 percent CP. If we had an average hay (50th percentile), the CP of 10 percent would meet her needs, but she would be short on energy at 53 percent TDN. She would lose body condition, which might result in a lower conception rate on first service. This can be made up by feeding soybean hulls, but you would have the additional cost of the hulls, labor, and feeding facilities. Increasing hay TDN from 53 percent to 56 percent means harvesting about two weeks earlier and realizing a savings in purchased supplements.

When using plastic wrap and harvesting early, you can get by with less drying of the hay and make high-quality hay without rain damage. If you wait to harvest at the same maturity as you would when making dry hay, you will lose forage quality and much of the economic value of using plastic wrap.

Plastic wrapped haylage will have slightly higher forage quality than the dry hay when harvested from the same field the same day (Table 3). This is due to less field loss in harvesting the wetter haylage and to less heat loss in fermentation of properly wrapped haylage than during the sweating of dry hay. The increased lignin content is a measure of heat damage that occurs during fermentation of haylage and sweating in dry hay.

On average, farmers who use plastic wrapping are making hay only 1 point higher in CP (11 percent vs. 12

Table 3. Forage quality of plastic wrapped haylage versus dry hay harvested from the same field the same day (7 fields, 6 bales per field per method).

Measure	Wrapped Haylage	Dry Hay
	Percent Dry Matter Basis	
TDN	57.9	53.0
CP	13.2	11.7
ADF	38.1	41.2
NDF	56.9	63.0
Lignin	6.9	8.2

ADF - acid detergent fiber CP - crude protein
NDF - neutral detergent fiber TDN - total digestible nutrients

percent) and about 2 points higher in TDN (55 percent vs. 57 percent). The plastic wrapping does allow better managers to do a better job. The top 25 percent of producers making dry hay produced hay with greater than 13 percent CP and 58 percent TDN; the top 25 percent of producers making wrapped hay produced hay with greater than 15 percent CP and 61 percent TDN.

Summary

- Cut the first cut as early as needed by livestock.
- For every day that harvest is delayed, the hay loses 0.22 units of TDN.
- Lactating beef cows need hay cut in the late boot or early head stage of maturity.
- Dry beef cows can get by on full-head or early - bloom hay if they are calving on green pasture in the spring.
- Dry beef cows need early-head maturity hay during the last trimester before calving if they calve in the winter or early spring.
- Making "good-enough" hay is one way to reduce feeding costs during the time when you have to feed hay.

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