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factors. In alfalfa, selection for improved quality is underway by most commercial companies, and several U.S. firms have initiated selection in corn silage hybrids for improved forage quality.

Several lesser factors also can influence forage quality. Weeds can negatively affect quality, especially in the case of noxious weeds. Insect pests can lower forage quality, particularly if they cause significant leaf loss. Plant diseases can affect quality when they result in a shift in the species present in the field and when they promote leaf senescence. Insects and diseases generally have their greatest impact on yield and persistence of forages.

Forage crops that accumulate a significant quantity of grain may increase slightly in overall quality with maturity as grain content increases in the plant. Some species contain antiquality factors that can lower animal performance. Variety can become the most important forage quality factor in cases where varieties are developed to significantly reduce or eliminate species antiquality factors, as in low-alkaloid varieties of reed canarygrass. Harvest and storage of a forage crop at a moisture content deading to spontaneous combustion would plainly

become a most important factor. Or, if prolonged flooding or drought threatens a forage crop, environment becomes as important as any of the other factors. Certain soil fertility conditions, such as a very low pH, could eliminate alfalfa from a mixed seeding, thereby changing the species composition of the stand and greatly diminishing its quality.

All of the ranked factors above can be controlled to some extent through proper management. For example, maturity can be controlled by adjusting harvest dates. The highest quality species that fit the available soil resources should be chosen. Drying agents and preservations may help to avoid raindamaged forage. Soil testing can identify optimum lime and fertilizer additions. Although variety selection is very important for yield and persistence, it is of relatively less value to forage quality.

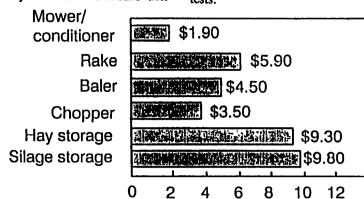
Attempts are being made to modify alfalfa plant composition and leaf-to-stem ratio through breeding, as with the multileaf alfalfas, using chemical analyses as the selection criteria. Several alfalfa trials throughout the United States now include forage quality in their evaluation of new varieties. At a given trial site, all variet-

ies are harvested on the same date and then evaluated for forage quality. Any differences in maturity among varieties could influence the ranking of those varieties (Table 1). In other words, some of the reported differences in forage quality between varieties may only be reflecting that they were harvested and compared at different maturities. Keep in mind that maturity is the most important factor influencing forage quality.

Selection for forage quality in corn silage is now being done, and it is likely that many commercial companies will be promoting hybrids on this basis as well. Preliminary studies at Cornell University, Michigan State University. and the University of Idaho indicate that there is a range in overall silage quality among hybrids. It may be possible to breed for higher stover quality while maintaining a high grain-stover ratio, and

develop a silage hybrid with overall higher digestibility. As with alfalfa, selection may be based on chemical in vitro analyses, with little or no actual animal performance data to back up forage quality claims. This means that

varieties ultimately will be compared for animal performance on the farm by the forage producer. Claims of improved forage quality may be added only after those varieties excel in animal performance tests.



Economic loss (\$ per ton of feedable DM)

Figure 2. Economic value of harvest and storage losses of alfalfa

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