Timing Use of Cool- and Warm-Season Grasses on Pine Ranges[1]

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Highlight

A 3-pasture rest-rotation grazing system based on plant growth and development during 2 annual precipitation periods resulted in more equitable utilization of cool- and warm-season grasses (Arizona fescue and mountain muhly) on ponderosa pine range. Plant and cattle productivity were maintained and utilization of forage species was more uniform.

Las Epocas de Pastoreo Deben Ser Adecuadas a las Epocas de Crecimiento Vegetal.

Resumen[3]

El presente estudio se llevó a cabo en un tipo de vegetación de pino ponderosa (*Pinus ponderosa*) cerca de Flagstaff, Arizona, E.U.A. Los pastos de esta zona se caracterizan por una mezcla de zacates de verano e invierno. Esto dificulta el pastoreo uniforme de las especies debido a la mezcla. Este estudio significó que con un sistema de rotación con tres potreros se obtuvo mas uniformidad de pastoreo de los diferentes zacates. Las épocas de pastoreo y descanso fueron conforme a las épocas de crecimiento relacionadas a las épocas de precipitación.

Beef is a major product of ponderosa pine (*Pinus ponderosa*) ranges in the Southwest. Maximum beef production from these lands, while maintaining desirable forage stands, requires a grazing system based on vegetative growth patterns.

In the Southwest, part of the precipitation falls during the winter and spring due to storms originating on the Pacific Coast, while part falls during the summer from monsoon storms originating in the Gulf of Mexico. Across Arizona and New Mexico, the proportion of winter precipitation decreases from west to east, and summer rainfall decreases from east to west. The two-season precipitation pattern is most pronounced in central Arizona. Annual precipitation in the Flagstaff area averages 23 inches. About half falls as snow during the winter and spring; the remainder falls as rain during the summer and fall. A drought period during May and June separates the two periods.

Arizona fescue (*Festuca arizonica*) and mountain muhly (*Muhlenbergia montana*) are the dominant cool- and warm-seasons growers, respectively, on the ponderosa pine ranges near Flagstaff. Growth and development on these important grasses coincides with the two distinct precipitation periods. Arizona fescue makes 74% of its height growth from April 15 to June 30 due to the winter and spring moisture, while only 26% comes after the summer rains (Pearson, 1967). In comparison, mountain muhly makes 61% of its height growth after the summer rains begin in July.

A major problem on ponderosa pine ranges is to maintain a desirable proportion of cool- and warm-season forage grasses. Traditionally, ponderosa pine ranges have been grazed from June through October each year. Under this system, Arizona fescue, the cool-season species, is grazed lightly because it is approaching maturity at the time the cattle are brought onto the range. Cattle, therefore, pass up the fescue which has started to seed, and concentrate grazing on the immature mountain muhly. After several years of grazing, fescue becomes the dominant forage grass. The obvious solution is to make heavier use of the Arizona fescue, and lighter use on mountain muhly. This could be accomplished by starting to graze earlier in the spring while the Arizona fescue is still succulent and highly palatable.

In designing a grazing system, we sought to (1) establish the earliest time when animals could enter the range without undue damage to Arizona fescue, (2) provide periods of nonuse for growth and development of both Arizona fescue and mountain muhly, (3) obtain more balanced utilization between the two forage species, and (4) maintain beef production.

Determining Range Readiness

Entrance dates for putting cattle on the range were determined from plant growth and development information. Arizona fescue provided ade-

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Table 1. Three-pasture rest-rotation grazing system used on ponderosa pine range allotments near Flagstaff, Arizona.

Pasture	Grazing period[1]	Year 1	Year 2	Year 3
A	Early	Rest	Graze	Rest
	Late	Rest	Rest	Graze
B	Early	Graze	Rest	Rest
	Late	Rest	Graze	Rest
C	Early	Rest	Rest	Graze
	Late	Graze	Rest	Rest

[1]Early refers to the 10-week early grazing period (generally from early May to mid-July); Late refers to the 10-week late grazing period (generally from mid-July to October).

quate forage for grazing when it attained 4 inches of height, since it grew about an inch per week during the following 4 to 5 weeks. The soil was firm enough to hold the animals when grass reached this height. Since growth varies among years, plant measurements were used to predict 2 weeks in advance when the range would be ready. This permitted adequate time for delivery of livestock to the range. The entrance date was generally in early May.

Rest-Rotation

A three-pasture rest-rotation system was initiated on the Maxwell Spring and A-1 allotments of the Coconino National Forest near Flagstaff (Table 1). The three-pasture system provides one complete season of rest every 3 years, and only early- or late-period grazing in intervening years. The number of yearling cattle in each grazed pasture was increased up to 15% more than the previous total of all three pastures.

Results

Arizona fescue was utilized most during the early period due to its early growth, while mountain muhly was utilized most during the later period.

During the early grazing period, all forage species were uniformly utilized to about 50%. Arizona fescue made up the bulk of the animal diet due to its succulence and high productivity during this season. By October, all forage species in the early-grazed pasture appeared relatively unused. However, close observation showed a reduction of Arizona fescue seed stalks and a predominance of mountain muhly seed stalks.

The warm-season plants in the pasture grazed during the late season averaged 29% utilization by October. Arizona fescue predominated the range aspect in late-grazed pastures. Because it is rank and unpalatable during the late growing season, stock virtually ignored it. Mountain muhly appeared to completely recover from the late-season grazing during the following year.

Cattle weight gains after three years of grazing under the three-pasture system have been favorable. Under the previous system of continuous season-long grazing, yearling cattle gains were slightly greater than 1 lb. per animal per day. Cattle on the three-pasture system gained 1.2 lb. per day (not significantly more).

These results indicate an improvement in the balance of warm- and cool-season growers without reducing beef production. When proper forage balance is obtained on the present ranges, more intensive management systems such as two-pasture rest-rotation may be tried to increase beef production per acre.

Literature Cited

PEARSON, H. A. 1967. Phenology of Arizona fescue and mountain muhly in northern Arizona ponderosa pine type. U.S. Forest Serv. Res. Note RM-89, 4 p. Rocky Mt. Forest and Range Exp. Sta., Fort Collins, Colo.