Table 37.—Average slaughter and carcass data results with antibiotics fed in swine rations.

	Primal cut yield % (net body wt.)	Lean cut yield % (net body wt.)	Primal cut yield[1] (%)	Lean cut yield[2] (%)	Total fat trim (lbs.)	Grade[3]
Trial No. 1—November 11, 1952-April 9, 1953						
Basal	48.19	35.89	62.98	46.90	33.9	Ch.No.2
Basal + 10 mg. aureomycin HCl	48.37	36.13	61.61	46.03	35.5	Ch.No.2
Basal + 10 mg. terramycin HCl	48.40	36.45	64.10	48.29	33.9	Ch.No.1
Trial No. 2—May 9-September 26, 1953						
Basal	51.10	39.38	65.55	50.50	32.9	Ch.No.1
Basal + 10 mg. aureomycin HCl	49.40	37.10	64.18	48.20	38.4	Ch.No.1
Basal + 10 mg. terramycin HCl	49.70	37.38	63.95	48.10	36.5	Ch.No.1
Trial No. 3—November 14, 1953-March 6, 1954						
Basal	49.31	37.71	63.18	48.32	39.4	Ch.No.2
Basal + 10 mg. aureomycin HCl	49.70	37.30	62.95	47.24	41.6	Ch.No.2
Basal + 10 mg. terramycin HCl	48.92	36.74	63.26	47.50	40.4	Ch.No.2
Trial No. 4—May 15-October 8, 1954						
Basal	47.04	36.02	59.81	45.80	38.8	Ch.No.1
Basal + 10 mg. aureomycin HCl	47.80	36.90	59.84	45.90	39.5	Ch.No.1
Basal + 10 mg. terramycin HCl	47.78	37.31	60.98	47.61	36.4	Ch.No.1
Summary of the four trials						
Basal	48.91	37.25	62.88	47.88	36.3	Ch.No.2
Basal + 10 mg. aureomycin HCl	48.82	36.86	62.15	46.84	38.8	Ch.No.2
Basal + 10 mg. terramycin HCl	48.70	36.97	63.07	47.88	36.8	Ch.No.1

1. Based on chilled carcass weight.
2. Based on net body weight.
3. Grade based on the official U.S. Standards for Grades of Pork Carcasses.

Beef Cattle

Ratio of Roughage to Concentrate for Fattening Heifers, 1954.

PROJECT 222

D. Richardson, F. H. Baker, E. F. Smith, and R. F. Cox

This is the third test in an experiment planned to secure information on the effects of different levels of roughage on average daily gain, feed required per unit of gain, carcass quality, and digestibility of the ration. Kansas normally produces a large quantity of roughage. It is desirable to have information concerning the maximum amount of roughage that can be used in fattening rations, consistent with maximum and economical gains.

Experimental Procedure

Fifty Hereford heifers were divided into five lots as equally as possible on the basis of weight, size, conformation, and previous treatment. The heifers were wintered, 10 per lot, as calves on the following rations: (1) alfalfa hay and 3 pounds of corn; (2) Atlas sorghum silage, 2 pounds milo grain, and 1 pound cottonseed meal; (3) Atlas sorghum silage and 3 pounds special supplement; (4) prairie hay, 2.6 pounds milo grain, and 1 pound cottonseed meal; (5) corn cobs, 2.25 pounds milo grain, and 1.5 pounds cottonseed meal. Two heifers from each lot on the above wintering rations were allotted to each of the five lots in this experiment. That gave a total of 10 animals per lot.

The feeds used were good quality, chopped alfalfa hay, coarsely cracked milo grain, and corn. One lot of animals received corn so that a comparison of milo grain and corn could be made. Water, salt, and ground limestone were provided free choice at all times.

After starting the animals on feed, the grain was increased until each lot was on the ration indicated as follows:

Lot 1—1 pound of alfalfa hay to 1 pound milo grain.
Lot 2—1 pound of alfalfa hay to 3 pounds milo grain.
Lot 3—1 pound of alfalfa hay to 3 pounds corn.
Lot 4—1 pound of alfalfa hay to 5 pounds milo grain.
Lot 5—Changing ratio, started at 2 pounds alfalfa hay to 1 pound milo grain. Each succeeding 28 days the grain was increased until the ratio was 1 pound hay to 4 pounds grain at the end of the test.

Eleven yearling steers were used to determine the digestibility of the ration when alfalfa hay and milo grain were fed at ratios of 1 to 1, 1 to 3, and 1 to 5. The steers were fed in stanchions, and canvas collection bags were used to collect the feces.

Results and Discussion

Table 38 gives a summary of the results obtained in the feedlot test. Corn produced better results than milo grain in this test; however, the reverse was true in a previous test. Lot 1 animals on equal parts of hay and grain made satisfactory gains but not so good as animals on a more concentrated ration. The gains were economical but the question arises as to the possibility of getting animals to average choice grade on this ration; and, if so, how long it would take.

Table 39 shows the average daily gains of animals based upon their wintering ration.

Table 40 gives the average percentage digestion of the various nutrients and the percent of total digestible nutrients on ratios of 1 to 1, 1 to 3, and 1 to 5 of hay and grain, respectively.

In general, best results have been obtained in the feedlot on the ratio of 1 part hay to 3 parts concentrates or 25 percent roughage. These digestion results agree with the feedlot tests.

Table 38.—Ratio of roughage to concentrates for fattening heifers.
(May 7-October 8, 1954—154 days)

Lot number	1	2	3	4	5
Ratio of roughage to concentrate	1 hay 1 milo	1 hay 3 milo	1 hay 3 corn	1 hay 5 milo	Changing ratio
Number heifers per lot	10	10	10	10	10
Av. initial wt., lbs.	518	512	511	515	518
Av. gain per heifer, lbs.	289	303	349	330	315
Av. daily gain per heifer, lbs.	1.88	1.97	2.27	2.14	2.04
Total feed per head, lbs.:					
Milo grain	1588	2183		2348	2002
Corn			2108		
Alfalfa hay	1657	950	925	771	1158
Av. daily feed per head, lbs.:					
Milo grain	10.3	14.2		15.2	13.0
Corn			13.7		
Alfalfa hay	10.7	6.2	6.0	5.0	7.5
Lbs. feed per 100 lbs. gain:					
Milo grain	549	720		711	635
Corn			604		
Alfalfa hay	573	313	265	234	368
Days to reach ratio	18	39	39	55	
Feed cost per 100 lbs. gain*	$21.10	$23.29	$19.92	$22.25	$21.46
% shrink to market	1.63	2.29	2.25	2.46	2.16
Av. dressing % (including cooler shrink)	59.8	60.9	61.8	61.0	60.0
Carcass grades:					
High choice				1	
Av. choice		2	4	3	2
Low choice	3	4	4	5	5
Top good	5	3	2	1	1
Av. good	1	1			2
Low good	1				
Marbling:					
Moderate		1	1		
Modest			6	6	4
Small	1	3	1	3	1
Slight	9	6	2	1	5

* Alfalfa hay per ton, $20; milo grain per cwt., $2.80; and corn per bu., $1.60.

Table 39.—Average daily gain per head based upon wintering rations with 10 animals per lot.

Previous treatment	Prairie hay, 2.6 milo, 1 C.S.M.	Corn cobs, 2.25 milo, 1.5 C.S.M.	Atlas sorgo silage, 3 special supplt.	Atlas sorgo silage, 2.0 milo, 1.0 C.S.M.	Alfalfa hay, 3.0 corn
Av. daily gain during 154-day fattening period	2.03	2.12	2.04	1.92	2.18

Table 40.—Average digestion coefficients of 11 yearling steers on different ratios of roughage to concentrate.

Ratio of alfalfa hay to milo grain	% Apparent Digestibility of— Crude protein	Ether extract	Crude fiber	N-free extract	% total dig. nutr.
1 to 1	64.6	50.8	51.7	75.0	61.7
1 to 3	66.1	64.0	57.5	79.6	69.0
1 to 5	63.2	62.3	49.2	78.9	68.5

Grinding and Pelleting Complete Rations for Fattening Beef Heifers, 1954.

PROJECT 222

F. H. Baker, E. F. Smith, D. Richardson, and R. F. Cox

Pelleted rations for fattening sheep have been studied rather extensively at several experiment stations. The results indicate that the feed efficiency and rate of gain of sheep fed pelleted rations are superior to those of similar sheep fed non-pelleted rations. A limited amount of data from other stations suggests that cattle may react similarly to pelleted rations. This experiment was designed to study the effect of both fine grinding and pelleting of rations on the fattening performance of beef heifers.

Procedure

Thirty light yearling heifers of good to choice quality were used. The heifers were purchased the fall of 1953, used in wintering tests until May 1, 1954, and grazed on native grass pasture during May and June. Assignment of the cattle to lots for this experiment was made on the basis of weight, feeder grade, and winter treatment.

The rations for the experiment were corn, 60 percent; cottonseed meal, 5 percent; molasses, 10 percent; and alfalfa hay, 25 percent. In starting the cattle on feed, this basic mixture was fed twice daily to all lots, and alfalfa hay was fed free choice. After the first month of the test the only hay fed to the cattle was that contained in the mixed ration. The cattle in all lots were self-fed the complete ration after the first month of the test. The rations for the various lots were prepared in the following manner:

Lot 1—Coarsely cracked corn, cottonsed meal, and molasses were mixed together by a commercial feed mixer. The alfalfa hay was chopped as coarsely as possible in a forage chopper and mixed with the other portion of the ration as it was fed to the cattle.

Lot 2—The entire ration was ground as finely as possible and mixed by a commercial feed mixer.

Lot 3—This ration was ground and mixed as the ration for Lot 2, and then made into pellets 3/8 inch in diameter.

It is recognized that these rations in the quantities consumed by the heifers provide more protein than is normally fed to fattening cattle. The cottonseed meal was included in the mixture to insure that the daily protein intake would be adequate for maximum gains, even though

the total feed intake might be low in some of the lots. It is likewise recognized that 10 percent molasses may not be necessary for maximum gains; however, it was included in these rations to control the dustiness of the finely ground feeds.

Observations

1. The cattle fed the coarsely cracked corn and chopped hay (Lot 1) made significantly faster gains than the cattle fed the finely ground or the pelleted rations. Likewise, the cattle of Lot 1 had higher carcass grades, dressing percentages, and marbling scores than the cattle of the other two lots.
2. Despite their lower rate of gain, the feed efficiency of the cattle fed the pelleted ration was as high as that of the cattle fed the coarsely cracked corn and chopped hay.
3. It was apparent that the low feed consumption certainly contributed to the lower gains of the cattle fed the finely ground and pelleted rations.
4. The absence of rumination (cud-chewing) was quite evident among the heifers of Lots 2 and 3, which were fed the finely ground and the pelleted rations, respectively. In the later stages of the test the heifers of both Lots 2 and 3 exhibited a strong desire for coarse roughage. They chewed vigorously on the wooden fences and ate every sprig of bedding that was placed in their pen.

Table 41.—A study of the preparation of rations for fattening heifers.
(July 3-October 23, 1954—112 days)

Lot number	1	2	3
Management	Chopped hay and coarsely ground grain ration	Finely ground ration	Pelleted ration
Number heifers per lot	10	10	10
Initial wt.	590	590	592
Final wt.	869	797	811
Gain per heifer	279	207	219
Daily gain per heifer	2.49	1.85	1.96
Daily ration per heifer, lbs.:			
Corn	11.88	9.28	9.14
Cottonseed meal	.98	.77	.76
Molasses	1.96	1.55	1.52
Alfalfa hay	6.62	5.53	5.48
Salt	.01	.02	.03
Lbs. feed required per cwt. of gain:			
Corn	474.84	502.15	467.65
Cottonseed meal	39.57	41.84	38.97
Molasses	79.14	83.69	77.94
Alfalfa hay	265.66	302.71	280.01
Salt	.43	1.21	1.78
Feed cost per cwt. gain	$22.77	$24.42	$23.57
Initial cost of heifer @ $18.00	$106.20	$106.20	$106.56
Feed cost per heifer	$63.53	$50.55	$51.62
Heifer cost plus feed cost	$169.73	$156.75	$158.18
Market wt., lbs.	844	780	795
Necessary selling price per cwt.	$20.11	$20.10	$19.90
Selling price per cwt.	$23.50	$22.50	$22.50
Dressing %	60.9	59.5	59.1
Carcass grades:			
Choice	6	2	1
Good	4	8	9

Table 41 (Continued).

Marbling score:			
Moderate	1		
Modest	5	1	
Small	1	5	4
Slight	2	4	4
Traces	1		2

Feed prices: corn, $2.70 per cwt.; cottonseed meal, $80 per ton; alfalfa hay, $22 per ton; molasses, $2 per cwt.; salt, $15 per ton; mixing feed, $4 per ton; pelleting, $2 per ton; grinding, $5 per ton.

Fundamental Nutrition Studies of Sorghum Roughages and Grains.

A Comparison of Rolled, Coarsely Ground, and Finely Ground Milo Grain for Fattening Yearling Heifers, 1954.

PROJECT 222

F. H. Baker, E. F. Smith, R. F. Cox, and D. Richardson

Thirty light yearling Hereford heifers were used in this experiment. The heifers were purchased in the fall of 1953, used in wintering tests until May 1, 1954, and grazed on native grass pasture from May 1 to July 1, 1954. In allotting the heifers for this test, consideration was given to weight, feeder grade, and previous treatment.

The rolled milo was dry rolled and appeared satisfactory upon emergence from the roller; however, after sacking and when finally fed, it was in small particles and somewhat powdered. The coarsely ground or cracked milo was the product of a burr mill. A hammer mill was used to prepare the finely ground milo, which was ground to a coarse, mealy mixture.

The heifers were hand-fed twice daily, according to appetite, until they were on full feed (35 days). During the remainder of the experiment, 5 pounds of alfalfa hay was fed once daily and the grain was self-fed. Fresh water and salt were available at all times.

Observations

1. The daily consumption of finely ground milo by the heifers in Lot 1 was slightly lower than consumption of coarsely ground and rolled milo by heifers of Lots 2 and 3, respectively. The heifers in Lots 1 and 3 used the feed more efficiently than did the heifers of Lot 2.
2. The gains of the heifers fed finely ground milo and of those fed rolled milo were materially higher than those of the heifers fed coarsely ground milo.
3. The selling price, dressing percentage, marbling scores, and carcass grades of the heifers fed coarsely ground milo were slightly lower than either those fed finely ground or rolled milo.

Table 42.—A comparison of rolled, coarsely ground, and finely ground milo grain for fattening heifers.
(July 3-October 23, 1954—112 days)

Lot number	1	2	3
Management	Finely ground milo	Coarsely ground milo	Rolled milo
Number heifers per lot	10	10	10
Initial wt. per heifer, lbs.	592	588	590
Final wt. per heifer, lbs.	848	818	853