

# ALFALFA INSIGHTS

VIRENXIA'S NEWSLETTER ON ALFALFA, THE QUEEN OF FORAGES

## ALFALFA POST-HARVEST MANAGEMENT

We know that harvest management decisions have a direct influence on alfalfa yield and nutritional quality (RFV), **so does post-harvest management decisions!** Leading to monetary losses which can be considerable during phases such as harvest and storage of alfalfa.

Yield and leaf losses during mowing and conditioning have been estimated at about 2% and 3%, respectively (Orloff and Mueller, 2008). Yield and leaf losses occurring during other harvest operations, such as curing, raking, baling, pickup, are moisture-dependent and could be as high as 21% (Orloff and Mueller, 2008).



For effective productivity of alfalfa forage, these losses must be minimized as much as possible since they can affect the amount and price of the marketable end product. Dry matter losses are associated with virtually all alfalfa harvest and storage processes.

In this issue, we are providing some of the best practices for **alfalfa curing and storage** to reduce losses in hay yield and nutritive value during and after harvest, which will lead to greater profitability.

## 5 STEPS TO BETTER-CURED, HIGH-QUALITY ALFALFA HAY

Steve Morgan, University of Georgia Extension coordinator, in his article “Harvesting and Curing High Quality Hay” gives some good tips on the best ways to ensure hay is cured properly and timely and meets the nutritional needs of cattle.

The five following management practices will help dry hay as quickly as possible:

### **Take advantage of good drying conditions.**

Even if the weather forecast projects good drying conditions in the 7-day forecast, the chances are fairly high of afternoon showers. If the decision is made to harvest, begin cutting the crop immediately before or soon after the dew is off. By waiting to the end of the day to cut, the drying time is pushed back by a full day or more. This exposes the curing hay to more risk of weather-damage.

**Use a conditioner.** A successful harvest of high quality forage starts with the proper use and set-up of the mower-conditioner. A key factor in achieving a high quality harvest is productivity - getting the crop cut and off the field as fast as possible to avoid weather damage. The conditioning system on the

mower-conditioner is intended to crack, strip or split the plant stem. This reduces the period of time the crop is on the ground and exposed to damage from rain. Studies have shown that the drying rate of a hay crop is 15-25% better when a conditioner is used. There are two basic types of conditioners: impeller (sometimes called flail) and roller-crimper. The impeller conditioner uses v-shaped flails that whip around on a rotating drum. The flails in a impeller-type mower conditioner are not knives. They do not cut the hay; they are designed to strip some of the waxy coating off the hay to allow faster drying. The intermeshing rubber rolls of a roller crimper conditioner crush the stems and leaves of the forage crop. Crimping and crushing newly cut hay promotes faster and more even drying.





**Use the right conditioner.** Roller-crimper conditioners are better for thick stemmed species like alfalfa. Avoid the use of a flail mower on leaf crops. This will help prevent leaf losses during the harvesting process.

**Spread the windrow out wide.** The hay producer's best friend is sunshine. Sunlight speeds up drying. Therefore, it is important to spread the windrow out wide to get equal drying time on the entire crop. For alfalfa and other legumes, (leaf crops) however, wheel traffic over top of the swath may increase leaf losses. In this case, it may be best to lay the forage in a narrow swath at first, and then use a tedder to spread the forage out.



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**Tedder allows the hay to dry ("cure") better.**

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**Use a hay tedder.** A hay tedder inverts, stirs, and spreads out the hay crop. It is used after cutting and before windrowing, and uses moving forks to aerate the hay thus speeding up the process of hay-making. The use of a tedder allows the hay to dry ("cure") better. The proper use of a hay tedder can substantially increase the drying rate of a hay crop (by 15-30%). Tedder hay on the morning after the crop was cut. However, if large clumps of forage pile up behind the cutter, it may be necessary to tedder the hay shortly after mowing. It is usually best to complete all tedding operations before late morning because running the tedder after the dew has completely dried or when the forage is too dry can lead to excessive leaf shatter and losses.

Source: Steve Morgan - University of Georgia Extension Coordinator



## IN-HAND FORAGE QUALITY

### NEAR-INFRARED REFLECTANCE SPECTROMETERS (NIRS)

Over the past decade, Near-Infrared Reflectance Spectrometers (NIRS) have gone from the lab to the field and can now fit into the palm of your hand. But how do these systems work, and why is the calibration such an important consideration? How can the output be incorporated into your decision-making?



Aurora NIR Unit

The NIR spectrometer illuminates the sample and measures the light reflected. If we make a plot of the light reflected for each wavelength of light, we'll notice that some wavelengths were reflected better than others.

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**The missing light was absorbed by the sample and is related to its chemical properties.**

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The near-infrared reflectance spectroscopy technique assumes that the missing light was absorbed by the sample and is related to its chemical properties.



X-NIR

## Calibration is Key

Managing variability is the job of the spectrometer's calibration, and consequently, the calibration is the most important part of the NIRS method. The table below depicts the various calibrations available for current hand-held commercial systems.

Table 1. Crop calibrations available for handheld NIRS systems*							
Instrument	Fresh, ensiled				Dry		
	Alfalfa	Whole-plant corn	Whole-plant small grains	Grass	Alfalfa hay	Grass hay	TMR
AuroraNIR	X	X	X	X			X
X-NIR	X	X	X	X	X	X	X
poliSPEC		X	X	X	X	X	X

\*These data were provided by each manufacturer and are continually updated. Check with them for the latest capabilities.

You'll note that a separate calibration is utilized for each crop species and for fresh or ensiled crops. This is because the manufacturer has determined that calibration performance can be improved by this separation. In calibration development, it is important to either control the variability so that it doesn't influence the calibration, or include it so that the calibration can account for it.

On-farm NIRS does have some advantages over laboratory NIRS. Results are rapid and can be readily incorporated into management decisions. Additionally, you can scan more samples to ensure that you're working with analysis from a more representative sample, to assess variability in your feedstuffs, and to make decisions based on historical trends in analysis.

**Results are rapid and can be readily incorporated into management decisions.**

Table 2. Chemical constituents predicted by on-farm NIRS systems						
Instrument	Dry matter	NDF/ ADF	Starch	Sugar	Crude protein	Crude fat
AuroraNIR	++	++	++	++	++	++
X-NIR	++	++	+	+-	++	++
poliSPEC	++	++	++	+	++	++

++ available for all crop species, + available for most crop species, +- available for some crop species

Source: Mathew Digiman - Agricultural Engineer  
University of Wisconsin



# 5 TIPS FOR BETTER HAY STORAGE

Discussion with Dan Undersander, Extension forage agronomist at the University of Wisconsin.

As with any livestock operation, hay needs to be preserved to prevent losses of dry matter and nutritional quality. The single biggest factor in that preservation is, of course, storage.

So, with that in mind, we offer the following five tips:

## 1 Understanding types of loss

A good way to begin this discussion is with a review of the two basic types of losses that affect hay:

- 1) Dry matter, refers to a decrease in the physical amount of hay present and available for consumption
- 2) Nutritional quality, refers to the specific nutritional value of the hay, such as total digestible nutrients or crude protein. A number of factors can cause both categories of loss, but **moisture** - whether the bale is stored with too much of it, it comes from precipitation or wicks up from the ground - is one of the main causes.



## 2 Managing moisture

The first step to preserving quality hay, according to Dan Undersander, Extension forage agronomist at the University of Wisconsin, is baling it at the right moisture level, even if it means leaving bales outside to “sweat” a few days before going into tight storage.

If, he says, bales are put “at 20 or 22% moisture, then we will have microbial growth, and the microbes are using up the starches and the sugars. They’re giving off heat and carbon dioxide, and we’re basically losing energy from that forage.”

## 3 Get it off the ground

Next, says Undersander, is **keeping bales off the ground to prevent them from wicking moisture up from the soil**. For instance, in the case of round bales, “one of the things a lot of people don’t realize is that a couple of inches of exterior is a very high percentage of the bale,” he says. “So, if you have a 5-foot-diameter bale and you lose 4 inches around the edge, that’s 30% of the bale that you’re losing. **Anything to break the contact of the bale with the soil is truly beneficial to keep that bale from taking up moisture from the soil**. That means putting bales on boards, tires, asphalt, plastic or some other barrier to limit water uptake from the ground.”

## 4 Get it covered

As you would protect the bottoms of the bales, it's also best to protect them at the top, and, if possible, on the sides. There are two very distinct reasons, says Undersander, depending on where you live. In hotter, more arid climates, it's important to cover hay, mainly to protect it from solar radiation to keep it from getting too dry and brittle. In areas where rain is a concern, producers need to cover the hay to keep the rain from going into the top layer of bales, and, again, causing the moisture content to increase and mold to grow.

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**Protect it from solar radiation to keep it from getting dry and brittle.**

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The best solution is to store bales in a barn, whether they're round bales or big square bales. That's particularly true in wetter climates. As Don Ball, forage specialist at Auburn University, has often stated: "You're paying for a hay barn, whether you build it or not." The next best alternative, of course, is to cover the bales with a tarp or plastic.

*Source: Dan Undersander,  
Extension forage agronomist at the University of Wisconsin*

## 5 Sorting bales by quality

Undersander echoes the need to sort and stack bales according to forage quality, noting:

"You might want to feed higher-quality forage to beef cattle when they have a higher energy need, and as they're nearing the end of pregnancy. Likewise, you might use a lower quality for dry cows. If you store by quality, then you can make best use of the energy and protein that you have in those bales." The dairy farmer agrees. "If I give a milk cow less quality than she needs or feed her hay with a little mold in it, I'll see a drop in milk production for the next 24 hours, or maybe more," he says.

