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Research Note

Differences in Food Ingestion and Digestion Among Sheep Classified as High or Low Sagebrush Consumers

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Abstract

Animals vary substantially in amount of three-tip sagebrush (*Artemisia tripartita* [Rydb.] *tripartita*) or other chemically defended plants they will voluntarily consume. This individual variation results from differences in dietary experience and inherited digestive characteristics. We conducted a series of experiments to examine behavioral and digestive traits of sheep identified as high or low consumers of sagebrush. In a pen-acceptance trial, high sagebrush consumers ate the same amount of sagebrush as low consumers when they had unrestricted access to a basal ration of alfalfa pellets ($P = 0.77$). However, when animals were restricted to 75% of their recommended energy requirement, sheep identified as high consumers ate more sagebrush than low consumers ($P = 0.05$). In a digestion trial, sagebrush reduced the dry matter digestibility when it was added to a hay-based diet. In vivo digestibility of a diet containing 10% fresh sagebrush and 90% alfalfa/grass hay was higher for high sagebrush consumers than low consumers ($P = 0.02$). The parameters measured in this trial suggest sheep that willingly consume high amounts of sagebrush, digest diets containing sagebrush more efficiently than low consumers.

Resumen

El consumo voluntario de “Sagebrush” (*Artemisia tripartita* [Rydb.] *tripartita*) y otras plantas con defensas químicas varía substancialmente entre los animales. Esta variación individual resulta de diferencias en la experiencia de forrajeo del animal y las características digestivas heredadas. Condujimos una serie de experimentos para examinar las características digestivas y de comportamiento de ovinos identificados con consumo alto y bajo de “Sagebrush.” En un ensayo en corral, los animales con alto consumo comieron la misma cantidad de “Sagebrush” que los animales de bajo consumo, esto cuando tuvieron acceso irrestricto a una ración basal de alfalfa paletizada ($P = 0.77$). Sin embargo, cuando el consumo de energía de los animales se restringió al 75% de sus requerimientos, los ovinos identificados como altos consumidores comieron más “Sagebrush” que los bajos consumidores ($P = 0.05$). En un experimento de digestión se detectó que cuando el “Sagebrush” fue adicionado a una dieta a base de heno redujo la digestibilidad de la materia seca. La digestibilidad In vivo de una dieta conteniendo 10% de “Sagebrush” en verde y 90% de heno de alfalfa/zacate fue mayor en los ovinos de alto consumo que en los de consumo bajo ($P = 0.02$). Los parámetros medidos en este experimento sugieren que los ovinos que consumen voluntariamente altas cantidades de “Sagebrush” digieren más eficientemente las dietas que contienen “Sagebrush” que los ovinos de bajo consumo.

Key Words: chemically defended plants, diet selection, digestion balance, grazing behavior, prescribed grazing

INTRODUCTION

Rangeland managers have long tried to improve the grazing value of brush-infested rangelands, including pinyon–juniper woodlands (Aro 1971; Rippel et al. 1983), mesquite woodlands (Herbel et al. 1958), and sagebrush steppe (Johnson 1969) through chemical and mechanical brush control. A more contemporary management approach is to select and manage animals with the ability to harvest and digest the existing forage supply efficiently (Launchbaugh et al. 2001). We know animals vary in preference and intake of specific range plants (Provenza et al. 2003). This individual variation is based on experience (Provenza et al. 2003) and inheritance (Snowder et al. 2001)

and could be exploited to create herds and flocks of animals with specific dietary attributes to reach grazing management goals.

Two experiments were conducted to examine ingestive and digestive traits affecting consumption of three-tip sagebrush (*Artemisia tripartita* [Rydb.] *tripartita*) by domestic sheep. Our objectives were to examine behavioral and metabolic differences in sheep identified as either high or low consumers of sagebrush in 1) a pen feeding trial examining voluntary intake or acceptance of sagebrush, and 2) a metabolism trial to determine differences in dry matter (DM) digestion and energy and nitrogen retained from sagebrush consumption.

MATERIALS AND METHODS

Animal Selection

Sagebrush consumption in 597 Rambouillet ewes was characterized at the USDA Agricultural Research Service Sheep Experiment Station near Dubois, ID (lat 44°14'N, long

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