

Seasonal Changes in the Nutritive Value of Five "Old World Bluestems"

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Story in Brief

Five varieties of Old World Bluestems were established at the Southwestern Livestock and Forage Research Station in 1973. Samples of the forage were collected weekly for two years during each growing season. The samples were dried then ground for laboratory analysis of "test-tube" digestibility (IVDMD), protein (CP), fiber (NDF and ADF) and lignin (ADL). The results were used to estimate the magnitude and nature of seasonal effects on the feeding value of the forage.

Introduction

Forages generally decline in feeding value as the growing season advances. Different forages vary, however, in their peak quality as well as their rate of quality-decline. Thus, as well-adapted, productive forages are developed or selected, frequent serial sampling for several growing seasons is necessary for an evaluation of the worth of the new material as a livestock feed.

In recent years, the group of grasses dubbed "The Old World Bluestems (OWBS's)" has been the subject of extensive agronomic study. These grasses, blends of ecotypes from India, Pakistan and Turkey, are known to be high yielding, pest and disease resistant, responsive to fertilization and high in *in vitro* dry matter digestibility (IVDMD) when grown in the Southern Great Plains. They are especially well adapted to the "Hard Redlands," an area which is notably devoid of highly productive perennial grass species. Both as a soil conservator and as livestock feed, these grasses are potentially important.

The seasonal changes in the nutritive value of five varieties of OWBS's, estimated on the basis of determinations of chemical composition and IVDMD, are the subject of this report.

Materials and Methods

Five Old World Bluestems were established in large plots (two to six acres) in the spring of 1973. The varieties chosen were "Caucasian," "Plains," "T-Blend," "B-Blend" and "L-Blend." Beginning in the spring of 1974, samples of forage were clipped from each plot at roughly one-week intervals throughout each of the next two growing seasons. These plots were established on a Dale silt loam with 0.5 percent slope.

As samples were collected, they were carefully weighed, dried in a forced-air oven at 65 C, then ground for laboratory analysis.

Results and Discussion

Patterns of change for each variety and each component are shown in Figure 1. Each line represents the "average" trend of the two years studied.

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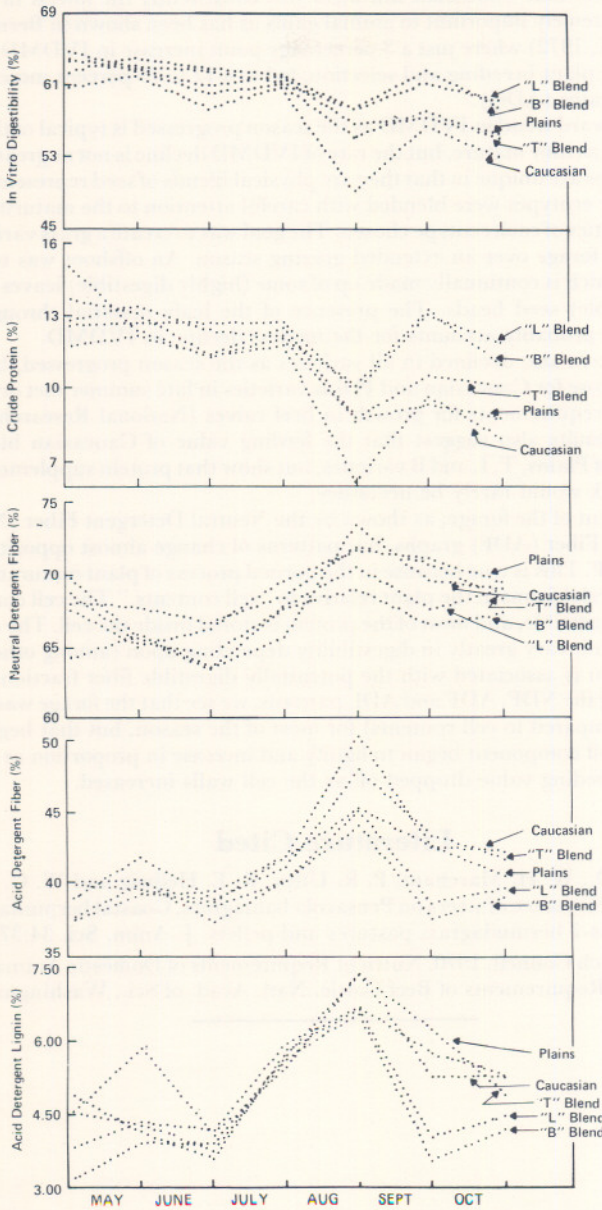


Figure 1. Seasonal changes in the *In vitro* digestibility (IVDMD) and chemical components of five Old World Bluestems (values are an average of two years).

Digestibility (IVDMD) and crude protein (CP) are most important in determining the feeding value of the forage; the remaining fractions can, however, help us understand why the changes in digestibility occur and thereby help us select the variety most suited to our needs.

IVDMD values for these forages were not very different until August, but it is important to note that Caucasian Bluestem was consistently the lowest in IVDMD. This can be extremely important to animal gains as has been shown in Bermudagrass (Chapman *et al.*, 1972) where just a 3 percentage point increase in IVDMD, achieved through careful plant breeding and selection, led to a 12 to 15 percent increase in calf average daily gains (ADG).

The downward trend in IVDMD as the season progressed is typical of that shown by most grasses as they mature, but the rate of IVDMD decline is not as great. The Old World Bluestems are unique in that they are physical blends of seed representing many ecotypes. These ecotypes were blended with careful attention to the maturity (flowering) characteristics of each ecotype chosen. The goal was to create a grass variety which would produce forage over an extended grazing season. An offshoot was to create a grass variety which is continually made up of some (highly digestible) leaves and some (poorly digestible) seed heads. The presence of the leafy material throughout the growing season probably accounts for the modest decline in IVDMD.

Crude protein also declined in all varieties as the season progressed, but all CP values except those for Caucasian and Plains varieties in late summer met or exceeded the nutritional requirements for growth in beef calves (National Research Council, 1970). These results also suggest that the feeding value of Caucasian bluestem is inferior to that of Plains, T, L and B varieties, but show that protein supplementation of grazing livestock would rarely be necessary.

Fiber content of the forage, as shown by the Neutral Detergent Fiber (NDF) and Acid Detergent Fiber (ADF) graphs, has patterns of change almost opposite those of IVDMD and CP. This is true because in the normal process of plant maturation, more "cell wall" material forms in the plant relative to "cell contents." The cell contents are almost totally digestible, and most of the protein is stored inside the cell. The cell walls, on the other hand, vary greatly in digestibility depending upon (among other things) how much lignin is associated with the potentially digestible fiber fractions.

Comparing the NDF, ADF and ADL patterns, we see that the forage was lush and low in fiber (compared to cell contents) for most of the season, but that beginning in July, the cell wall component began to lignify and increase in proportion as the plant matured. The feeding value dropped off as the cell walls increased.

Literature Cited

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