

Effect of Source of Supplemental Crude Protein on Intake and Digestibility of Wheat Straw by Lambs

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Story in Brief

Thirty lambs with a mean initial weight of 85 lb were housed in individual pens and fed untreated chopped wheat straw free choice and either soybean meal (SBM), dehydrated alfalfa pellets (DEHY) or harvested wheat forage in amounts to supply .13 lb of supplemental crude protein per day. Straw dry matter (DM) intake was greatest for lambs supplemented with SBM (1.26 percent of body weight). Intake of straw by lambs fed DEHY (1.12 percent of body weight) was slightly lower than lambs fed SBM. Supplementation with wheat forage decreased ($P < .05$) straw consumption as compared with lambs supplemented with SBM and DEHY. Total feed intake was highest for lambs supplemented with DEHY. Dry matter digestibility of wheat straw was 37.2, 36.4 and 49.2 percent, respectively, for lambs supplemented with SBM, DEHY and wheat forage. The decreased straw consumption of lambs supplemented with wheat forage would be of concern in situations where an abundant supply of straw or other low-quality roughage was to serve as the base of the feeding program. In these situations, supplemental protein should enhance intake and utilization of the low-quality roughage.

Introduction

Effects of protein supplementation in increasing consumption and digestibility of low-quality roughages by ruminants are well known. While oil seed meals such as cottonseed and soybean meal are commonly used as sources of supplemental protein, high-protein forages may also be used. Wheat forage commonly contains 25 to 30 percent crude protein (DM basis). Utilization of wheat forage to supplement low-quality roughages would be particularly appropriate since large amounts of wheat pasture are grown on the southern Great Plains. The objective of this study was to determine the effect of three sources of supplemental crude protein (soybean meal, dehydrated alfalfa and wheat forage) on intake and dry matter digestibility of wheat straw by lambs.

Experimental Procedure

Thirty wether and ewe lambs with a mean initial weight of 85 lb were randomly assigned, within sex, to three treatments. The lambs were housed in individual pens and had free-choice access to chopped wheat straw. Supplements of either soybean meal (SBM), dehydrated alfalfa pellets (DEHY) or wheat forage were fed to supply .13 lb crude protein per day. Amounts of wheat forage that were fed

were adjusted daily according to dry matter and crude protein analyses of the forage. The wheat straw contained 4.3 percent crude protein and had an in vitro dry matter digestibility of 37.4 percent. Dicalcium phosphate, limestone, trace mineralized salt and vitamins A and D were added to the supplements to fulfill daily requirements. Wheat forage was harvested in early April with a small pull-type flail harvester. After harvesting, the forage was placed in large plastic bags (about 25 lb/bag), excess air was removed and the bags were sealed. The bagged forage was stored in a walk-in freezer at -2° C and fed as needed during the trial.

Samples of wheat straw and the three sources of supplemental protein were collected daily and composited over 5-day intervals during the trial for chemical analysis. The trial included a 10-day preliminary period for the lambs to adapt to the diets and a 13-day period in which straw consumption was measured. Total fecal excretion of five lambs per treatment was measured during the last 5 days of the trial by use of fecal collection bags.

Dry matter (DM) digestion coefficients of wheat forage and dehydrated alfalfa were obtained by feeding an additional five lambs per supplement for a period of 10 days with total fecal output collected the last 4 days. The supplements were fed at a level of 1.6 percent of body weight. The TDN value of 81 percent (NRC) was used as the DM digestion coefficient of SBM. Straw dry matter digestibility was calculated by "difference" (Schneider and Flatt, 1975).

The data were analyzed by analysis of variance procedures. Duncan's multiple range test was used to test differences among treatment means for significance.

Results and Discussion

Dry matter and crude protein content and dry matter digestibility of the three supplements are shown in Table 1. The wheat forage was harvested at the three-joint, pre-boot stage of maturity. Its crude protein content and digestibility were therefore lower than that of wheat forage grazed during the "normal" November 15 to March 15 grazing period.

Table 1. Dry matter and crude protein content and DM digestibility of supplements

	Source of supplemental crude protein		
	Soybean meal	Dehydrated alfalfa pellets	Wheat forage
Dry matter, %	88.1	91.4	23.6
Crude protein, % of DM	47.7	16.9	20.7
Dry matter digestibility, %	81.0 ^a	60.1 ^b	64.5 ^b

^aFrom TDN value of SBM of 81% (NRC).

^bFrom lamb digestion trial.

Total DM intake expressed as a percentage of body weight is presented in Figure 1. Dry matter consumption from supplements was greatest for lambs fed DEHY (.89 percent of body weight) followed closely by wheat forage (.74 percent of body weight). Soybean meal DM intake was only .32 percent of body weight. Straw DM intake (Table 2) was greatest (1.26 percent of body weight) for lambs fed soybean meal. Intake of straw by lambs fed DEHY (1.12 percent of body weight) was slightly lower than lambs fed SBM. Supplementation with wheat forage decreased ($P < .05$) straw consumption as compared with lambs supplemented with SBM and DEHY. Total feed intake was highest for lambs supplemented with DEHY.

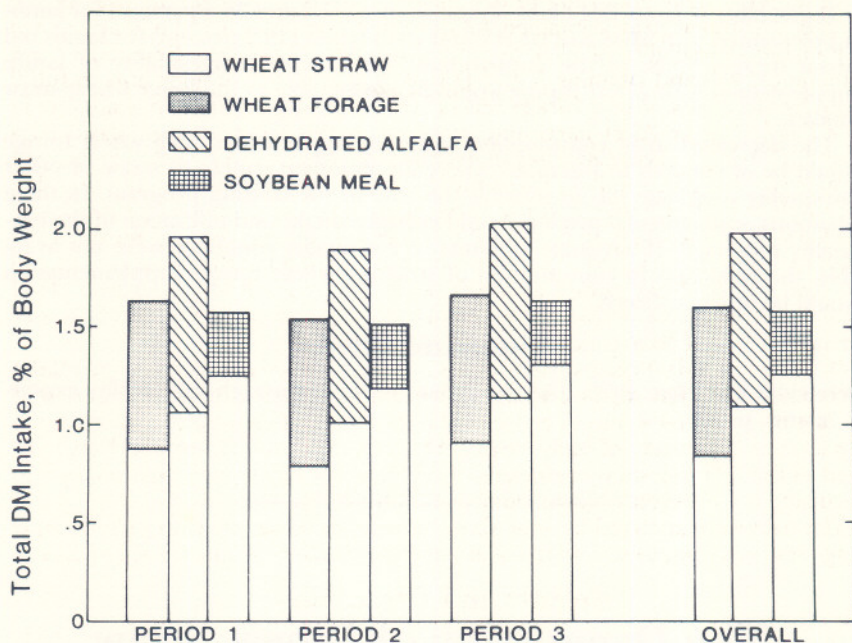


Figure 1. Total DM intake. Period 1, 2 and 3 relate to days 11-15, 16-20 and 21-23 of the 23-day trial. Overall is days 11-23.

Table 2. Feed dry matter (DM) intake and DM digestibility of wheat straw

	Source of supplemental crude protein		
	Soybean meal	Dehydrated alfalfa pellets	Wheat forage
Supplemental crude protein, lb/head/day	.13	.13	.13
Lamb weights, lb			
Initial	85.9	86.3	84.1
Final	83.5	85.2	83.3
Feed DM intake			
Supplement, lb/day	.27	.76	.62
Wheat straw			
lb/day	1.06 ^a	.96 ^a	.70 ^b
% of body wt	1.26 ^a	1.12 ^a	.84 ^b
Supplement plus wheat straw, % of body wt	1.58 ^a	2.02 ^b	1.59 ^a
Straw DM digestibility, %	37.2 ^a	36.4 ^a	49.2 ^b

^{a,b}Means in the same row with different superscripts are different ($P < .05$).

Digestibility of straw DM (Table 2) was similar (37.2 and 36.4 percent) for lambs supplemented with SBM and DEHY and was highest (49.2 percent) for lambs fed wheat forage. Some of the improvement in straw DM digestibility of lambs supplemented with wheat forage would be attributable to the lower wheat straw intakes.

The decreased straw consumption of lambs supplemented with wheat forage would be of concern in situations where an abundant supply of straw or other low-quality roughage was to serve as the base of the feeding program. In these situations, supplemental protein should enhance intake and utilization of the low-quality roughage. If adequate amounts of low-quality roughage were not available, the reduction in consumption of straw by wheat forage supplementation would be of less concern.

Literature Cited

Schneider and Flatt. 1975. The evaluation of feeds through digestibility experiments. p. 165.

The Digestibility of Wheat Straw After Being Ensiled with Alfalfa or Wheat Forage

W. A. Phillips and L. C. Pendlum

Story in Brief

The addition of wheat straw to wheat forage prior to ensiling increased the initial dry matter content and the amount of dry matter lost during storage. Even though the silage made of wheat forage and straw (DCS) lost more dry matter during storage, there was still more dry matter present in the silo at the time of feeding than with direct cut silage (DC). DCS silage was less digestible than DC silage. Wilting wheat forage to 43 percent dry matter before ensiling decreased dry matter digestibility (DMD). The amount of dry matter lost during ensiling and the DMD were greater for alfalfa silages than for wheat forage silages. Wilting alfalfa forage or adding wheat straw prior to ensiling decreased DMD of the silage. Wheat straw DMD was significantly decreased when added to alfalfa forage but was increased when added to wheat forage.

Introduction

There is good probability that less grain will be fed to beef cattle in the future as a result of increased demand for corn and sorghum for other purposes and