

Foraging Around



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After more than 40 years studying and working as a practical plant scientist, I still sometimes think I should have been an Ag Engineer. It would be much easier it seems to me, to explain the stresses and strains of a piece of metal, for example, than to explain the effects of light, temperature, moisture, and all of the other factors on growing forage plants. Engineers, of course, may strongly disagree on this point.

Nevertheless, I've chosen the plant sciences, and light, temperature, moisture, and other factors do impact on plant growth and quality. In today's column, let's take a brief look at the results of a study or two that point out some of these affects.

Quality - The Key

First, let's agree that profitable ruminant livestock production depends on feeding quality forage.

But, experts agree, the forages you feed can be no more nutritious than the crop you harvest. That's why it all starts back in the field with timely cutting, and, whether the crop is legume, grass, or a combination, quality is most closely related to the maturity of the plants at time of harvest. Young, immature plants are high in protein and low in fiber or lignin, but as hay matures, fiber content increases and feeding value goes down.

The above statements are certainly true. But, even when all of the harvest rules are followed, we still frequently note measurable differences in quality. Why?

Hay Crop Silage

Hay crop silage is often the forage feed where quality questions arise. While silage is an efficient method of conserving the feed value of a hay crop, hay crop silage is also one of the most inconsistent and variable foodstuffs used in cattle rations.

Kansas State University forage specialist Keith Bolsen suggests nine distinct but interdependent factors affecting silage quality. Of these, he says, moisture level is the most critical single factor. Moisture level is not a simple factor because as alfalfa matures, the moisture content that is best for good silage compaction changes -- and compaction is the key to oxygen exclusion, probably the next most critical factor. Recommended maturity at which alfalfa should be cut for silage ranges from late bud to early bloom for first cut alfalfa, and up to 1/4 bloom for other cuttings. And, recent studies show that maturity affects other variables critical to the ensiling qualities of the alfalfa crop.

Changes In

Carbohydrate Levels

One of those other variables is the dawn-to-dusk fluctuations in the levels of crude protein, acid

detergent fiber, and non-structural carbohydrates in the alfalfa plant.

These changes have been studied from time to time over the years and most recently reported by workers in Idaho. In brief, here's what they found:

1. There was a strong tendency for the percentage of crude protein in the plant to fall during daylight hours and rise again at night.

2. Carbohydrates (energy) showed a reverse pattern as levels rose during the day and declined at night.

This, workers agree, is a normal light/dark response characteristic of green plants and has long been known to occur in alfalfa. But, what the Idaho scientists also found was that there is an apparent maturity threshold that has a major affect on the level of carbohydrates reached and retained in the alfalfa herbage at night. These

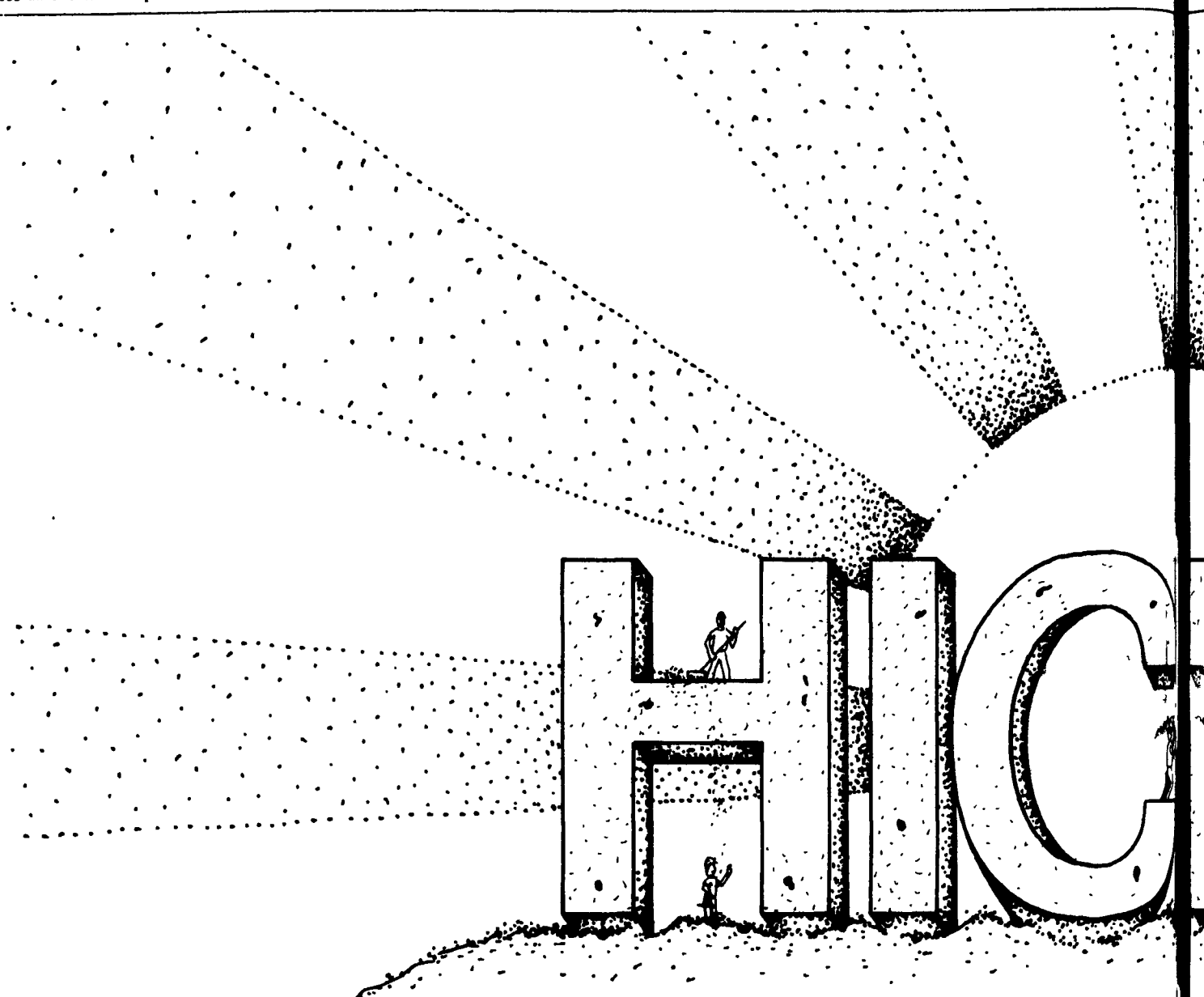
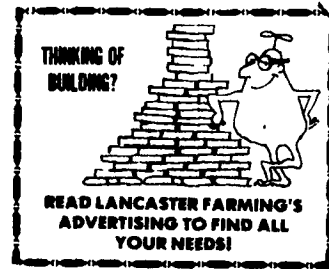
carbohydrates are the source of energy for the plants life functions, and they're probably the main source of energy for fermentation during ensiling.

In the Idaho study, the same pattern occurred for all cuttings; for example, as plants got older, carbohydrate levels in the plants increases. They noted, too, that cutting schedules the previous year also had an influence on carbohydrate levels of the first crop. For instance, levels were lower following a four-cut system as compared to a three-cut system. Both of these observations, they say, suggest that the level of underground storage carbohydrates was a key factor affecting the carbohydrate level in forage.

It appears highly likely that alfalfa cut for silage should have a

maturity at which 6-7 percent water soluble carbohydrates are present. These levels could probably be attained in the morning for first cutting at early bloom following a three-cut schedule the previous year, but when alfalfa was cut four times the previous year, a late afternoon harvest would be better.

Sounds complicated doesn't it? Maybe I should have chosen another science as a profession.



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