Summary

Two feeding trials were conducted using 48 Hereford steers to study the effects of pelleting 1:4 and 4:1 concentrate-to-roughage ratios, and to study possible causes of response to pelleting high-roughage rations.

In the study of the effects of pelleting the two different concentrate-to-roughage ratios, pelleting the 1:4 ratio improved rate of gain, feed intake, feed efficiency, and carcass merit. Pelleting the 4:1 mixture caused no appreciable change in rate of gain, but resulted in an increase in feed efficiency and decreased feed intake and carcass grade. Feed cost per cwt. gain on both ratios was increased by pelleting.

Preliminary results from a further study indicate that the improved gain from pelleting the high-roughage mixture may be due to a combination of increased feed intake, increased feed efficiency, and the physical form in which it was fed. The increased efficiency of feed utilization appeared to be the most important factor.

Soybean Meal Vs. Urea Supplement, With and Without Trace Minerals, In Rations Containing Sorghum Silage or Cottonseed Hulls

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In a previous trial, yearling steers full-fed ground milo and sorghum silage were able to utilize a urea-milo-bone meal supplement as efficiently as soybean meal, when each was fed to supply the same amount of crude protein. No advantage was gained by adding a trace mineral mixture to either supplement.

During the past year, this study was repeated, with each supplement fed with two different roughages, sorghum silage and cottonseed hulls. It was possible, therefore, to compare the utilization of a high-urea supplement to that of soybean meal on a silage vs. hull type ration, as well as to study the possible need for additional trace minerals with each type of roughage.[1]

Procedure

Sixty-four yearling Hereford steers averaging 725 lbs. were selected from the Experiment Station herd at Lake Carl Blackwell in October. During the previous summer these cattle were part of an experiment on

[1] The urea feed compound used in these trials were generously supplied by the Chemical Division of Deere & Co., Pryor, Oklahoma, and the trace mineral mixture by Calcium Carbonate Co., Chicago, Illinois.

the effect of 0 vs. 12 mg. stilbestrol implants while grazing native range grass. They were allotted to treatment during this feeding test so that the effect of previous summer implants on feedlot performance could be studied. The results of this phase of the study are reported elsewhere.

On the basis of shrunk weight, feeder grade, and previous summer gain, the steers were divided into 8 groups of 8 head each; the groups were then assigned to treatment at random. The fattening trial was conducted at Fort Reno in dirt pens with an adjacent open shed for protection. Each steer received a 24 mg. stilbestrol implant at the start of the feedlot test.

All cattle were full-fed ground milo, with limited amounts of roughage and 1.6 to 2.24 lbs. of the various supplements to be tested. A mineral mix of 2 parts salt to 1 part bone meal was available, free choice. The feeding trial continued for 154 days, at which time a final shrunk weight was obtained, and the cattle were slaughtered at Oklahoma City. Dressing percentages, carcass grades to the nearest one-third, and marbling scores were recorded. The "on-foot" value of the cattle per cwt. was calculated from carcass grade, yield, and the value of the dressed carcass.

The test was so designed that the value of the various supplements could be compared on an equal crude protein (nitrogen) basis in rations supplying the same amount of energy from grain and roughage. All rations were made essentially equal in calcium and phosphorus. Differences in digestible protein, TDN, calcium, and phosphorus between the silage and hull rations were equalized as much as possible. A dry, stabilized vitamin A premix was added to supply approximately 3,000 U. S. P. units per 100 lb. body weight to all cattle. The trace minerals were fed at a level of 4 gm. per steer per day, and were fed as a commercial premix which supplied (mg. per steer daily): iron, 384; copper, 29.2; manganese, 488; zinc, 26.8; iodine, 15.2; and cobalt, 10.4.

The average daily rations fed the steers by lots are shown in Table 1.

Results

A summary of the results obtained are shown in Table 2. For purposes of comparison, results from several lots have been averaged where treatments were similar.

1. Soybean meal vs. the urea supplement

Soybean meal and the urea-milo-bone meal supplement can be compared with either sorghum silage or cottonseed hulls as the roughage. The summary of performance of all lots fed either soybean meal or the urea supplement, according to each roughage, are shown in Table 2.

With either roughage, the high-urea supplement produced less gain than soybean meal when fed at the same crude protein level. Most marked differences appeared when hulls were the roughage. The reduction in average daily gain of 0.09 lb. per head daily on silage and

Table 1. — Average Daily Rations Fed Steers in S.B. Meal Vs. Urea Study.

	Sorghum Silage				Cottonseed Hulls			
Lot Number	1	2	3	4	5	6	7	8
Supplement Fed	S.B. Meal	Urea Supple.	S.B.M.+ Tr. Min.	Urea+ Tr. Min.	S.B. Meal	Urea Supple.	S.B.M.+ Tr. Min.	Urea+ Tr. Min.
Average daily ration, lbs.								
Milo	18.2	18.2	18.2	18.2	18.8	18.8	18.8	18.8
Supplement								
S.B.M.	1.5		1.5		2.07		2.07	
Milo		1.24		1.24		1.71		1.71
Urea		.21		.21		.30		.30
Bone meal		.045		.045		.06		.06
$CaCO_3$	.1	.1	.1	.1	.17	.17	.17	.17
Vitamin A premix, mg.	3	3	3	3	3	3	3	3
Trace minerals, gm.			4	4			4	4
Total	1.6	1.6	1.6	1.6	2.24	2.24	2.24	2.24
Sorghum silage	26.3	26.3	26.3	26.3				
Cottonseed hulls					8.6	8.6	8.6	8.6
2-1 mineral mix	ad. lib.	ad. lib.	ad. lib.	ad. lib.	ad. lib.	ad. lib.	ad. lib.	ad. lib.

Table 2.—Average Daily Gains, Feed Efficiency, and Carcass Data.

Comparison and Lot No.	Ave. Daily Gain (lbs.)	Feed Per Cwt. Gain			Carcass Data			On-Foot Value Per Cwt.
		Milo (lbs.)	Supplement (lbs.)	Roughage (lbs.)	Yield %	Marbling Score[1]	Grade Score[1]	$
Soybean Meal vs. Urea Supplements								
With silage								
S.B. Meal (1&3)	2.70	678	60	977	60.0	7.0	5.9	25.28
Urea supplement (2&4)	2.61	693	61	998	59.1	7.2	6.0	24.79
With C.S. hulls								
S.B. meal (5&7)	2.76	693	81	321	59.2	7.4	5.9	25.76
Urea supplement (6&8)	2.46	769	89	353	58.9	8.7	6.7	24.33
Effect of Trace Minerals								
With silage								
None (1&2)	2.64	687	60	989	59.3	7.0	6.1	24.90
Trace minerals (3&4)	2.62	684	60	986	59.8	7.2	5.9	25.16
With C.S. Hulls								
None (5&6)	2.63	742	87	343	59.2	7.6	6.1	25.66
Trace minerals (7&8)	2.59	719	84	330	58.9	8.5	6.6	24.38
Sorghum Silage vs. C.S. Hulls								
Sorghum silage (1,2,3,4)	2.66	686	60	998(296)[2]	59.6	7.1	6.0	25.04
C.S. hulls (5,6,7,8)	2.61	731	85	337	59.1	8.1	6.3	25.02

[1] Marbling score: 2 = abundant, 8 = average, 14 = meager amount
Carcass grade score; 5 = Low Choice, 6 = Top Good, 7 = Average Good.
Silage converted to same approximate dry matter as in hulls.

0.30 lb. on hulls-resulted in higher feed requirements per cwt. gain for the urea supplement. This difference in performance due to the supplement fed occurred even though milo and roughage in the basal ration supplied nearly all the digestible protein recommended for cattle of this age and weight.

With either roughage, the urea-supplemented cattle yielded less dressed carcass, which had slightly less marbling and a lower grade on the rail. Such differences, when related to the live value of the animal, gave the urea-fed cattle $0.49 per cwt. less value on silage rations, and $1.43 less when hulls were the roughage.

Apparently, our knowledge of the factors necessary for optimum utilization of urea when used to supply nearly all the crude protein equivalent in a supplement is lacking—especially with milo and cottonseed hull rations. It should be remembered, however, that the level of urea used in these experiments is much higher than state laws tolerate in dry feeds, although not much higher than is common in certain urea-molasses mixtures now on the market.

2. Effect of additional trace minerals

In Table 2, both groups of cattle fed soybean meal and urea have been summarized, within each source of roughage, to show the effect of additional trace minerals. With neither roughage did trace minerals appear to be beneficial. While the breakdown between soybean meal vs. urea supplements, with and without trace minerals, is not shown here, the results indicate no consistent pattern of response.

These results, together with a previous trial and extensive range experiments at this station, have failed to show that additional trace minerals are beneficial where oil meal supplements are fed. In several range trials with urea supplements, however, an increase in gain has resulted from adding trace minerals. It appears doubtful that feeds commonly fed to either wintering and fattening cattle in Oklahoma will be deficient in trace minerals.

3. Silage vs. cottonseed hulls

Little difference in performance or carcass merit will be noted when all four lots receiving sorghum silage are compared to those fed cottonseed hulls. In this experiment an attempt was made to equalize the two rations by adjusting the milo, protein, and mineral allowance. Thus, cattle fed cottonseed hulls received slightly more milo, supplement, and calcium so as to equalize the energy, protein, and mineral picture as much as possible between the two rations.

In addition, sufficient vitamin A was added to all rations. Apparently, the two rations so supplemented were nearly equal in nutritive value. Slight differences in yield, marbling, and carcass grade are apparent in favor of the silage-fed cattle. The actual packer bid favored these cattle over the hull-fed groups. Shrink to market, based on final weight off test at Ft. Reno, was essentially the same between the two groups.

Summary

Eight lots of yearling steers were fed 154 days to compare soybean meal and a urea-milo-bone meal supplement, with and without additional trace minerals, and when used to supplement milo-sorghum silage or milo-cottonseed hull type rations. With either silage or hulls as the roughage, soybean meal proved superior to the urea supplement. This was especially true when cottonseed hulls were the roughage. Trace minerals did not improve steer performance or feed efficiency with either supplement. Little difference was noted between sorghum silage and cottonseed hulls when the rations were equalized as much as possible with respect to protein, energy, and minerals, and both were supplemented with vitamin A. Apparently other factors or conditions than those studied here are necessary for optimum use of high-urea supplements.

Effect of Feeding for Rapid Vs. Moderate Rates of Gain On Feed Efficiency and Carcass Composition of Steer Calves

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Beef is included in the diet more as a source of protein than for its energy value. Surveys indicate that the consumer is more calorie-conscious today than in the past, preferring trimmer, leaner cuts of meat. Flavor, tenderness, and juiciness are important considerations. Thus, feeding systems which will result in more lean beef (of acceptable palatability) at lower cost need to be developed.

To study the problem, a series of tests was initiated in the fall of 1956 to determine the effect of different rates of gain of steer calves on efficiency of feed conversion and the quality and quantity of beef produced. The results reported here cover the third trial which was started in the fall of 1958.[1]

Procedure

Twenty-four weanling Hereford steer calves were selected for this study from the Fort Reno Experiment Station herd in October, 1958. Each treatment group contained two calves sired by each of a pair of half-brother bulls, and two calves sired by two other closely related bulls. Age and weight of the calves, treatment of dam, and feeder grade were also considered in allotment.

[1] The results of the first (1956-57) and second (1957-58) trials are reported in Okla. Agr. Exp. Sta. Misc. Pub. MP-51 and MP-55, respectively. A fourth trial is now in progress.