Milo vs. Wheat for Fattening Cattle*

Robert Totusek, Larry Franks, James R. Newsom and E. C. Nelson

Story in Brief

Wheat, milo, and a mixture of equal parts of wheat and milo were compared in a feeding trial. Net energy and ruminal volatile fatty acid values were also obtained. Differences in rate of gain, feed intake, and feed efficiency were small and not statistically significant. The type of grain had little apparent effect on carcass merit, but the feeding of milo resulted in more calculi in the bladder than did wheat. Differences in production of volatile fatty acids and net energy were small and non-significant. Correlations between the production of volatile fatty acids and feedlot performance are presented. The results of this trial indicate that the wheat and milo which were used were similar in energy value.

Introduction

The price of wheat has usually been too high to allow it to be used extensively as a livestock feed. However, there have been occasional periods in recent years when wheat has been available at a price to make it competitive with feed grains, and there are likely to be such periods in the future. Quantities of wheat unfit for human fod are also occasionally available for livestock feed. In these instances it is desirable to know the relative feeding value of wheat. Current information concerning the feeding value of wheat for finishing cattle is limited. Some reports have indicated best results when wheat does not comprise more than one-half to two-thirds of the ration. It is also generally recognized that milo is lower in feeding value than other feed grains, and many cattle feeders feel that milo is utilized more efficiently when mixed with one or more additional grains. The objective of this experiment was to compare (1) milo, (2) wheat, and (3) a mixture of equal parts of milo and wheat, for finishing steers.

Procedure

Twenty-seven steer calves with an average weight of approximately 500 lb. and an average age of 9 mo. were obtained from the Experiment Station herds. They were randomly allotted into 3 groups of 9 calves each. All of the calves received a basal ration composed of (percent): dehydrated alfalfa pellets, 35; cottonseed hulls, 23.0; cottonseed meal,

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40.0; salt, 1.0; and dicalcium phosphate, 1.0. Vitamin A was added at a level of 2,000 I.U./lb. of basal, and chlortetracycline was added in necessary quantity to effect an intake of 75-100 mg. per steer daily. This basal ration was fed in sufficient quantity to meet the maintenance requirements of the calves, with daily allowances adjusted at 3 week intervals. Grains were fed to appetite, in addition to the basal. The grains were steam rolled.

The steers were individually fed twice daily in metal stalls approximatel 3 x 7 ft. in size. They were allowed to remain in the stalls about 90 min. at each feeding. The remainder of the time the steers were allowed to run together in 4 pens and had access to an open sided shed and an outside paved pen. Water was available in the outside pen but not in the individual stalls.

Samples of rumen fluid (25 ml.) were obtained by stomach tube and analyzed for volatile fatty acid content by gas chromotography.

Initial and final weights were taken after a 16-hr. shrink without feed and water. The feeding period was 180 da. long. At the conclusion of the feeding trial the steers were slaughtered at the Harris Packing Company, Oklahoma City, and carcass information was obtained after a 48-hr. chill. Specific gravities of the carcasses were obtained and used to estimate caloric content. Net energy values were calculated by comparing feed intake to energy gained and used for maintenance, by the method devised by Garrett and Lofgreen at the California Station.

Results and Discussion

Feedlot performance of the steers is shown inTable I. The rates of gain were smaller than those attained with group-fed cattle, but very acceptable for cattle fed individually in stalls. Steers fed milo gained slightly faster than those fed either wheat or a combination of milo and wheat, with little difference between the latter two rations. However, differences were not statistically significant. Steers receiving milo consumed the most feed, those receiving the milo-wheat combination consumed the least, with consumption of wheat intermediate between the two. Milo produced the most efficient gains, with wheat second, and milo-wheat third. Since differences in intake and feed conversion were very small and not statistically significant, little importance can be attached to them.

Slaughter and carcass data are presented in Table 2. All differences in dressing percent and carcass merit were small and non-significant and the results indicate that cattle fed wheat as all or part of the grain produced carcasses equal to those produced by cattle fed milo. The type

Table 1. Feedlot performance (180 days, 9 steers per treatment, individually fed)

	Ration		
	Milo	Wheat	½ Milo ½ Wheat
Initial wt., lb.	506	509	510
Final wt., lb.	914	889	882
Daily gain, lb.	2.25	2.07	2.05
Daily feed, lb.			
Milo	6.80		3.07
Wheat		6.46	3.08
Basal	8.11	7.91	7.81
Total	14.91	14.37	13.96
Feed/lb. gain, lb.			
Grain	3.02	3.05	3.00
Basal	3.63	3.91	4.08
Total	6.65	6.96	7.08

Table 2. Slaughter and carcass data

	Ration		
	Milo	Wheat	½ Milo ½ Wheat
Dressing %[1]	58.8	57.5	57.9
Fat thickness, in.[2]	.34	.29	.26
Ribeye area, sq. in.[3]	11.27	11.01	11.57
Cutability, %			
Carcass basis[4]	51.4	51.8	52.4
Live basis[5]	30.3	29.8	30.3
Carcass grade[6]	8.9	8.2	8.6
Urinary calculi[7]			
No. without calculi	3	8	4
No. with calculi	6	1	5
Av. wt. of calculi, gm.[8]	2.43[9]	.16[9]	.75

[1] Calculated on basis of shrunk Ft. Reno live weight and chilled carcass weight.
[2] Average of three measurements determined on tracings at the 12th rib.
[3] Determined by measurement of tracings of ribeye.
[4] Calculated as follows: percent of carcass as boneless trimmed retail cuts from the four major wholesale cuts = 51.34 (fat thickness) − .462 (percent kidney fat) + .740 (ribeye area) − .0093 (carcass weight).
[5] Trimmed retail cut yield as determined in footnote 4 multiplied by dressing percent.
[6] USDA carcass grade converted to following numerical designations: high prime − 15, average prime − 14, low prime − 13, high choice − 12, average choice − 11, low choice − 10, high good − 9, average good − 8, low good − 7.
[7] Based on contents of bladder at time of slaughter.
[8] Average of those which had measureable calculi.
[9] The milo ration produced significantly more calculi ($P < .05$) than the wheat ration.

of grain did influence the incidence of urinary calculi, with a higher incidence observed in the steers fed milo than in those fed wheat or a combination of the two grains. Many cattlemen believe that milo produces more calculi than other grains.

The results of this experiment, considered alone, would indicate that milo and wheat, or an equal mixture of the two, are similar in feeding value for fattening cattle. The tendency toward a lower rate of gain which was observed when wheat was included in the ration was also noted in experiments conducted at the Ft. Hays, Kansas Station (Bul. 487, Kansas Agricultural Experiment Station) when wheat replaced milo. However, in the Ft. Hays tests feed intake decreased more than rate of gain so that efficiency of conversion of grain to cattle gain was 15 percent better for wheat than milo. Furthermore, wheat had an especially high feeding value (24 percent greater than milo) when fed in combination with milo in the Ft. Hays trials.

An advantage of wheat over milo was demonstrated by the Ft. Hays trials in which the protein supplement was reduced when wheat replaced milo, with no decrease in cattle performance. Since the digestible protein of milo and wheat averages 7.0 and 10.7 percent respectively, each 1 lb. replacement of wheat for milo results in a net gain of .037 lb digestible protein. Supplemental protein can be reduced accordingly. The approximate digestible protein content of several protein feeds, and the amount each could be reduced in the daily ration is indicated below.

	Cotton-seed meal	44% Soybean meal	50% Soybean meal	32% Supple-ment	20% Supple-ment	Alfalfa hay
% Digestible Protein	33	42	46	26	16	10
Reduction, lb. daily	.11	.09	.08	.14	.22	.37

For example, if 7 lb. milo in the daily ration were replaced by 7 lb. wheat, cottonseed meal could be reduced .77 lb. daily ($.11 \times 7 = .77$). The possible saving in supplemental protein cost in this way is obvious.

No significant differences were obtained in volatile fatty acids, as shown in Table 3. This is to be expected, since the grains did not differ significantly in feed efficiency. Correlations of volatile fatty acids with feed intake and feed efficiency are shown in Table 4. Significant negative correlations were obtained for feed intake and acetic-propionic ratio and for feed/lb. gain and total volatile fatty acid concentration. A significant positive correlation between feed intake and percent propionic acid was also obtained. A possible explanation is that as percent propionic acid increased and the acetic-propionic ratio therefore decreased, feed intake increased and feed required per lb. of gain decreased. Also, as total VFA concentration increased, feed/lb. of gain decreased. It should be pointed out that these correlations indicate only a relationship between two variables; they do not indicate cause and effect.

Table 3. Production of rumen volatile fatty acids[1-2]

	Ration		
	Milo	Wheat	½ Milo ½ Wheat
Acetic acid, %	52.9	51.9	54.3
Propionic acid, %	33.9	34.7	34.2
Butyric acid, %	13.2	13.4	11.4
Acetic-propionic ratio	1.57	1.53	1.80
Total volatile fatty acid conc., μm/liter[3]	85.0	79.7	90.7

[1] None of the differences due to treatment were significant ($P < .05$).
[2] Rumen samples from steers, obtained by tubing, were analyzed by gas chromotography.
[3] Micro moles per liter.

Table 4. Correlations of volatile fatty acids with feedlot performance[1]

	Propionic acid, %	Acetic-propionic ratio	Total VFA conc, μ/ml
Av. daily feed intake, lb.	0.54[2]	—.62[2]	0.10
Feed/lb. gain, lb.	— .34	0.41	— .56[2]

[1] All correlations were adjusted for treatment effects.
[2] Significantly different from zero ($P < .05$).

Net energy values of the total ration for maintenance and production, and of the grain for maintenance, production and maintenance plus production are shown in Table 5. The NEp of the milo-wheat combination was slightly lower than either the milo or the wheat. However, the differences were not statistically significant, and probably were the result of animal variation and not due to real differences in net energy of the grains.

Table 5. Net energy values of milo and wheat[1-2]

	Ration		
	Milo	Wheat	½ Milo ½ Wheat
	Megcal./100 lb.		
NEm+p of total ration[3]	57.6	58.2	57.4
NEm+p of grain[4]	64.5	67.0	65.7
NEm of grain[5]	69.3	67.8	63.4
NEp of grain[6]	46.2	45.2	42.0

[1] Net energy values were determined by the comparative slaughter technique developed at the California Station
[2] None of the differences due to treatment were significant ($P < .05$).
[3] Net energy of total ration for maintenance and production.
[4] Net energy of grain for maintenance and production.
[5] Net energy of grain for maintenance, determied by multiplying NEp value by 1.5.
[6] Net energy of grain for production.

Results of this trial and other research indicate that results with wheat may be variable, but that acceptable feedlot performance and carcass merit can be obtained with wheat in the finishing ration. For consistently best results, wheat should not replace over one-half of the milo. The higher protein content of wheat should be recognized and the supplemental protein reduced accordingly.

The Value of Vitamin E Injections for Feedlot Calves*

Robert Totusek, James E. Tanner, Robert Renbarger Larry G. Franks and Norris B. Whitfield

Story in Brief

Vitamin E injections were given to one-half of a group of steers, heifers and bulls during a 168-day feeding trial. A total of 1500 I.U. was administered on the 28th day and again on the 84th day. The vitamin E was without apparent affect on rate of gain and carcass traits. It was concluded on this basis that the ration fed was adequate in Vitamin E.

Introduction

Several research reports from other states have indicated a possible deficiency of vitamin E in some cattle finishing rations, and occasional reports from the field have suggested a benefit from the administration of supplemental vitamin E to feedlot cattle. The objective of this experiment was to determine the value of vitamin E injected into calves being finished in drylot.

Procedure

A total of 138 Angus calves, including 44 steers, 48 heifers, and 46 bulls, was available for this experiment. The calves were dropped primarily in February and March and placed in the feedlot immediately

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