

POTENTIAL OF GOATS AS BRUSH CONTROL AGENTS

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Commonly used approaches to brushwood management are prescribed burning, mechanical methods, and herbicide applications. However, due to rising costs of fuel, equipment, legal restriction against the use of herbicides, environmental hazards from uncontrolled burning, and health concerns, a low-input biological control by goat appears to be a viable alternative to reduce these woody plants.

Goats are generally efficient at suppressing brush. However, many of these woody species produce anti-herbivory compounds in their leaves and stems that can reduce nutrient digestibility and retention. Information on the utilization of these components would help to plan grazing for goats on brush ranges, and shift the advantage towards use of the animals for production purposes and as biological control agents. The following study was therefore designed to evaluate the utilization of two brush species, western juniper (*Juniperus occidentalis*), and big sagebrush (*Artemisia tridentata*) by goats and also to investigate the possibilities that exist for manipulating vegetation through managed goat browsing.

Terminal twig portions with associated leaves and buds of big sagebrush and western juniper were separately hand-harvested. Plant materials were coarsely chopped and mixed manually into graded portions with chopped alfalfa hay. Experimental diets were formulated to provide four each of alfalfa to sagebrush/juniper diets in ratios of 100:0; 90:10; 80:20 and 70:30 on dry matter basis, and fed to eight growing female Spanish goats weighing between 25 to 30 kg, fitted with ruminal cannulas, in a dual 4 X 4 Latin square design to examine the voluntary intake and rumen kinetics.

Goats were weighed before and after each trial, which consisted of 14 days adaptation and 7 days of total fecal collection. Goats were kept in elevated digestion crates and were fed enough feed once daily. Water and mineral licks were provided for free choice throughout each trial. Feed, orts, feces, and urine samples were obtained daily during each fecal collection period for chemical analyses. Total fecal output and urine volume were recorded daily, and samples composited. Volatilization of ammonia from urine samples was prevented by adding 100 ml of 1.2 N HCl to the collection vessel.

On day one of the collection period, each goat was dosed intraruminally with about 30 g of Yb-labeled forage to determine the rate of passage. Rectal grab samples were collected before dosing (0 hr) and at 12, 18, 24, 30, 33, 36, 48, 60, 72, 96, 120, and 144 hours after dosing. Ruminal samples were taken at 0, 3, 9, 12, 18, and 24 hours on the last day of collection. The pH of digested samples was measured, and strained ruminal fluid was acidified with metaphosphoric and hydrochloric acids and stored frozen for VFA and NH₃ analyses.

Duplicate 5 cm x 10 cm nylon bags (pore size 50 + 10µm) filled with about 2 g ground basal diet sample were suspended in the rumen on day 3 of the collection period to estimate the in-situ digestion. Bags devoid of forage served as blanks. All goats received 3 bags per incubation time (duplicate sample of basal diet plus 1 blank). Bags were retrieved after 0, 12, 24, 36, 48, 72, and 96 hours, then rinsed with tap water until rinse water was clear. Samples were dried at 60°C for 48 hours, weighed, and later assayed for residual neutral detergent fiber (NDF). These trials are presently in progress.

As follow-up to the digestion trials, field research would be carried out to quantify the grazing impact and utilization pattern of the vegetation by goats. To determine these, observations would be made on the types of forages available for consumption, botanical composition, and the nutrient content of the diet selected. The influence of grazing on individual plants and parts of plants would be monitored to define the frequency, extent, and pattern of defoliation. Detailed assessment of goats movement, amount of time spent ruminating, watering, resting, and other related behavior would be noted. These data, combined with forage use and plant vigor, would provide guidelines to plan grazing for goats as management tools.