

**FORAGE QUALITY IN PERSPECTIVE: FACTORS INFLUENCING QUALITY**

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Fluctuations in milk prices, feed costs, and government programs are forcing dairy farmers to become more efficient with their farm operation.

Since feed accounts for approximately one-half of the total cost of producing milk, and high quality forage optimizes the productivity of the animals, increasing the quality of forage available is one of the best methods of improving overall feeding efficiency.

To effectively produce high quality forage, it is necessary to understand what forage quality is and to keep the factors influencing forage quality in perspective.

Forage quality is defined as the sum total of the plant constituents that influence an animal's use of the feed. Along with its quality, the overall potential feeding value of a forage feed is influenced by the form in which it is fed (e.g., particle size), the palatability of the forage, and by the quality of other feeds in the ration (associative feed effects).

**GRAZING PASTURE MANAGEMENT**

Six major factors affecting forage quality (not yield), ranked by their impact on forage quality, include maturity, crop species, harvest and storage, environment, soil fertility, and variety. The relative importance of each of these factors, along with some exceptions to the ranking, are:

• **Maturity (harvest date).** Maturity is the most important factor affecting forage quality. Forage quality is never static; plants continually change in forage quality as they mature (Figure 1). As plant cell wall content increases, indigestible lignin accumulates. In fact, forage plant maturity changes so rapidly that it is possible to measure significant declines in forage quality every two or three days.

• **Crop species.** Differences in forage quality between grasses and legumes can be very large. The protein content of legumes is typically much higher than that of grasses, and legume fiber tends to digest faster than grass fiber, allowing the ruminant to eat more of the legume.

• **Harvest and storage.** Improper harvest techniques can seri-

ously reduce forage quality, primarily through the loss of leaves. Storing a hay crop at an incorrect moisture content, or improper ensiling of a forage crop, can dramatically lower its quality. Estimated averaged economic losses during harvest and storage are shown in Figure 2.

• **Environment (climate).** Moisture, temperature, and the amount of sunlight influence forage quality. Rain damage is very destructive to forage quality. When bad weather delays harvesting, the forage crop becomes more mature and hence lower in quality. High temperatures may increase lignin accumulation and decrease quality, but drought stress may actually benefit quality by delaying maturity.

• **Soil fertility.** Soil fertility affects forage yield much more than it does quality. While it is possible to produce high quality forage on poor, unproductive soils, it is generally very difficult to produce high yields of high quality forage with an unproductive soil resource. Proper soil pho-

sphorus (P) and potassium (K) levels help to keep desirable legumes in a mixed seeding and also reduce weed problems. It is necessary to balance soil fertility to avoid mineral imbalances in ruminants. Low soil fertility, as well as very high fertility, has resulted in reduced forage quality.

• **Variety (cultivar).** After decades of breeding foraged for yield and persistence, attention has recently been focused on developing or identifying varieties with improved quality. Variety or cultivar can affect forage quality, but not as greatly as the other five (Turn to Page D7)

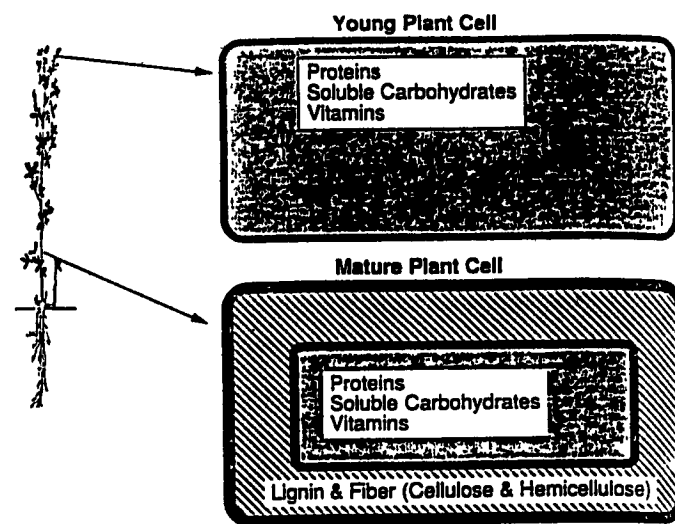


Figure 1. Maturation of plant cell walls.

Table 1. Relationship between net energy of lactation (NE<sub>L</sub>) and relative maturity (mean stage by count, MSC) for several alfalfa varieties.

Variety**	NE <sub>L</sub> Mcal/lb	Maturity* stage
Vernal	0.71	2.7
Multileaf-A	0.75	3.2
Multileaf-B	0.75	2.4
High quality-A	0.77	1.4
High yield-A	0.70	3.2
High yield-B	0.70	3.3

\* The higher the maturity stage number, the more mature the alfalfa. A stage reading of 3.0 is at an early flower stage.

\*\* Multileaf-A and -B were selected for the multileaf trait. High quality-A was selected for high quality. High yield-A and -B produced two of the highest yields of 44 varieties tested in the trial.

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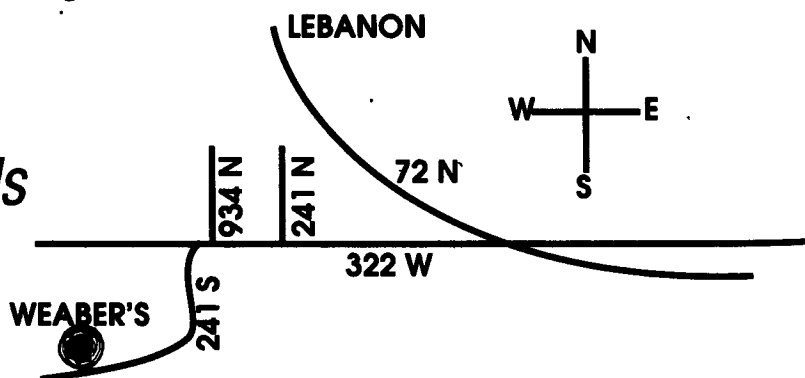
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