



whereas for cows with calves at side, early cut, immature plants that are higher in protein are ideal.

Relative maturity can be easily determined. If it's alfalfa, look for buds or flowers. If it's grass hay, look for boot stage or seed heads to indicate more maturity. "One problem with mixed hay is that one species is generally ahead of the other in maturity, so the timing of cutting must be a compromise," Shewmaker says.

Kevin Sedivec, North Dakota State University professor of range science, says harvest strategy will be different for grass hay than for a stand of straight alfalfa or a mixed stand of grass and alfalfa.

"Here in the Northern Plains, a lot of producers don't cut their grass hay until after July 4. I am sure it's tradition because they've done it this way for many decades.

"Hay readiness and weather generally make it better to cut it earlier than that, or at least have some flexibility in when you cut it. Weather is probably a reason people wait until early July, because on the northern plains it is usually warmer by then, and a little more breeze, and lower risk for rain on the cut hay," Sedivec says.

Grass hay

The best time to cut hay, however, particularly grass hay on the Northern Plains, is just after

Making Hay

Timing and type are everything when it comes to producing quality hay.

by **Heather Smith Thomas**

Each year cattlemen rely on hay to get them through the winter months or dry seasons. Harvesting a successful crop in the summertime ensures supply when needed. Timing of harvest makes all the difference in hay quality. Poor harvesting conditions and methods can reduce

a good hay crop to a poor one — with less nutrient quality and more dust or mold.

Glenn Shewmaker, University of Idaho forage specialist, says the stage of harvest is important, especially in terms of plans for selling or feeding hay. For dry cows, mature hay may be used,



boot stage, right before heading, Sedivec says.

“This is when you can optimize both quantity and quality. We did studies on cutting grasses for hay, looking at timing. We cut a different piece of the field every two weeks. When you get to the heading stage (just after the boot stage) versus the seed-set stage, you have about 90 to 95% of the potential growth of that plant. The quality is still fairly high. The protein level at that stage is about 9 to 10% depending on the type of grass, and this is about the quality you’d need for a lactating beef cow,” Sedivec explains.

This stage of growth occurs earlier in southern regions and later in northern regions, which have a shorter growing season.

“If you wait until July 4, you’ll be in the seed set stage,” Sedivec says. “You might gain 5% more production total mass and quantity but the quality drops from the 9 or 10% protein level down to about 6 or 7%, which now puts it at a quality that’s only good for a dry cow. So I always tell producers that if they can cut their grass hay before July 1, they’ll have a much better quality and won’t give up very much production.”

Sedivec adds that if pastures have adequate moisture, grasses will regrow faster if cut at that stage. Once the plant starts to produce a seed, it puts all its energy into seed production and not much energy toward grass/leaf production.

“By contrast, if you cut it before the heading stage, it will still try to regrow leaf tissue, because it still wants to grow and produce seed. The best time to cut grass is the boot stage, for quality, but you give up about 30% of your growth,” Sedivec says. This benefit is why producers should compromise a little bit of quality to get more tonnage, waiting until just before it heads.

“Our use of the detergent fiber test has often led us to discount grass hay too much,” says Shewmaker. “There are higher fiber levels in grass hay, but it is a more digestible fiber. Some of the newer tests, like the digestible

NDF (neutral detergent fiber) and relative forage quality, as opposed to older tests for relative feed value are better measures, and more accurately compare grass and mixed hay with alfalfa.”

The time of day grass hay is cut can also make a difference in quality, especially in terms of sugar content. Research in Kansas and Nebraska showed that if grass is cut in the evening, the sugar content will be higher than if it’s cut in the morning. Shewmaker explains that the plants accumulate sugars and starches during the day through photosynthesis and then use up these nutrients at night as they grow.

Time of day may also be a factor in terms of humidity. “If you are cutting it in the morning, it will be wetter if there is dew on it, and it might be too wet to cut. The third to fourth week in June, however, it will be a little drier, with less humidity, and you can usually get it cut and put up in pretty good shape,” says Sedivec.

Alfalfa hay

“The biggest thing with alfalfa is what you plan for it in terms of feeding — such as dairy cattle, versus beef cattle,” Sedivec says. If producers want dairy quality alfalfa, they need to cut it in the bud stage and well ahead of any blooms. Biomass is given up for that first cutting when alfalfa is cut early, but if it’s cut in the bud stage, there is almost always a gain of an extra cutting later in the season.



Shewmaker says there are hay prediction sticks but most cattlemen and hay producers look at relative maturity.

“The rule of thumb when cutting alfalfa for beef cattle is to cut it when it’s about 10% bloomed,” Sedivec says. “I’m not a big fan of that rule, because by the time you see blooms you don’t have much time to be in that window. If you see a field 10% bloomed, it can be at 20% by the very next day. Once it starts blooming it goes fast. When I see one bloom, it’s time to cut that field. You do give up a little quality, for beef cattle, once it starts to bloom, but the relative feed value will still be in the upper 140 to 150

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range, versus 175 to 190 if it's still in the bud stage," he says.

Sedivec explains that waiting to cut until alfalfa just starts to bloom causes only a 10% loss in the potential biomass. "I don't recommend waiting any longer because once it starts to bloom it gets a lot more stem and there is also more leaf shatter when baling it. When it is this mature, any class of livestock will do more sorting when you feed it; they'll try to eat just the leaves and sort out the stems," Sedivec says. Leaves will be lost if they shatter or if the wind is blowing while hay is being fed, or they will fall off the stems and be trampled into the mud.

"When the hay is at that stage of maturity you have to watch the timing of baling, to make sure it's not too dry or leaves will fall off," Sedivec says. "You need enough humidity to keep the leaves on, but not so much moisture that the hay will mold."

Cattlemen may have to bale in the late evening just as the dew comes on and quit when the dew gets heavy.

"Good hay producers have a feel for this when baling. They can tell, just by the equipment, if the hay starts to get a little 'tough' which means it has too much moisture," Sedivec says.

Shewmaker says some hay producers use moisture meters to check the hay and to help them determine when to bale a field, though some who've been putting up

hay for a long time have an intuitive sense for the moisture levels in the hay just by feeling the stems.

"We recommend using a moisture meter, and most of these are designed for bales. They don't work as well in a windrow. One of my colleagues, Ron Thaemert, developed a tool made from PVC pipe, which compresses a forage sample from a windrow. You can use this probe to measure moisture before you even pull the baler into the field. You can also go by feel, scratching the cuticle on the stems, or various twisting and snap tests to check stem dryness. We advise using both new and old technology," says Shewmaker.

"When everyone was doing loose hay or small bales, moisture content was easier to target. You could have moisture as high as 16 to 18% and ensure good leaf attachment with alfalfa hay." Moisture could be higher in small bales, due to more handling and low volume of hay compared with the large bales.

"There's a bigger window for harvest with small bales, allowing you to still put it up dry. With the lower capacity, however, you had to spend more time baling to do the same acreage," he says.

The large bales are denser and, therefore, a lower moisture level is crucial. "To meet the target moisture of 13% and no more than 15% without preservative, is a fine line. Most people try to get the hay dried down to about 12% and then get a slight dew or even

just a 'toughness' in the evening so leaves will hang on better. It still won't be as good as it would be with small bales, where you can get up around 15 to 18% moisture without it spoiling. It's challenging, with 13% average moisture for alfalfa with large bales and a smaller window to target."

Producers might start out with the hay too wet and end up with it too dry before they finish baling.

Grass/alfalfa mix

Sedivec recommends cutting mixed hay based on the maturity stage of the alfalfa, not the grass. "When you start to see alfalfa bloom, it should be cut, even though the grass won't be quite ready. The alfalfa usually matures more quickly, starting to bloom before the grass is in the boot stage. So you give up some biomass on the grass. If you wait until you see that first bloom in the alfalfa you are giving up about 20% of the potential biomass for the grass, but still have a nice high quality feed that works well for almost any class of livestock," Sedivec says.

There are certain grasses that do better with alfalfa than others because they match the alfalfa growth cycle better and this similarity in growth pattern makes it easier to cut at the best time for both the grass and the alfalfa.

"There are also some grasses that regrow better, so you can get a second crop—either for hay or grazing — so you still have a mix of grass and alfalfa versus all alfalfa in the regrowth," Sedivec explains.

Grasses that regrow best that match alfalfa include meadow brome and orchard grass. "One thing I like about meadow brome is that it is a bunchgrass and not a sod-forming grass, so it doesn't choke out the alfalfa. The alfalfa will last a lot longer. I have seen some meadow brome/alfalfa stands that are 30 years old and look the same today as when they were planted in the 1980's," he says. This meadow brome/alfalfa combination eliminates the cost of reseeding. **HW**



New forage index for ranking hay quality

Hay is often tested for nutrient levels. Tools used for hay analyses include analytical tests for crude protein levels (CP) and fiber components, stated as ADF (acid detergent fiber) and NDF (neutral detergent fiber).

Some tests use an index system such as RFQ (relative feed quality), which is a good equation but costly; it requires additional nutrient analysis. Relative feed value (RFV) is the most common index used when people compare different batches of hay.

According to Fred Muller, DVM and owner at Ag Health Laboratories in Sunnyside, Wa., and Lynn Van Wieringen, ruminant nutritionist and lab manager, there is a newer index that works better.

Their lab has been doing feed analyses for many years and began using the digestible organic matter index (DOMI), a formula created by Cumberland Valley Analytical Services (CVAS), a feed analytic lab in Maryland.

The typical ranking system for many years is RFV. "This index was created by nutritionists, to have one number that would show the quality of a hay sample," Muller explains.

"If you are comparing different fields, or buying or selling hay, you could use it to see differences in quality, which can help determine the value of that hay. RFV has been a standard in the industry for more than 20 years, but there have been problems and limitations with it," he says.

Van Wieringen says one of the limitations is that RFV merely looks at two fiber values — ADF and NDF — to come up with one number and does not take

into account other nutrients in the hay, such as crude protein. It also does not take into account the digestibility of the fiber.

"One of the problems here in the West is that there is often a lot of soil contamination in hay, which will elevate the ash content and can skew the RFV value downward. A large portion of the ash will show up as fiber, in this test," she explains.

Hay can be contaminated when wind blows dust over a field and it settles onto the growing crop. Traffic along a nearby gravel road on a windy day can spread clouds of dust over large areas of a field.

"Dirt can also get into the hay when harvested," Muller says. "Some of the newer rakes pick up more dirt as windrows are raked together. Rain can splatter dirt onto the plants." Those forages would test higher in ash.

"These are some of the limitations of the RFV index," Van Wieringen says. "There was a need for a different ranking system. It's nice to have an index value because it is just one number — rather than having to compare multiple numbers. If you are looking at different alfalfa hay samples you may look at some of the nutrient analyses but it is nice to have one number to help with the ranking."

Ag Health Laboratories is an affiliate of CVAS, which developed the DOMI. "We've had a lot of interest in this index because it removes ash from the calculation and removes the indigestible fiber," Van Wieringen says. "It evaluates quality more than RFV does because it looks at digestible organic matter in the sample, which will contain all other nutrients such

as crude protein and readily available carbohydrates."

Muller says the DOMI evaluates protein, which RFV does not do, and discounts for high ash levels, which RFV doesn't do very well, and takes into account fiber digestibility, which RFV doesn't do.

"Those are the main big differences that make DOMI a more valuable tool," she says. "CVAS has been reporting the DOMI is as pounds of organic matter per ton of feed. If you have a value of 1,300 lb. of digestible organic matter in a ton of hay, that would be better than hay with 1,100 lb. value. This index makes it simple and easy to understand."

To get a DOMI, the hay is sampled the same, but it is important to provide a core sample of multiple bales from a stack.

Producers can order a hay probe, or borrow one from a local Extension office. "We're now using smaller diameter hay cores. This allows us to sample more bales, because we need a random sampling from the stack and not just one or two bales," he says.

"We want a one-quart baggie of sample, and there should be at least eight to 10 bales represented, and 15 or more is even better. It depends on the size of your hay probe, however, regarding how many will fit in the sample bag."

A random sampling is ideal to get a true picture of the hay quality. For instance, in a field of grass/alfalfa, some bales will be predominantly alfalfa and some may be mostly grass. **HW**

