Varieties and Forage Quality: Is There Really a Difference?

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ABSTRACT

Recently there has been much interest in new alfalfa varieties bred for improved forage quality. Although alfalfa is the premier forage crop in the U.S., significant quality losses occur due to poor weather conditions and improper management. Several alfalfa breeding firms have released, or are developing, "high quality" alfalfa varieties. Varieties with improved levels of forage quality will hopefully maintain higher quality into maturity, and will perhaps be more flexible during poor haying conditions.

Key Words: alfalfa, forage quality, NIRS

INTRODUCTION

There have been several strategies used to improve forage quality of new high quality varieties in the Midwest: 1) leaf disease resistance results in increased leaf harvest - especially critical in highly humid environments, 2) increased leaf:stem ratio, 3) incorporation and selection of the multifoliolate (ML) leaf characteristic - leaves with more than three leaflets, and 4) selection for improved forage quality parameters (HQ = "high quality" varieties) - bred for better acid detergent fiber (ADF), neutral detergent fiber (NDF), crude protein (CP), total digestible nutrients (TDN), relative feed value (RFV), etc. Most breeding firms have selected for several of these traits, in conjunction with selection for improved forage yield, multiple pest resistance, and persistence. As a result, there are currently over 25 new alfalfa varieties available reported to be "high quality," and newer varieties are in development.

PROCEDURES

In May 1992, we established replicated trials at four Montana locations to evaluate new high quality varieties. Twelve varieties are being evaluated: four types of varieties - conventional trifoliolate (tri), high quality (HQ), multifoliolate (ML), and MLHQ in each of fall dormancy classes II, III, and IV. At 15 weekly intervals during 1993 and 1994, forage quality samples were taken from each plot and analyzed by near infrared reflectance spectroscopy (NIRS) for CP, ADF, NDF, TDN, and RFV. In 1993, eight sampling dates (May 19 - July 7) represented first cut, six dates (July 9 - August 13) represented second cut, and a third cut was taken October 4. In addition to the forage quality samples, mean stage of maturity by count (MSC) were taken for every entry to account for maturity differences.

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RESULTS

As expected, forage quality declined significantly with advanced maturity (Table 1). Protein concentration dropped from about 25% to 20%, and TDN dropped from over 67% to 61% between May 19 and July 7. Generally, the HQ, ML, and MLHQ had higher forage quality than the tri types at each date. Averaged across all dates, the conventional tri varieties had significantly lower CP and TDN concentrations than the varieties bred for improved forage quality. All of the 1994 data has not been completed, however it appears that the varieties bred for improved forage quality have forage yields equal to or better than conventional varieties, plus they have higher quality.

It is obvious from these and numerous private and public trials that new improved-quality varieties indeed have higher levels of forage quality. Breeders have made significant improvements in multiple pest resistance and forage yield, and there is no reason to believe that continued improvements will not be made in forage quality of alfalfa. In general there has been a negative relationship between forage yield and quality, which may now be broken by genetic improvements. In semidormant and nondormant alfalfa varieties, selection for improved forage quality should help overcome the tendency to increase stem mass when breeding for higher yield.

Table 1 Forage quality of tri, HQ, ML, and MLHQ types near Bozeman, Montana in 1993

	1993 Sample Dates								
% CP	**5/19**	**5/26**	**6/2**	**6/9**	**6/16**	**6/20**	**6/30**	**7/7**	**MEAN**
tri	24.0	22.4	22.1	20.0	18.3	17.3	17.7	16.3	19.8
HQ	25.1	23.4	23.4	19.7	18.8	17.7	18.1	18.3	20.6
ML	25.0	23.5	22.8	20.8	19.3	17.5	18.1	17.8	20.6
MLHQ	24.6	23.5	23.1	20.8	19.0	18.1	18.3	17.5	20.6
lsd (0.05)	NS	1.1	1.3	0.8	NS	NS	NS	1.1	0.4
% TDN									
tri	66.5	64.1	63.3	60.9	57.7	56.4	55.7	55.5	60.0
HQ	67.6	64.7	64.4	59.6	57.7	57.3	56.1	58.8	60.8
ML	67.6	65.6	63.7	62.0	59.2	57.3	56.9	57.5	61.2
MLHQ	66.9	65.2	63.8	61.8	58.3	58.5	56.1	58.1	61.2
lsd (0.05)	NS	1.1	NS	1.1	NS	NS	NS	2.3	0.7

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