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Effect of level of supplemental alfalfa and its method of processing on intake and utilization of wheat straw

Abstract

Sixteen ruminally fistulated steers were used to study the effects of supplemental alfalfa level (.25 or 1.0% body weight [BW]) and method of processing (hay or pellets) on wheat straw utilization. Response to increased level of supplemental alfalfa did not dependent on method of processing (longstem vs pelleted) for the quality of alfalfa (22.7% CP) used in this trial. Increasing the level of alfalfa from .25 to 1.0% of BW reduced (P#.02) straw intake and diet digestibility, but increased (P<.002) digestible dry matter intake by steers. With high quality hay, ground and pelleted alfalfa elicits the same type of response as longstem alfalfa.

Keywords

Cattlemen's Day, 1993; Kansas Agricultural Experiment Station contribution; no. 93-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 678; Beef; Supplements; Alfalfa; Processing; Cattle; Wheat straw

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EFFECT OF LEVEL OF SUPPLEMENTAL ALFALFA AND ITS METHOD OF PROCESSING ON INTAKE AND UTILIZATION OF WHEAT STRAW[1]

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Summary

Sixteen ruminally fistulated steers were used to study the effects of supplemental alfalfa level (.25 or 1.0% body weight [BW]) and method of processing (hay or pellets) on wheat straw utilization. Response to increased level of supplemental alfalfa did not dependent on method of processing (longstem vs pelleted) for the quality of alfalfa (22.7% CP) used in this trial. Increasing the level of alfalfa from .25 to 1.0% of BW reduced ($P \leq .02$) straw intake and diet digestibility, but increased ($P < .002$) digestible dry matter intake by steers. With high quality hay, ground and pelleted alfalfa elicits the same type of response as longstem alfalfa.

(Key Words: Supplements, Alfalfa, Processing, Cattle, Wheat Straw.)

Introduction

Previous research has shown that protein supplements enhance intake and utilization of low-quality forages. In addition, when fed at low levels, alfalfa has been shown to elicit the same type of response as concentrate supplements (when fed to provide the same amount of protein). Our previous work showed a linear decrease in intake of a low-quality forage when increasing levels of supplemental longstem alfalfa hay were fed. Therefore, our objective was to determine whether the method of processing supplemental alfalfa would alter the response to increasing level of supplementation when steers were fed a basal diet of a low-quality roughage (wheat straw).

Experimental Procedures

Sixteen ruminally fistulated steers (average BW = 965 lbs) were used in a 2×2 factorially arranged experiment to determine the effects of alfalfa level and method of processing on wheat straw intake and utilization. Main effects were level of supplementation (.25 vs 1.0% of BW) and method of processing (no processing of hay vs grinding and pelleting. Hay from a single cutting of alfalfa was used, and half the hay bales were randomly selected for grinding (3/8 inch screen) and pelleting. Contents of CP and NDF were 22.7 and 30.3% vs 19.3 and 34.3% for hay and pellets, respectively. Wheat straw (5.4% CP, 77% NDF) was fed ad libitum by offering 130% of the previous 5 days' average intake. Steers were fed once daily and were adapted to diets for 14 d then fitted with fecal bags for 7 days of total fecal collection to determine digestibility. After the fecal collection, each steer's rumen was manually emptied before (0 h) and 4 hours after feeding to determine ruminal dry matter (DM) and liquid fill.

Results and Discussion

The lower CP and higher NDF in the pellets likely reflect leaf loss during grinding and pelleting. Processing had little impact ($P > .10$) on dry matter intake, dry matter (DM) digestibility, and fill (Table 1). However, increasing the level of alfalfa supple-

[1]The authors would like to thank Gary Ritter, Wayne Adolph, and the student workers at the Range/Cow-calf unit for their invaluable assistance in conducting this trial.

mentation reduced wheat straw intake and fiber (NDF) digestion ($P \leq .02$). Although alfalfa DM is more readily digestible than wheat straw, the fiber fraction in alfalfa is poorly digested. Thus, the reduced NDF digestion is likely due to the increased contribution of alfalfa to the diet and potential increases in rate of digesta passage resulting from increased total intake of dry matter. Because of the greater DM digestibility of alfalfa and the greater total amount of DM consumed for the high supplementation treatment, digestible dry matter intake was increased ($P < .01$) by increasing the level of supplemental alfalfa.

In conclusion, response to an increased level of supplemental alfalfa did not depend on the method of processing for the high quality of alfalfa we used. However, the response to supplement level might have been different, if alfalfa quality had been lower.

Table 1. Effect of Level of Supplemental Alfalfa and Processing on Intake, Digestion, and Rumen Fill[a]

	Level		Processing			Probability	
Item	.25%	1.0%	Hay	Pellets	SE	L	P
Total DMI, % BW	1.78	2.21	1.94	2.04	.07	.01	.33
Straw DMI, % BW	1.56	1.24	1.35	1.45	.05	.01	.27
Supplement, DMI, % BW	.23	.91	.57	.57	.01	.01	.67
DM digestion, %	58.1	59.8	59.4	58.4	.9	.21	.48
NDFD, %	64.0	58.4	61.5	61.0	1.3	.02	.78
DDMI, lb/d	10.05	12.53	11.03	11.56	.42	.01	.39
0 h DM fill, lb	37.34	32.71	37.57	32.49	3.54	.36	.34
4 h DM fill, lb	48.40	54.59	48.18	54.59	2.87	.16	.13
Liquid fill, L	79.4	72.4	76.2	75.5	2.9	.12	.83

[a]L = level of supplementation; P = method of processing; SE = standard error; DMI = dry matter intake; % BW = percent of body weight; NDFD = neutral detergent fiber digestion; DDMI = digestible dry matter intake.