

What's on the Inside Counts

Test forages to meet cattle nutrition needs.

Story & photos by
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You can't judge a book by its cover, and you can't determine forage quality by a mere glance. Stella, Mo., Angus breeder Elsie Reynolds knows that firsthand.

A couple of years ago, she and husband Darrel decided to test some hay before purchasing it.

"We wanted to see what its feed value was," Reynolds says. "That helped us in our decision. There was some that we passed up."

Looks can be deceiving, she says. "Just because hay looks good doesn't mean it has the nutrition your cows need."

University of Kentucky Extension Beef Cattle Specialist Jeff Lehmkuhler sees it this way: "You can't determine the ribeye area and marbling score on a steer just by looking at him. With an educated guess you can get close, but it's difficult to be accurate all the time."

Why test your forages?

Forage quality varies from year to year, according to University of Missouri (MU) State Forage Specialist Craig Roberts.

After a wet spring and summer in much of the country's midsection, determining forage quality for winter feeding is especially critical.

"If you are not feeding enough nutrients, the production, health, immunity [of your cattle] will suffer," Roberts explains. "If you are feeding too many nutrients, you are losing money. It pays to test so you know exactly what you have to feed."

Roberts says in cool, wet years, it is typical to find forages with lower fiber and higher digestibility. In hot, dry years, high fiber and less digestible forages are more common.

Wet conditions delayed harvest this year, and that means the maturity level at which most hay was harvested likely will reduce digestibility, he says.

Leaching can also be a problem in wet years.

"In other words, nitrogen in the soil

can leach down into the groundwater and disappear," Roberts says. "This means that nitrogen isn't available to plants, giving forages and feedstuffs low protein."

Lehmkuhler says testing forages for quality helps cattlemen better meet the nutritional requirements of the cattle being fed.

"Nutrition requirements for beef cattle change according to their phase of production," he says. Lower-quality forage, for example, would match up better with a dry cow in mid-gestation vs. a cow in peak lactation.

"Testing forages allows us to better target our feeding program to meet the nutritional needs of the cow and strategically target our supplements," Lehmkuhler says.

Eldon Cole, MU Extension livestock specialist, agrees.

"Simply put," he says, "testing forages gives you an objective measure of the fiber, moisture, energy and protein in a highly variable feed ingredient."

Forages vary widely in those items,



depending on the stage of maturity and the species that make up the hay or pasture.

"Feedstuffs such as grains, oil meals and byproduct feeds generally have more consistent nutritive book values available when building a ration," Cole explains. "Beef cows may have 100% of their daily feed made up of hay, haylage, silage or pasture. We really need to know how close the forage comes to meeting their nutrient requirements."

David Carrier has been testing forages for more than 20 years on his Lockwood, Mo., Angus operation. He says the first thing he's learned is that no two forage varieties test the same.

"Alfalfa tests high for protein and energy," he says. "Red clover isn't as high in protein and energy but is still adequate for young stock. The

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Table 1: What nutrients do my cattle need?

Note that only mature bulls and mid-pregnancy cows can handle forages with as little as 50% TDN and 7% crude protein. The forages harvested this year seem to be running lower than normal in both TDN and protein. Check your hay to see if supplemental energy or protein is needed for your cattle to perform to your expectations.

| Type of cattle | Lb. dry per day | % TDN | % Protein |
|-----------------------------------------------------------|-----------------|-------|-----------|
| 1,200-lb. cow, mid-pregnancy | 21 | 50 | 7.1 |
| 1,200-lb. cow, last one-third of pregnancy | 24 | 54 | 7.9 |
| 1,200-lb. cow, lactation, avg. milk producer | 30 | 58 | 9.8 |
| 1,200-lb. cow, lactation, high milk producer | 32 | 59 | 10.5 |
| 1,120-lb. replacement heifer, last one-third of pregnancy | 23 | 58 | 8.9 |
| 1,120-lb. lactating heifer, avg. milk producer | 27 | 62 | 10.4 |
| 500-lb. calf gaining 1.5 lb. per day | 12.6 | 64 | 11.2 |
| 500-lb. calf gaining 2.0 lb. per day | 12.7 | 69 | 12.8 |
| 600-lb. calf gaining 1.5 lb. per day | 14.4 | 64 | 10.6 |
| 600-lb. calf gaining 2.0 lb. per day | 14.6 | 69 | 11.9 |
| 2,000-lb. mature bull gaining 0.5 lb. | 40 | 50 | 7.0 |

Source: University of Missouri Extension.



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higher the protein, the less concentrates you have to use to supplement [the ration].”

What do the numbers mean?

Hay growers and hay buyers view forage-test numbers differently.

A forage test reveals moisture (dry

matter, DM), acid detergent fiber (ADF), neutral detergent fiber (NDF), crude protein (CP), relative feed value (RFV), energy (TDN), nitrate content and mineral levels.

“Once you get an analysis back, do more than just look at crude protein,” says Cole. “Record what the important test

results are and a bit about the species of the hay, date cut and any other unusual circumstances surrounding that hay harvest.”

It's challenging for producers to know how to read the test results, says Lehmkuhler. “They don't use the information the test provides to develop a feeding program. Predominately, the test tells what digestibility and energy value the

animal will get out of the particular forage.”

Also, Lehmkuhler says knowing where forage falls short in protein and energy helps determine what types of supplements need to be added to the ration.

He recommends consulting with a nutritionist or livestock specialist to help build a supplement program to match the producer's forage base.

University of Kentucky has an Internet-based online tool — <http://apps.ca.uky.edu/forage-supplement-tool/> — to help producers plug in numbers from their forage test to get an approximate supplement level needed.

Certified forage-testing labs test primarily for protein and fiber, Roberts explains. “Those measurements are converted over to estimates of intake and energy.”

However, he says, those labs are not certified for measuring toxins in the forage. In the fescue belt — south of Iowa, north of Louisiana and east to the Atlantic coast — tall fescue is the primary pasture grass.

“You can have excellent fiber and protein levels, high energy, but if you

What's in a forage test?

Dry matter (DM) is also referred to as the amount of moisture in the forage. If the hay has been harvested for some time, the moisture level should be around 10%-13%. Moisture levels above 18%-20% will likely bring heating, molding and loss of feed value.

Acid detergent fiber (ADF) is closely related to the digestibility of the forage. The higher the ADF, the lower the energy value. Good-quality legumes will have percent ADF values in the 20s to mid-30s range. Grasses will range from the low 30s to mid-40s in percent ADF.

Neutral detergent fiber (NDF) provides the best estimate of the total fiber in the forage. It is closely related to animal intake. The more NDF forage has, the less the animal will eat. Grasses contain more NDF than legumes at the same stage of maturity. NDF scores for legumes will range in percent from the high 30s to upper 40s. Grasses will mostly fall in the high 50s through the 60s.



have high toxin levels, you will see poor animal performance,” Roberts says. “Just because you test the forage and you receive favorable nutrient values, that doesn’t always mean the cattle will perform well.”

Is testing worth the cost?

“From a nutrition standpoint,” Lehmkuhler says, “forage testing is a low investment. Producers should test every year, and should test every cutting every year. It provides that much more information to help fine-tune the nutrition program.”

For Carrier, forage testing saves on his bottom line.

“[It’s] the most educational thing we can do as cattlemen. If you feed good-quality hay that is high in energy, then you can back off on the expenses you’re going to feed along with it.”

In fact, Carrier’s forages last year were high enough in quality he didn’t have the expense of purchasing soybean meal for his feed ration.

The cost of a forage test varies from \$20 to around \$30, Cole says, and can save producers a lot of money in the long run.

The Kentucky Department of Agriculture is such a proponent of forage testing that it offers the service for \$10 per sample to producers in its state. Additional information on the program can be found at www.kyagr.com/marketing/forage-program.html.

For veteran Angus breeders like Reynolds and Carrier, testing forages is an invaluable management tool.

“[Forage testing] helps you know whether or not you need to manage your pasture differently, what forages to grow,” Reynolds says.

Often underutilized, the bottom line is that forage testing is designed to help livestock producers fine-tune their supplement program.

“Cattle prices are good now,” Lehmkuhler says. “Folks have a little bit

extra change. If we can just get one more cow bred because we did a good job on our nutrition program, that will easily pay for several years of forage testing.”



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NDF values above 70% will have low intake and are candidates for anhydrous ammonia treatment.

Total digestible nutrients (TDN)

is commonly used to measure energy in beef cow diets. TDN represents the total of digestible crude protein, carbohydrates and fat. Leafy, immature legumes run the highest in energy, with TDN levels in the mid-60s. Mature grasses can drop nearly 20 percentage points below that to the mid-40s. Decent hay for lactating beef cows needs to be in the upper 50s or supplemental feed may need to be fed.

Net energy for lactation (NE_L)

is another term used to measure the energy level in the forage for lactating cows.

Nitrate (%NO₃). The basic forage test will have a qualitative test for nitrates. Normally, none will be found and the report simply says “negative.”

— **Source:** Eldon Cole, University of Missouri Extension

