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WHOLE PLANT FABA BEAN SILAGE AS A COMPONENT OF GROWING STEER DIETS

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Summary

Whole plant faba bean silage was compared to corn-alfalfa silage as a roughage source in 30% roughage growing steer diets. When the proportion of faba bean silage was increased from 0 to 10, 20 and 30%, respectively, daily feed intake, average daily gain and feed conversion of the steers were 18.32, 18.38, 18.23, 19.13 lb per head; 3.66, 3.42, 3.39, 3.57 lb per head; and 5.01, 5.38, 5.37 and 5.36, respectively. Substitution of faba bean silage for corn-alfalfa silage in a 30% forage diet had no significant ($P < .05$) effect on feed intake, weight gain and feed efficiency for growing steers.

(Key Words: Steers, Faba Beans, Drought Corn Silage, Feedlot.)

Introduction

Faba beans are a cool season, frost resistant, annual legume adapted to short growing seasons. Faba bean production is new in South Dakota and the extent of adaptation is not well known. Experimental plantings have been grown at the Southeast South Dakota Experiment Farm near Beresford.

The plant grows erect and possesses excellent stalk strength which facilitates harvest as silage. Under optimum conditions, the plant may reach 6 to 8 feet in height and yield 4 tons of high protein dry matter per acre. The yield potentials and the high protein content of the crop suggest that the whole plant could be an economical feed when used as a silage.

The objective of this research was to determine the nutritive value of whole plant faba bean silage compared with corn-alfalfa silage for growing steers.

Materials and Methods

Feeding Trial. Approximately 15 acres of faba beans were planted on April 14, 1988, at the Southeast South Dakota Experiment Farm near Beresford. The crop was cut July 13, 1988, at the stage of pod formation, wilted to approximately 30% dry matter, chopped and ensiled.

Because of drought, alfalfa hay production at the farm was limited. In addition, several acres of corn were extremely stressed due to heat and started to dry in the field. Therefore, another silage was made from 80% immature corn plant and 20% alfalfa hay on an as is basis. Chopped alfalfa hay (15% moisture) was added to the chopped corn to obtain the proper moisture (approximately 65%) for silage making. Both silages were stored using Ag Bag⁵ plastic bags. Samples of ensiled forages were obtained on August 10, 1988, for chemical analysis.

Sixty-four, fall-born, crossbred steer calves were shipped to the Southeast Farm from northeastern Oklahoma in mid-July. The calves were fed a standard receiving diet (50% dry rolled corn, 50% ground grass hay) for 21 days. On August 9, feed and water were withheld overnight (16 hours) and the steers were weighed and randomly allotted to eight pens.

Ad libitum amounts of each of the four diets (Table 1) were fed to two pens of steers per diet. The whole plant faba bean silage available was sufficient only to feed the steers for 46 days from August 10 to September 15. Upon completion of the trial, steers were withheld from feed and water overnight (16 hours) and weighed.

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TABLE 1. DIETS USED TO FEED STEERS

Item	Level of faba bean silage			
	0	10%	20%	30%
Ingredient ^a				
Corn-alfalfa silage	30.00	20.00	10.00	0
Faba bean silage	0	10.00	20.00	30.00
Corn grain	67.15	67.19	67.23	67.27
Hi-Cal mineral ^b	2.84	2.11	1.37	.64
Supplement ^c	.01	.71	.40	2.09
Composition ^{ad}				
Dry matter ^e	57.20	57.15	57.17	57.15
Crude protein	12.00	12.00	12.00	12.00
Neutral detergent fiber	21.34	21.08	20.81	20.54
Calcium	1.26	1.05	.84	.64
Phosphorus	.43	.41	.39	.36
Potassium	1.01	1.13	1.25	1.38

^a Percentage of dry matter.

^b Product of Zip Feeds, Inc., Sioux Falls, SD. Contains 30% Ca, 5% P, 5% NaCl, .001% Co and 50,000 IU/lb vitamin A.

^c Product of Zip Feeds, Inc., Sioux Falls, SD. Contains 32% crude protein, 3.5% Ca, 1% P, .0268% Zn and 50,000 IU/lb vitamin A.

^d Calculated composition.

^e Percentage of as-fed.

Data were analyzed according to analysis of variance procedures as a completely randomized design. Treatment means were compared by orthogonal contrasts. Linear, quadratic and cubic effects of treatment were tested.

Results and Discussion

The chemical analyses of both silages fed during the trial are shown in Table 2. The high crude protein content of the corn-alfalfa silage reflects the immaturity of the corn and the excellent quality of alfalfa used to make the silage. Mixing alfalfa hay with the silage was necessary to obtain the proper moisture content for the ensiling process. However, an added benefit appears to be a boost in crude protein content.

Performance of steers is shown in Table 3. Substitution of faba bean silage for corn-alfalfa silage had no effect on daily dry matter intake, average daily gain or feed conversion. Steers consumed about 18.5 lb dry matter daily, gained at 3.51 lb per head daily and required 5.27 lb dry matter per pound of gain.

Production of corn-alfalfa silage appears to be an acceptable strategy to salvage a drought stressed corn crop early prior to significant dry matter losses in the field. Faba bean silage appears to be a useful forage for growing calves. The decision to use faba beans should be based on agronomic or economic factors rather than cattle performance.

TABLE 2. CHEMICAL COMPOSITION OF FABA BEAN AND CORN-ALFALFA SILAGES FED TO STEERS^a

Item	Faba bean silage	Corn-alfalfa silage
Dry matter ^b	31.58	32.65
Crude protein	15.10	17.60
Acid detergent fiber	34.60	38.90
Neutral detergent fiber	48.30	49.90
Calcium	1.11	1.14
Phosphorus	.37	.28
Magnesium	.56	.25
Potassium	3.60	2.52

^a Percentage of dry matter.

^b Percentage, as-fed basis.

TABLE 3. PERFORMANCE OF STEERS AS INFLUENCED BY LEVEL OF FABA BEAN SILAGE

Item	Level of faba bean silage, %			
	0	10	20	30
Initial wt, lb	668	668	659	637
Average daily gain, lb/head	3.66	3.42	3.39	3.57
Daily DM ^a intake, lb/head	18.32	18.38	18.22	19.13
Feed/gain	5.01	5.38	5.37	5.36

^a Dry matter.