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Wheat, Barley and Corn Silage Rations for Growing Yearling Steers

K. K. Bolsen, Larry L. Berger, and J. G. Riley

Summary

Seven silage and ration treatments compared were: (1) Paoli barley, (2) Arthur wheat, (3) Parker wheat, (4) Parker-head wheat, (5) Parker-head wheat and corn silage (equal parts), (6) corn silage plus a soybean meal supplement, (7) corn silage plus a urea supplement. Treatments 1 through 5 included a soybean meal supplement.

Each ration was fed to eighteen steers (3 pens of 6 steers each) for 100 days. All steers were full-fed a 12.5% crude protein ration containing 86% silage and 14% supplement. Steers fed Paoli barley, Parker head wheat-corn silage, corn silage plus soybean meal or corn silage plus urea rations performed similarly. Daily gain and dry matter intake were lowest for steers fed Parker wheat and Parker head wheat rations. Steers fed the Parker silage ration were less efficient than those fed Paoli barley, Arthur wheat, Parker head-wheat-corn silage or corn silage plus soybean meal rations.

Introduction

In 1973 there were 10.6 million acres of hard, red winter wheat grown in Kansas. This is six times the corn acreage and two and one half times the grain sorghum acreage in the state. Fluctuations in price often have made wheat competitive with other feed grains.

In 1972, studies were initiated at this station to evaluate the potential of wheat as a silage crop. In a steer growth trial, type of wheat ensiled (awnless, soft red winter vs. awned, hard red winter) influenced performance of steers receiving high-silage rations (Progress Rpt. 210, Kan. Agr. Expt. Sta., 1974). Steers fed the awnless, soft red winter wheat silage gained faster and consumed more feed than steers fed the awned, hard red winter wheat silage. Gain and efficiency of steers fed corn silage were superior to that of steers fed wheat silage.

This second year's trial (1) repeated the comparison of hard red winter wheat and soft red winter wheat silages; (2) compared relative feeding values of wheat, barley and corn silages; (3) compared whole-plant wheat silage and head-wheat silage and (4) evaluated a mixture of equal parts of head-wheat and corn silages.

Experimental Procedure

Cereal grain forages were harvested in dough stage between June 1 and June 12, 1973, in this order: Paoli (awned, winter) barley, Arthur (awnless, soft red winter) wheat, Parker (awned, hard red winter) wheat and Parker head-wheat. All forages were direct-cut with a self-propelled forage harvester equipped with a 15-foot cutter bar and a two-inch recutter screen. Whole-plant forages were cut as near the soil as possible leaving 2 to 3 inches of stubble. Water was added to the forages at the silo blower to raise their moisture contents from 56 to 60% when harvested to 64 to 68% when ensiled. The upper half of the wheat plant was harvested for head-wheat silage. Approximately 45 tons of each of the cereal grain forages were ensiled in concrete stave silos (10 x 50 ft.). Corn with an estimated grain yield of 125 bu. per acre was ensiled in a 12 x 60 ft. concrete stave silo.

One hundred twenty-six Hereford, Angus and mixed breed steers averaging 586 lbs. were used in the 100-day growing trial (October 10, 1973 to January 18, 1974). Three pens of six steers were randomly assigned to each of the seven rations. Ration composition (dry matter basis) was 86% silage and 14% supplement (table 12.1). Supplement A was fed with Paoli barley and Parker head-wheat; supplement B with Arthur and Parker wheats and corn silage; supplement C with corn silage and supplement D with corn silage and Parker head-silage-corn silage. All rations were formulated to contain 12.5% crude protein and each was mixed twice daily and fed free-choice. Steers were fed in 15 x 30 ft. sheltered, concrete pens. Weights were taken at the beginning and end of the trial after steers were without feed or water 15 hours; 42-day and 84-day intermediate weights were taken before the a.m. feeding.

Results and Discussion

Results of chemical analyses of the five silages are shown in table 12.2. Crude protein was lowest and crude fiber highest in the whole-plant Arthur and Parker wheat silages. No nitrogen fertilizer was applied to the growing cereal grains, which probably explains those relatively low crude protein values.

Performance of the steers is shown in table 12.3. Steers fed the Paoli barley, Parker head-wheat-corn silage, corn silage plus soybean meal or corn silage plus urea rations performed similarly. Average daily gain and feed intake were lower ($P < .05$) for steers receiving Parker wheat and Parker head-wheat silage rations than for those receiving any of the other five rations. Steers fed the Parker silage ration were less efficient ($P < .05$) than those fed Paoli barley, Arthur wheat, Parker head-wheat-corn silage or corn silage plus soybean meal rations.

Table 12.1. Compositions of Supplements.

Ingredient	Supplement			
	A	B	C	D
	%, dry matter basis			
Soybean meal	38.21	82.83	0.00	62.74
Urea	0.00	0.00	12.12	0.00
Milo	53.37	11.24	76.24	30.17
Fat	1.00	1.00	1.00	1.00
Dicalcium phosphate	1.19	1.92	8.09	1.72
Limestone	3.68	0.46	0.00	1.85
Salt ¹	2.14	2.14	2.14	2.14
Trace mineral premix	0.05	0.05	0.05	0.05
Vitamin A ²	0.09	0.09	0.09	0.09
Aureomycin ³	0.27	0.27	0.27	0.27

¹Formulated to be 0.3% of the total ration.

²Formulated to provide 30,000 IU per steer per day.

³Formulated to provide 70 mg per steer per day.

Table 12.2. Compositions of the Five Silages.

Item	Paoli barley	Arthur wheat	Parker wheat	Parker head-wheat	Corn silage
Dry matter, %	32.9	36.9	34.6	41.2	40.9
	%, dry matter basis				
Crude protein	9.5	7.5	7.4	9.9	8.3
Crude fiber	23.1	26.5	30.8	21.3	19.4
Ether extract	2.5	2.4	2.1	2.6	2.7
NFE	55.7	54.7	51.7	59.1	63.0
NDF	47.03	48.84	57.35	50.15	45.53
ADF	50.66	52.95	62.34	44.58	42.91
Acetate, molar %	2.11	1.36	1.04	0.90	1.12
Propionate molar %	0.17	0.17	0.19	0.18	0.15
Butyrate molar %	0.36	0.21	0.13	0.20	0.27
Lactate, % of the dry matter	6.10	3.86	4.61	4.79	2.14

Table 12.3. Steer Performances.

Item	Silage and ration treatment						
	Paoli barley	Arthur wheat	Parker wheat	Parker head- wheat	Parker head- wheat + corn silage	Corn silage + soybean meal	Corn silage + urea
No. of steers	18	18	18	18	18	18	18
Initial wt., lb.	580.1	585.2	579.7	593.6	583.7	595.1	584.5
Final wt., lb.	807.8	794.2	734.1	768.2	805.9	842.4	812.9
Avg. daily gain, lb.	2.28 ^{a,b}	2.09 ^b	1.54 ^c	1.75 ^c	2.22 ^{a,b}	2.48 ^a	2.29 ^{a,b}
Avg. daily feed, lb. ¹	17.4 ^a	17.4 ^a	14.7 ^b	14.8 ^b	18.0 ^a	18.6 ^a	19.1 ^a
Feed/lb. gain, lb. ¹	7.7 ^a	8.4 ^a	9.6 ^b	8.5 ^{a,b}	8.1 ^a	7.5 ^a	8.4 ^{a,b}

¹100% dry matter basis.

a,b,c Means on the same line with different superscripts differ significantly (P<.05).