The Nutritional Dynamics of Our Major Rangeland Grasses

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Introduction

Stockmen and wildlife managers need to be aware of the seasonal nutritional dynamics of forages in their pastures to sustain adequate growth and reproduction of their animals. Similarly, those marketing or purchasing pasture should be aware of forage nutrient value to assure exchange of equitable payment. In the northern Great Basin, rangeland grasses typically begin growing in the early spring and stop growing by mid-summer when soil moisture is depleted. Cattle on our rangelands can gain as much as 4 lb per day early in the season and lose almost a pound a day by mid- to late August. Within the same interval, calf gains may range from 1.5 lb to as little as 0.2 lb per day. Our objective was to describe the seasonal and annual nutritional dynamics of seven of the region's most prominent grasses. Forages were sampled in 1992, a drier than average year, and 1993, when above-average precipitation occurred.

Experimental Protocol

Six study locations within the vicinity of Burns, Oregon, were selected, with each supporting a broad array of forage species. All sites were dominated by Wyoming big sagebrush, which characterizes most of our landscape in the region. On an east-west line, the sites spanned 73 miles; north-south extremes encompassed 47 miles. Once a month, for 8 months each year, each site was visited and samples of the seven grasses collected. Grasses included in the study were Sandberg's bluegrass, cheatgrass, bottlebrush squirreltail, bluebunch wheatgrass, Idaho fescue, Thurber's needlegrass, and giant wildrye. Samples then were analyzed for crude protein and forage digestibility, as indexed by in vitro organic matter disappearance.

Results and Discussion

Crop year (September–June) precipitation accumulations for 1992 and 1993 were 86 and 167 percent of average, respectively. A model for predicting annual herbage yield in the region suggested that we had about 484 lb/acre of forage in 1992 and 1,121 lb/acre of herbage in 1993.

Intuitively, and from a production standpoint, we tend to view the wetter years as being the good times. From a forage quality standpoint, however, just the opposite is true. Figure 1 illustrates the average crude protein content of the grasses from late May through late November of each year. The solid line near the middle of the graph depicts the 7.5-percent crude protein level. This is about the concentration needed for livestock and big game to efficiently digest the foods they eat and gain weight. In 1992, we had 5 months in which the crude protein content of the grasses was above, or just touching, the 7.5-percent line. The up and down inflections of the 1992 line also show that even though it was a dry year, the grasses greened up in response to some July and October rains. This suggests that in drier years our grasses become somewhat dormant when soil moisture is depleted, but they can wake up and start growing again if we have significant rainfall.

In 1993, however, there were only 3 months (May, June, and July) where the crude protein concentration of the grasses was above or

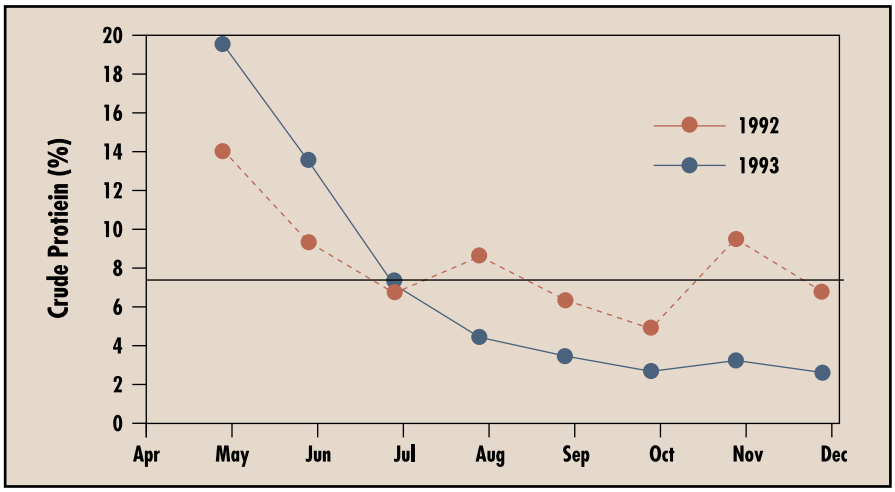

Figure 1. Mean monthly crude protein content of common rangeland grasses sampled from late April through late November in 1992 and 1993 near Burns, Oregon. The horizontal line near the center of the graph marks the 7.5 percent crude protein level.

near the 7.5-percent line. In wetter years, our grasses can easily grow and progress through their annual life cycle. In those instances, they produce leaves, generate a flower or seed stalk, fill their seeds, and then each individual stem dies. These stems produce a wealth of biomass that is made up of an almost woody-like material with little nutritional value. Once a stem has produced seed, it typically dies, with next year's herbage coming from buds in the base of the plant. It appears that those buds are difficult to wake up, as 2.5 inches of precipitation in July 1993 failed to generate a perceptible response from the grasses.

Forage digestibility values tell a similar story, with the grasses being more digestible for 5 of 8 months in 1992 than they were in 1993 (Fig. 2). When forages are highly digestible, cattle can consume and assimilate more nutrients because their digestive tracts function more efficiently than when they are ingesting poor-quality herbage.

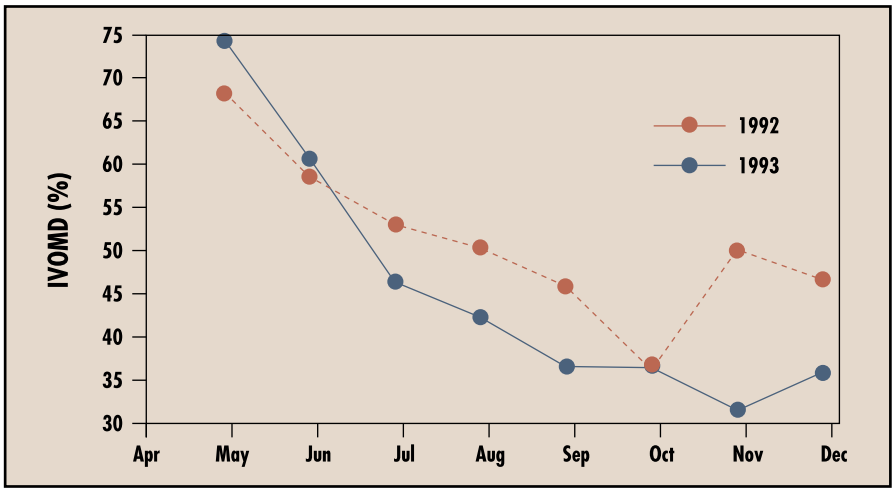

Figure 2. Mean monthly digestibility as indexed by in vitro organic matter digestibility (IVOMD) of common rangeland grasses sampled from late April through late November in 1992 and 1993 near Burns, Oregon.

Conclusions and Management Implications

A growing season with less-than-average moisture can generate grass that sustains a higher plane of nutrition for up to twice as long as a growing season with abundant moisture and greater forage production. We suspect that when cool-season grasses begin growth with less-than-optimum moisture, tillers become inactive as moisture is exhausted, but they can resume mid-summer growth if effective precipitation occurs. Conversely, when abundant moisture is available, grasses quickly advance through maturity and generate an abundance of low-quality reproductive stems. Subsequently, those tillers die, and the grasses enter a dormant stage where they do not respond to even elevated levels of summer precipitation. While annual yield of herbage is closely correlated with yearly and sometimes seasonal precipitation accumulation, forage quality dynamics are more complex and are certainly affected by seasonal events. These findings suggest that stockmen should be more concerned with mid- and late-summer supplementation programs for their animals in years that exhibit the best growing conditions for our grasses. Those interested in more detail on nutritional characteristics of particular grasses should contact the Eastern Oregon Agricultural Research Center in Burns and request a reprint of:

Ganskopp and Bohnert. 2001. "Nutritional dynamics of 7 northern Great Basin grasses," *Journal of Range Management*. 54:640–647.