



Forage Quality Considerations of Alfalfa

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Alfalfa Forage Quality Needs

- Protein
- Energy/fiber
- Anti-quality components of alfalfa





Protein in Alfalfa

- High protein content
 - Dairy animals need about 19% in ration
 - Protein supplementation has been cheap but not likely to continue
 - Higher protein in alfalfa is of greater value as more other forages used in ration, especially corn silage (low protein)





Protein in Alfalfa

- High protein content
- Bypass protein
 - Need certain amount of protein to avoid degradation in the rumen
 - If new genetics increases amount of by-pass protein (as occurs in red clover) this could greatly increase alfalfa use in dairy rations.



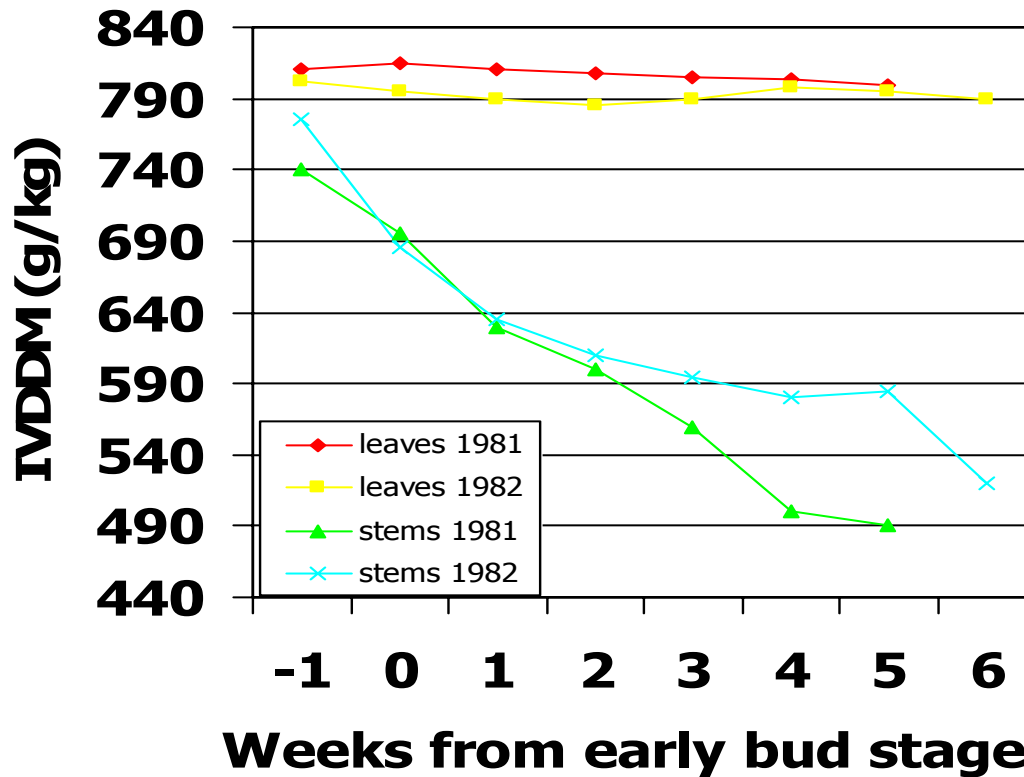


Energy and Fiber of Alfalfa

- Low fiber and high energy
 - Especially true of leaves



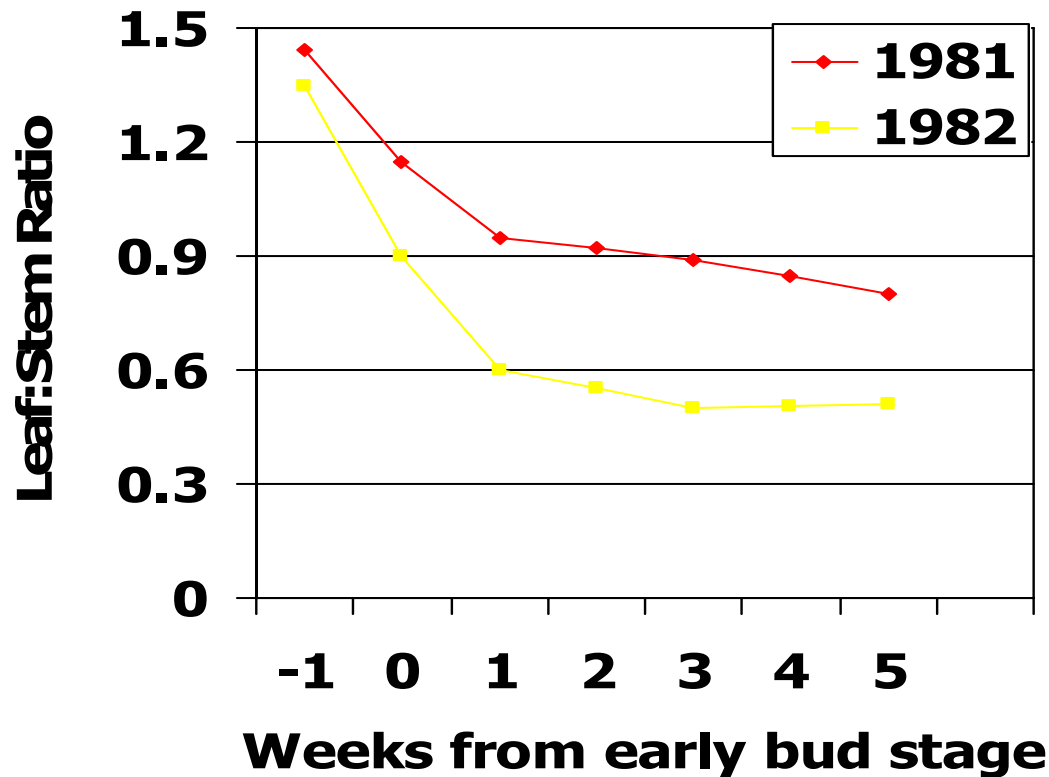
Forage Quality Changes with Advancing Maturity



- Leaves change little in quality
- Stems decline in digestibility



Forage Quality Changes with Advancing Maturity



- Leaf:stem ratio declines as the plant matures resulting in lower forage quality
- Need to reduce leaf loss





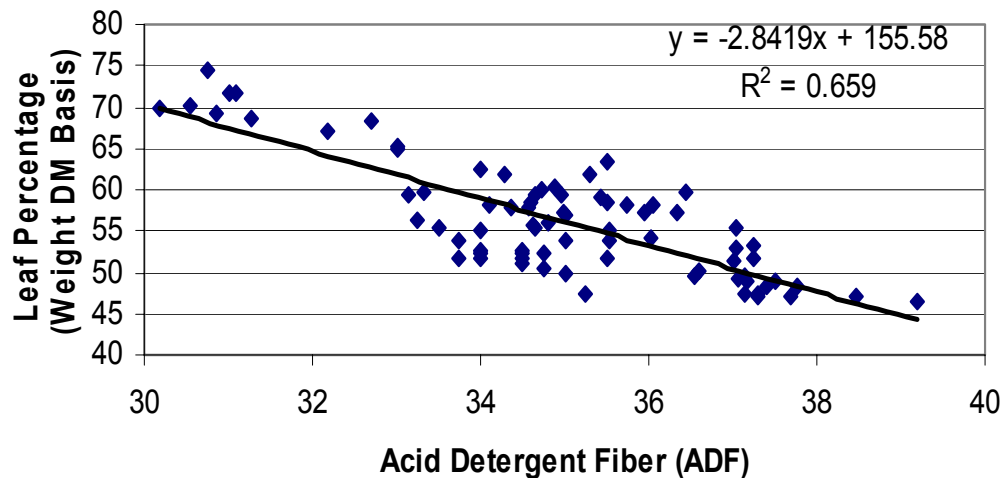
Reducing leaf loss to increase forage quality can be accomplished by:

- increased leaf disease resistance
- reduced senescence
- reduced abscission of senesced leaves
- appropriate management during harvesting



Some Considerations of Alfalfa Digestibility

Fig 1. Comparison of ADF to Leaf Content of Alfalfa in MN and UW Trials



- Some varieties have greater leaf content
- Additional low fiber mechanism - some varieties have lower fiber in stems





Some Considerations of Alfalfa Digestibility

Alfalfa changes daily in forage quality as it matures. Rainy weather may delay harvest and result in low quality. Slowing the rate of change of alfalfa quality with maturity would be of economic value to farmers.



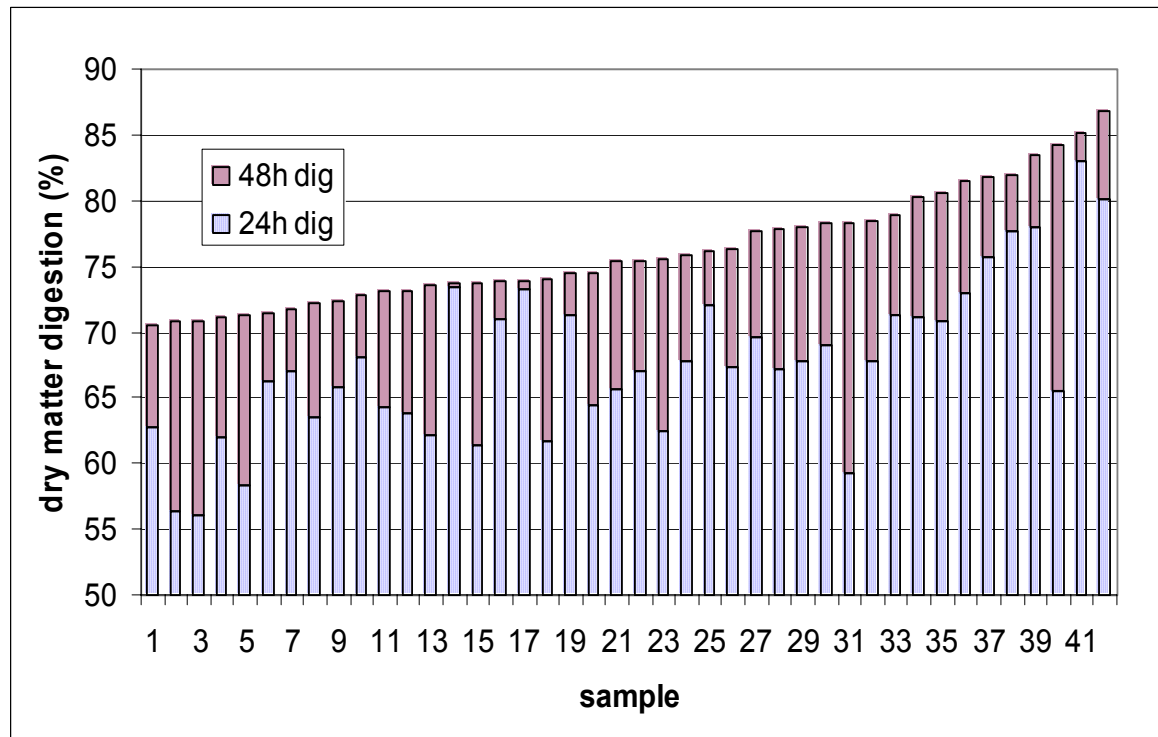


Energy and Fiber in Alfalfa

- Low fiber and high energy
 - Especially true of leaves
- Fiber Forms
 - Some fiber types more rapidly digestible

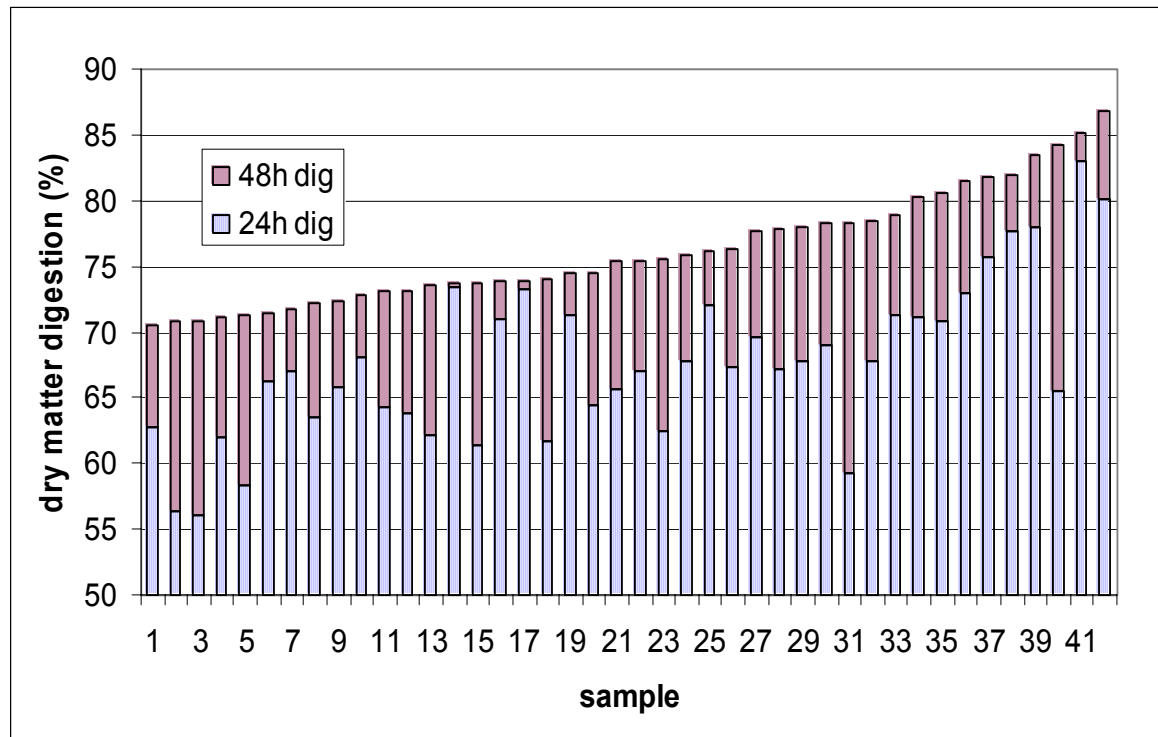


Rate of Alfalfa Digestion



- Higher intake level in dairy cattle causes forage to pass through the rumen faster, i.e. 24 hours for dairy, 48 hours for beef, dairy heifers
- Alfalfa germplasms vary greatly in their rate of digestion

Rate of Alfalfa Digestion



- Of fiber fractions order of digestion from slowest to fastest is:

Lignin <
Hemicellulose <
Cellulose <
Pectin

Therefore replacing other fiber with pectin will increase rate of digestion





Antiquality Components of Alfalfa

- Alfalfa can accumulate compounds causing photosensitization
 - Makes light-colored cattle, horses and sheep more sensitive to sun – will get sunburned
 - Can cause liver damage
 - May need medical treatment but most common remedy is to remove feedstuff from diet
 - Occurs most commonly on pasture (most of causal compounds eliminated during curing) but can occur in hay high in chlorophyll





Antiquality Components of Alfalfa

- Reduced intake with water stress
 - Alfalfa contains Acremonium, endophytic fungus (same species as in tall fescue)
 - Alfalfa accumulates secondary compounds to withstand water stress that reduces palatability of alfalfa
 - Most such compounds decompose during field curing





Antiquality Components of Alfalfa

➤ Host to Fusarium

- Fungus can produce mycotoxins at times during field curing or silage fermentation
 - Cause reduced intake
 - Negatively affect immunological system
 - Predisposition to animal to several diseases
 - Raise cell content of milk (reduce milk quality)
 - Some resistance appears to be available





Alfalfa Forage Quality needs

- Protein
- Energy/fiber
- Anti-quality components of alfalfa

Many changes underway will improve alfalfa in the future for use in animal rations.

