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Wheat, barley, oat and corn silage rations for growing steers

Abstract

Eleven wheat, barley, oat and corn silages were evaluated in two steers growing trials in 1975 and 1976. In both trials, steers fed barley or corn silages had similar rate and efficiency of gains. Also, barley and corn silages supported greater performance than any of the seven wheat or oat silages. In the 1976 trial steers fed Trio or Lodi oat silage had the lowest feed consumption and made the slowest and least efficient gains. For an average of the two trials barley and corn silages had similar feeding values. Wheat silages had 90 and 80% the relative feeding value of corn silage in 1975 and 1976, respectively. Oat silages had only 48% the feeding value of corn silage in 1976.

Keywords

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

Keith Bolsen, Jack Riley and Jim Oltjen

Summary

Eleven wheat, barley, oat and corn silages were evaluated in two steer growing trials in 1975 and 1976. In both trials, steers fed barley or corn silages had similar rate and efficiency of gains. Also, barley and corn silages supported greater performance than any of the seven wheat or oat silages. In the 1976 trial steers fed Trio or Lodi oat silage had the lowest feed consumption and made the slowest and least efficient gains.

For an average of the two trials barley and corn silages had similar feeding values. Wheat silages had 90 and 80% the relative feeding value of corn silage in 1975 and 1976, respectively. Oat silages had only 48% the feeding value of corn silage in 1976.

Introduction

In three years' research with silage growing rations at this station (Prog. Rpt. 210, 230, and 262, Kan. Agr. Expt. Sta.), we have shown: (1) corn and barley silages to have similar feeding values, (2) corn and barley silages superior in feeding value to wheat silages and (3) differences in feeding value between wheat silage varieties.

Our objectives in the two trials (1975 and 1976) were to (1) repeat comparisons of hard red and soft red winter wheat silages, (2) compare silages from grain and forage oat varieties and (3) determine relative feeding values of wheat, barley, oat and corn silages.

Experimental Procedure

Silage descriptions: Whole-plant wheat, barley, oats and corn were harvested and ensiled in the summers of 1975 and 1976.

Silage (Maturity)	Harvest dates	
	1975	1976
Corn (Hard-dent)	Aug. 29	Aug. 20
<u>Barley</u>		
Paoli (dough)	June 4	----
Kanby (dough)	----	June 2
<u>Wheat</u>		
Arthur-71 (dough)	June 13	June 7
Eagle (milk)	June 6	----
Eagle (dough)	June 14	----
Sage (dough)	----	June 9
<u>Oats</u>		
Trio (dough)	----	June 17
Lodi (dough)	----	July 2

Paoli and Kanby are awned, winter barleys; Arthur-71 an awnless, soft red winter wheat; Eagle and Sage, awned, hard red winter wheats; Trio an early-maturing grain-type spring oat and Lodi a late-maturing forage-type spring oat.

All forages were direct-cut with a self-propelled forage harvester equipped with a 15-foot cutter bar and two-inch recutter screen. Water was added to the forages, when necessary, to maintain 63 to 67 percent forage moisture in the 10 x 50 ft. concrete silos. Approximate grain yields (bushels per acre) were: corn - 125 for 1975 and 80 for 1976; barley - 80 for 1975 and 55 for 1976; Arthur-71 wheat - 45 for 1975 and 30 for 1976; Eagle wheat - 45 for 1975; Sage wheat - 30 for 1976; Trio oats - 30 for 1976 and Lodi oats - 18 for 1976.

1975 Trial: Seventy-five mixed breed yearling steers averaging 667 lbs. were used in the 87-day trial (October 10, 1975 to January 5, 1976). Three pens of five steers were randomly assigned by breed and weight to each of five silage treatments: (1) corn silage, (2) Paoli barley, (3) Arthur-71 wheat, (4) Eagle wheat (milk) and (5) Eagle wheat (dough). All silages were fed in fixed-percentage rations containing 86% silage, 10% milo-soybean meal mix and 4% supplement on a dry matter basis. Each ration was formulated to 11.9% protein and mixed and fed to appetite twice daily.

1976 Trial: One hundred eight Hereford and Angus yearling steers averaging 643 lbs. were used in the 89-day trial (October 15, 1976 to January 12, 1977). Three pens of six steers were assigned to each of six silage treatments: (1) corn, (2) Kanby barley, (3) Arthur-71 wheat, (4) Sage wheat, (5) Trio oats and (6) Lodi oats. All silages were fed in fixed-percentage rations containing 84% silage, 12% milo-soybean meal mix and 4% supplement on a dry matter basis. Rations for each silage averaged 10.5% protein and were mixed and fed free-choice twice daily.

In both the 1975 and 1976 trials, all steers were fed the same level of silage for two days before beginning and ending weights were taken. All feed and water were withheld 16 hours before weighings.

Results

1975 Trial. Performances of the steers are shown in table 20.2. Steers fed barley silage gained slightly faster (2.70 vs. 2.45 lbs. per day) and more efficiently (7.04 vs. 7.67 lbs. of feed per lb. of gain) than steers fed corn silage. Barley silage supported a faster ($P < .05$) and more efficient ($P < .05$) gain than any of the three wheat silages (Arthur, Eagle milk or Eagle dough). Steers fed Arthur wheat silage gained faster ($P < .05$), consumed more feed ($P < .05$) and tended to be more efficient than those fed Eagle milk or Eagle dough silages. Silage intake was lowest ($P < .05$) by steers fed Eagle milk silage.

1976 Trial. Performances of the steers are shown in table 20.3. Steers fed corn silage gained slightly faster (2.52 vs. 2.33 lbs. per day) and more efficiently (7.59 vs. 8.41 lbs. of feed per lb. of gain) than those fed barley silage. Corn, barley and wheat silages were consumed in similar amounts but the wheat silages supported a slower ($P < .05$) and less

efficient ($P < .05$) gain than corn or barley silage. Steers fed soft red (Arthur-71) and hard red (Sage) winter wheat silages had similar rate and efficiency of gains. Steers fed Trio or Lodi oat silages had the poorest performance--they consumed about 10 lbs. less wet silage daily and gained .87 to 1.50 lbs. less per day than steers fed any of the other four silages.

Table 20.1. Composition of the 11 silages fed in the 1975 and 1976 trials.

Trial and silage	Dry matter %	Crude protein	Crude fiber
		<u>%, dry matter basis</u>	
<u>1975</u>			
Corn	37.8	7.80	20.35
Paoli barley	35.3	11.48	21.55
Arthur wheat	36.9	10.81	22.90
Eagle milk wheat	33.8	9.94	28.08
Eagle dough wheat	37.6	8.35	26.34
<u>1976</u>			
Corn	37.2	8.29	19.51
Kanby barley	35.7	8.95	22.26
Arthur wheat	39.2	11.16	22.16
Sage wheat	41.2	8.27	25.98
Trio oats	30.1	12.56	31.20
Lodi oats	31.1	10.09	31.02

Table 20.2 Steer performance for the 1975 trial (87 days).

Item	Silages				
	Corn	Barley	Arthur wheat	Eagle wheat milk	Eagle wheat dough
No. of steers	15	15	15	15	15
Initial wt., lbs.	667	670	667	666	666
Final wt., lbs.	880	905	869	837	850
Avg. total gain, lbs.	213	235	202	171	184
Avg. daily gain, lbs.	2.45 ^{a,b}	2.70 ^a	2.32 ^b	1.97 ^c	2.11 ^c
Avg. daily feed, lbs.					
silage ¹	46.0	46.5	45.2	39.0	41.4
silage ²	16.10	16.26	15.81	13.64	14.48
milo-SBM ²	1.96	1.91	1.77	1.68	1.77
supplement ²	.77	.77	.70	.66	.69
total ²	18.83 ^a	18.94 ^a	18.29 ^a	15.98 ^c	16.94 ^b
Feed/lb. gain, lbs. ²	7.67 ^{a,b}	7.04 ^a	7.87 ^b	8.17 ^b	8.07 ^b

¹35% dry matter basis.²100% dry matter basis.

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

Table 20.3 Steer performance for the 1976 trial (89 days).

Item	Silages					
	Corn	Barley	Wheat		Oats	
			Arthur	Sage	Trio	Lodi
No. of steers	18	18	18	18	17	18
Initial wt., lbs.	649	640	644	641	640	645
Final wt., lbs.	873	847	828	816	737	736
Avg. total gain, lbs.	224	207	184	175	97	91
Avg. daily gain, lbs.	2.52 ^a	2.33 ^{a,b}	2.06 ^{b,c}	1.96 ^c	1.09 ^d	1.02 ^d
Avg. daily feed, lbs.						
silage ¹	45.9	47.2	45.4	46.6	34.9	35.7
silage ²	16.05	16.52	15.88	16.33	12.22	12.51
milo-SBM ²	2.30	2.27	2.16	2.21	1.80	1.69
supplement ²	.75	.73	.70	.67	.59	.51
total ²	19.10 ^a	19.52 ^a	18.74 ^a	19.20 ^a	14.61 ^b	14.72 ^b
Feed/lb. of gain, lbs.	7.59 ^a	8.41 ^{a,b}	9.10 ^{a,b}	9.86 ^b	13.47 ^c	14.45 ^c

¹35% dry matter basis.²100% dry matter basis.

a,b,c,d Means in the same row with different superscripts differ significantly (P<.05).