PERFORMANCE AND DIETS OF SHEEP GRAZING WITHIN A NORTHERN IDAHO CONIFER PLANTATION

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Abstract

The performance and diets of sheep (*Ovis aries*) grazing within a 4-year-old conifer plantation in northern Idaho were examined. The study site was divided into five 0.75-ha pastures and grazed at 5 herbage allowance HA levels during the summers of 1991 and 1992. HA levels ranged from 1.71 to 3.78 kg DM sheep^{-1} day^{-1} in 1991 and from 2.25 to 3.91 kg DM sheep^{-1} day^{-1} in 1992. Sheep grazed the pastures for 78 and 64 days in 1991 and 1992, respectively. Sheep weights and current year's standing crop of shrubs and herbs were monitored immediately before the animals entered the pastures, at monthly intervals, and at termination of each year's grazing season. When sheep were weighed, fecal grab samples were collected and subsequently analyzed for 2,6-diaminopimelic acid (FDAPA) and botanical composition using microhistological procedures. Regression analysis was used to determine whether average daily gain (ADG) and FDAPA were related to HA. Dietary overlap among the HA levels was evaluated using Kulczynski's similarity index. Relative forage preferences indices (RPI) were calculated. Seasonlong ADG was positively related to HA in 1991 and from-14 to 45g in 1992. Results indicated that in 1991, when vegetative growing conditions were favorable, HA of $\geq$ 2.06 kg DM sheep^{-1} day^{-1} was required to achieve ADG of 110g. In 1992, when growing conditions were unfavorable, ADG only reached 45 g when HA was 3.91 kg DM sheep^{-1} day^{-1}. Seasonlong FDAPA levels were not related to HA in either year (p=0.21 in 1991; p=0.84 in 1992). FDAPA ranged from 0.66 to 0.81 mg g fecal DM^{-1} in 1991 and from 0.62 to 0.73 mg g fecal DM^{-1} in 1992.There was a weak positive relationship between FDAPA and HA (p=0.12) from 16 August to 31 August 1991. ADG was related to FDAPA from 16 July to 15 August 1991 (p=0.06) and from 16 August to 31 August 1991 (p=0.01). Seasonlong dietary overlap ranged from 49 to 80% in 1991 and from 41 to79% in 1992 indicating that diets of the sheep were quite similar across grazing treatments considering the species diversity of the plant community within the conifer plantation. Major species in the sheep diets included redstem ceanothus (*Ceanothus sanguineus* Pursh), Scouler willow (*Salix scouleriana* Barratt), and ninebark (*Physocarpus malvaceus* [L.] Kuhn). RPI across treatments showed that the sheep selected for graminoids and shrubs seemed to avoid forbs. Results indicate that environmental conditions (e.g., temperature and

precipitation) during spring and summer have marked effect on sheep performance. Sheep producers and forest managers must work together for prescribed sheep grazing to work smoothly within a conifer plantation. Most sheep producers will be reluctant to graze conifer plantations at high intensities that result in decreased sheep performance. Therefore, forest managers desiring the benefits from higher grazing intensities should consider expected sheep performance when establishing grazing fees.

Study Site

The study was conducted on the University of Idaho Experimental Forest located in Latah County approximately 21 km northeast of Moscow, Idaho, at an elevation of about 1020 m. This region of Idaho has a temperate climate with cold, moist winters and warm, relatively dry summers. Average January and July temperatures are -2 and 19° C, respectively. Mean annual precipitation is 685 mm with 30% falling as rain during the May to September growing season (NOAA 1992).

The study site was a western redcedar (*Thuja plicata* Donn.)/queencup beadlily (*Clintonia uniflora* [Schult.]. Kunth.) habitat type (Cooper et al. 1991). Soils of the site were in the Vassar silt loam series (medial over loamy, mixed Endic Cryandepts) typified by a layer of volcanic ash underlain by residuum derived dominantly from granite (Barker 1981). Slopes on the site varied from 20 to 45% with east to northeast to north aspects. The study site had been clear-cut and broadcast burned in 1986 and planted with a mixture of container grown conifer seedlings in the spring of 1987. The tree species planted were Douglas-fir (*Pseudotsuga menziesii* var. *glauca* [Beissn.] Franco), western larch (*Larix occidentalis* Nutt.), ponderosa pine (*Pinus ponderosa* Dougl.), and western white pine (*Pinus monticola* Dougl.). In addition to the conifer seedlings, the major plant species present included redstem ceanothus (Ceanothus sanguineus Pursh), Scouler willow (Salix scouleriana Barratt), ninebark (Physocarpus malvaceus [Green] Kuntz), thimbleberry (*Rubus parviflorus* Nutt.), sheep fescue (*Festuca ovina* L.), and sedge

(*Carex* spp.). Before grazing standing crop of all shrubs, forbs and graminoids was 1332 and 1537 kg ha^{-1} in 1991 and 1992, respectively.

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