K S U

Wheat, Barley and Corn Silage Rations and Urea for Growing Steers

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Summary

Eight rations were fed to 15 yearling steers (3 pens of 5 steers each). Arthur wheat, Paoli barley and corn silages were supplemented with either soybean meal or urea; Blue Boy II and Eagle wheat silages were supplemented with soybean meal.

All steers were full-fed a 12.5% crude protein ration containing 86% silage and 14% supplement. Results of the 84-day trial show steers fed the four corn and barley silage rations gained faster and more efficiently than those fed wheat silages. Steers fed Arthur and Eagle silage rations performed similarly. Those fed Blue Boy II silage made the slowest and least efficient gain. Steers receiving urea performed similarly to those receiving soybean meal.

Introduction

Two years research at this station (Prog. Rpt. 210, Kan. Agr. Expt. Sta., 1974 and Prog. Rtp. 280, Kan. Agr. Expt. Sta., 1975) evaluating high-silage growing rations has shown: (1) soft red winter wheat silages superior to hard red winter wheat silages; (2) barley silage superior to wheat silages and (3) corn silage superior to barley silage.

In general, protein contents of wheat and barley silages are higher than corn or sorghum silages, so less supplemental protein is needed with wheat or barley silage. Can urea be used to provide the protein without lower animal performance? When urea is fed with corn silage growing rations, rate and efficiency of gain are lower than when soybean meal is the supplemental protein.

Objectives of this year's trial were to (1) repeat comparisons of hard red and soft red winter wheat silages, (2) determine the relative feeding values of wheat, barley and corn silages and (3) evaluate urea as a source of supplemental nitrogen for wheat, barley and corn silage rations.

Experimental Procedure

Whole-plant wheat and barley forages were harvested and ensiled in the dough stage between May 28 and June 18, 1974. Varieties were Paoli barley (awned, winter), Arthur and Blue Boy II wheats (awnless, soft red winter)

and Eagle wheat (awned, hard red winter). All forages were direct-cut with a self-propelled forage harvester equipped with a 15-foot cutter bar and a two-inch recutter screen. Water was added to the forages at the silo blower to maintain moisture at about 65 percent in the 10x50 ft. concrete stave silos. Corn with an estimated grain yield of 125 bu. per acre was harvested in the dent stage and ensiled in a 14x60 ft. concrete stave silo.

One hundred five yearling Hereford steers averaging 589 lbs. were used in the 90-day trial (October 11, 1974 to January 9, 1975). Three pens of five steers were randomly assigned to each of the following eight experimental rations:

	Silage	Supplement
1.	corn	+ soybean meal
2.	corn	+ urea
3.	barley	+ soybean meal
4.	barley	+ urea
5.	Arthur wheat	+ soybean meal
6.	Arthur wheat	+ urea
7.	Blue Boy II wheat	+ soybean meal
8.	Eagle wheat	+ soybean meal

All rations were 86% of the appropriate silage and 14% supplement (Table 13.1) on a dry matter basis; all provided 12.5% crude protein; were mixed twice daily and were fed free-choice. Supplements A and B were fed with corn silage; supplement C with barley and Arthur and Blue Boy II wheat silages; supplement D with barley and Arthur silages and supplement E with Eagle wheat silage. In the three urea-containing rations, urea provided 9.9% of the total ration crude protein equivalent. Weights were taken at the beginning and end of the trial after steers were without feed or water 15 hours; 35-day and 70-day intermediate weights were taken before the a.m. feeding.

Results and Discussion

Dry matter, crude protein and crude fiber analysis of the five silages are shown in Table 13.2. The higher protein content of the barley and Arthur wheat silages meant that 45 percent less supplemental protein was needed in supplements fed with them than in supplements fed with corn silage. That limited the amount of urea used in the urea-containing supplement fed with barley and Arthur silages.

Performances of the steers are shown in Table 13.3. All steers had grazed native bluestem pasture from May 1 to October 4, 1974, and were in thin condition when the trial began. That, plus the relatively high grain content of the silages and mild winter weather, resulted in exceptionally good performance by all steers.

Steers receiving soybean meal or urea performed similarly. Daily gain (lbs.) and feed per lb. of gain (lbs.), respectively, were: 2.43 and 7.16 for steers fed soybean meal, and 2.44 and 7.38 for steers fed urea.

Steers fed corn silage gained faster ($P<.05$) and consumed more feed ($P<.05$) but were no more efficient than steers fed barley silage. Steers fed the four corn and barley silage rations gained faster ($P<.05$) and more efficiently ($P<.05$) than those fed any of the four wheat silage rations. Daily gain and efficiency of gain were lower ($P<.05$) for steers receiving the Blue Boy II ration than for those receiving any other wheat silage ration. Raion consumption for the five silages from highest to lowest was: corn, barley, Eagle wheat, Arthur wheat and Blue Boy II wheat.

In our two previous trials, Parker (an awned, hard red winter) wheat silage had a lower feeding value than Blue Boy or Arthur (awnless, soft red winter) wheat silages. Significantly less Parker silage was consumed than Blue Boy or Arthur. The depressed intake was corrected by mixing equal amounts of Parker and corn silage. However, in this third trial, more Eagle wheat silage (an awned, hard red winter) was consumed than either of the two awnless, soft red winter wheat silages. Also, in two trials as much or more awned barley silage was consumed than any of the wheat silages. These results indicate that relative intake and feeding value of wheat silages are influenced by variety differences, not just the presence or absence of awns and not just characteristics of soft red winter or hard red winter wheats.

Table 13.1 Compositions of Five Supplements Fed with the Silage

Ingredient	Supplement A	B	C	D	E
	lbs./ton				
Milo	644.4	1037.4	1324.5	2799.4	1092.4
Soybean meal	1250	800	532	---	757
Urea	---	56	---	56	---
Dicalcium phosphate	35	44	18	29	22
Limestone	8	---	62	53	66
Aureomycin[1]	5	5	5	5	5
Trace mineral premix	1	1	1	1	1
Salt[2]	38	38	38	38	38
Fat	17	17	17	17	17
Vitamin A[3]	1.6	1.6	1.6	1.6	1.6

[1] Formulated to provide 70 mg per steer per day.

[2] Formulated to be 0.3% of the total ration.

[3] Formulated to provide 30,000 IU per steer per day.

Table 13.2 Compositions of the Five Silages Fed in the Steer Trial

Item	Silage Corn	Barley	Arthur wheat	Blue Boy II wheat	Eagle wheat
Dry matter, %	34.8	34.8	32.2	36.9	34.3
	%, dry matter basis				
Crude protein	9.12	11.95	11.17	11.18	9.55
Crude fiber	19.9	25.5	27.0	28.1	28.0

Table 13.3 Performance of Steers Full-fed Corn, Barley or Wheat Silages Supplemented with Soybean Meal (SBM) or Urea (Ocotber 11, 1974 to January 9, 1975 -- 90 days).

	Silages and supplements							
	Corn		Barley		Arthur wheat		Blue Boy II wheat	Eagle wheat
Item	SBM	Urea	SBM	Urea	SBM	Urea	SBM	SBM
No. of steers	15	15	15	15	15	15	15	
Initial wt. lbs.	590	591	587	587	590	588	593	588
Final wt., lbs.	844	845	820	815	762	761	733	760
Avg. total gain, lbs.	254	254	233	228	172	173	140	172
Avg. daily gain, lbs.	2.83[a]	2.83[a]	2.60[ab]	2.53[b]	1.91[c]	1.92[c]	1.56[d]	1.91[c]
Avg. daily feed, lbs.								
Silage[1]	16.59	16.93	15.07	15.08	12.92	13.61	12.81	14.15
Silage[2]	41.8	42.3	37.7	37.7	32.3	34.0	32.0	35.4
Supplement[1]	2.70	2.73	2.40	2.43	2.08	2.13	1.98	2.17
Total[1]	19.29[a]	19.66[a]	17.47[b]	17.51[b]	15.00[d]	15.74[cd]	14.79[de]	16.32[c]
Feed/lb. of gain, lbs.[1]	6.83[a]	6.95[a]	6.79[a]	6.92[a]	7.86[b]	8.28[b]	9.52[c]	8.53[b]

[1] 100% dry matter basis
[2] 40% dry matter basis.

abcde Means in the same row with different superscripts differ significantly ($P<.05$).