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Effect of Including Alfalfa Hays That Were Harvested in the Morning or Evening in Diets of Newly Received Sheep[1]

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ABSTRACT

In previous experiments, ruminants preferred evening-harvested (PM-alfalfa) over morning-harvested (AM-alfalfa) harvested alfalfa hay when given a choice. Therefore, could strategic use of PM-alfalfa fed as a pellet or included as a component of receiving diets stimulate naive sheep to increase DMI early in the receiving period? Experiments were conducted to 1) determine preferences of naive sheep for pellets prepared from PM- and AM-alfalfa, 2) measure performance of wether lambs fed pellets prepared from PM- and AM-alfalfa, and 3) measure performance and productivity of ewe lambs fed receiving diets formulated with PM- and AM-alfalfa. Pelleting PM-alfalfa resulted in pellets having similar ($P > 0.05$) palatability to naive sheep as pellets prepared from AM-alfalfa. Inclusion of PM-alfalfa in receiving diets fed to ewe lambs resulted in greater consumption of alfalfa stem fractions ($P < 0.01$). However, this effect did not result in greater DMI or gain over a 35-d feeding period ($P > 0.76$). Based on data from this study, strategic dietary use of pellets or hay prepared from evening-harvested alfalfa did not stimulate naive sheep to increase DMI. Lack of commonality between experiments reported herein and other research may be because 1) sheep cannot discriminate as well as other livestock between AM- and PM-alfalfa, or 2) pelleting or including in mixed diets masks sheep-preferred characteristics of PM-alfalfa. Based on the alfalfa hay used in these experiments, it was not advantageous to use pellets or hay prepared from evening-harvested alfalfa for the specific purpose of encouraging naive sheep to increase DMI.

Key words: evening harvested, morning harvested, alfalfa hay, receiving diets, sheep

INTRODUCTION

Displacement of lambs from the rearing flock or location to unfamiliar environments is associated with reduced DMI (Provenza and Balph, 1987). Stress-induced nutrient deficiency can augment the susceptibility of young ruminants to antiproductive factors such as disease (Galyean et al., 1999; Loerch and Fluharty, 1999). Therefore, managers must modify receiving diets to stimulate greater DMI. Increasing diet nutrient density is one strategy recommended to mitigate stress-induced nutrient deficiency (Galyean et al., 1999; Loerch and Fluharty, 1999). Although inclusion of nonspecific nutrient-dense feeds would most likely enhance diet palatability, strategic use of feedstuffs known to stimulate intake of novel diets (Loe et al., 2002) may provide a means to attract newly received or naive ruminants to the feed bunk earlier and more frequently.

When given a choice, ruminants preferred evening- (**PM-alfalfa**) over morning- (**AM-alfalfa**) harvested alfalfa hay (Fisher et al., 2002). The PM-alfalfa had greater nutritive value than AM-alfalfa (Fisher et al., 2002; Burns et al., 2005; Mayland et al., 2005). Could the strategic use of PM-alfalfa, as pellets or hay, in receiving diets stimulate greater DMI and, subsequently, performance

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in young or newly arrived sheep? To answer this, experiments were conducted to 1) determine preferences of naive sheep for pellets prepared from PM- and AM-alfalfa, 2) measure performance of weaned, newly arrived lambs fed pellets prepared from PM- and AM-alfalfa, and 3) measure performance and productivity of weaned, newly-arrived ewe lambs fed diets formulated with PM- and AM-alfalfa hays.

MATERIALS AND METHODS

Animals and Methodology

An Institutional Animal Care and Use Committee (USDA, ARS, Dubois, ID; FASS, 1999) reviewed and approved all experimental and husbandry procedures for the following experiments.

Experiment 1. This experiment was conducted to test the null hypothesis that time of alfalfa harvest (morning vs. evening) does not influence apparent preferences of naive sheep for pellets prepared from AM- or PM-alfalfa. Results from this experiment were used to determine whether PM-alfalfa pellets could be strategically used to increase DMI in naive sheep.

Yearling ewes (Targhee; n = 8; mean BW = 51.8 kg; SD = 4.7 kg) and newly weaned wether lambs (Polypay × Suffolk; n = 27; mean BW = 45.2 kg; SD = 2.3 kg) were individually housed in an enclosed and ventilated barn. Individual pens (160 × 240 cm; slatted floors) had automatic watering receptacles and 2 side-by-side feed bunks (20 × 40 cm). Yearling ewes were transported from a range setting to the research facility and had never had access to pelleted feeds. Wether lambs had been weaned within 2 d of assignment to pens, subsequently displaced from a range setting, and had never had access to harvested or processed feeds. Sheep had no previous experience with the experimental facility.

Preferences for AM- and PM-alfalfa pellets were determined for 2 exposure periods. The novel-exposure period (**novel**) tested the preference for AM- or PM-alfalfa pellets of naive ewes and lambs that had no former exposure to alfalfa pellets . The adapted-exposure (**adapted**) period tested ewe and lamb preference for AM or PM-alfalfa pellets after being familiarized with both pellet types over a 2-d period. For each preference test, feed, but not water, was withheld for 12 h, and sheep were subsequently offered (individually) 1 kg each of AM- and PM-alfalfa pellets placed in side-by-side bunks for 2.5 h. Left- or right-hand bunk positions of the pellets were randomized for each sheep; AM- and PM-alfalfa pellets were never mixed. Pellet intakes were based on weight differences before and after feeding commenced. Pellet weights were collected at 30 min and 2.5 h. In order that sheep always had a choice between pellets, AM- or PM-alfalfa pellets were added (0.25 kg) if total consumption was eminent. During the 2 d between the novel and adaptation-exposure preference tests, independent meals of AM- or PM-alfalfa pellets were offered ad libitum for 12-h periods to ewes and lambs. The order that the AM- or PM-alfalfa pellets were offered to each ewe and lamb was random.

Experiment 2. This experiment was conducted to test the null hypothesis that time of alfalfa harvest (morning vs. evening) does not influence intake and performance of naive lambs fed pellets prepared from AM- or PM-alfalfa. Results from this experiment were used to determine whether pellets prepared from PM-alfalfa could be used as a tool to improve performance of naive lambs immediately after weaning and during the early receiving period.

Weaned-wether lambs (n = 20; selected from the 27 wether lambs described in Exp. 1) were individually housed as described in Exp. 1. The effects of AM- and PM-alfalfa pellets on performance and pellet preference following a 14-d accustomation period were measured. The AM- and PM-alfalfa pellet treatments were randomly assign to each wether (n = 10/treatment). For 14 d, corresponding pellet treatments were individually fed to lambs for ad libitum intake. Trace-mineral salt (NTM Salt, Redmond Minerals Inc., Redmond, UT) was provided for ad libitum intake. Body weights (d 1 and 14) and feed refusals (d 7 and 14) were collected, and pellet intake, gains, and feed efficiencies were calculated. At the conclusion of the 14-d treatment period, feed, but not water, was withheld for 12 h, and an accustomed-exposure preference test for AM- and PM-alfalfa pellets was conducted as described for the novel and adapted-exposure preference tests in Exp. 1.

Experiment 3. This experiment was conducted to test the null hypothesis that time of alfalfa harvest (morning vs. evening) does not influence productivity of naive lambs fed diets formulated with AM- or PM-alfalfa hay. Results from this experiment were used to determine whether PM-alfalfa hay could be used as a tool to improve intake and subsequent productivity of naive ewe lambs.

Columbia (n = 49), Polypay (n = 128), Rambouillet (n = 265), Targhee (n = 118), Suffolk (n = 27), and Suffolk-cross (n = 44) range-ewe lambs (n = 631) were weaned, weighed, placed on separate range (mountain big sagebrush steppe) from their dams for 30 d, and then were transported (24 km) to the US Sheep Experiment Station facilities near Dubois, ID. Ewe lambs had never had access to feeding bunks, pens, nor harvested or processed feedstuffs. Within each breed, ewe lambs were sorted into 1, 2, or 3 BW classes based on weaning weight: heavy = 45.4 to 54.4 kg, moderate = 40.8 to 45.3 kg, and light = 34.0 to 40.7 kg. Within heavy, moderate, and light BW classes, pens (n = 6, 8, and 6, respectively) were randomly assigned to ewe lamb, and treatment (n = 2) was randomly assigned to pen. Ultimately, 4, 8, and 4 pens of the heavy, moderate, and light BW-class pens, respectively, had 32 ewes/pen; 2 light BW-class pens had