Av. final wt., lbs.	492	491	500	532
Av. gain, lbs.	132	131	140	172
Av. daily gain, lbs.	1.17	1.15	1.23	1.52
Av. daily ration, lbs.:				
Alfalfa silage	22.72[1]	22.12	22.13	
Alfalfa hay	.38[2]			7.18
Ground shelled corn	1.45	3.04	2.08	3.04
Cottonseed meal			.96	
Mineral[3]	.06	.07	.05	.06
Salt	.04	.04	.03	.04
Feed required per 100 lbs. gain, lbs.:				
Alfalfa silage	1943.98[1]	1912.65	1841.48	
Alfalfa hay	32.17			472.83
Ground shelled corn	123.69	263.50	173.34	200.35
Cottonseed meal			79.68	
Mineral[3]	5.00	5.98	4.12	3.85
Salt	3.48	3.45	2.65	2.62
Daily feed cost per head	$ .18	$ .18	$ .19	$ .18
Feed cost per 100 lbs. gain	15.29	15.48	15.50	11.81

1. Contained .07 pound corn per pound of silage.
2. Fed January 2 to January 13 only.
3. Composed of two parts steamed bonemeal and one part salt.

Observations

1. The greatest gains were produced by alfalfa hay plus 3.04 pounds of corn (Lot 6). These gains were statistically significant. Comparing Lot 6 with Lot 4, about 473 pounds of hay and 200 pounds of corn replaced 1913 pounds of silage and 264 pounds of corn in producing 100 pounds of winter gains. Likewise, the gains were distinctly more economical with the hay than with silage.

2. Gains and efficiency of gains on the cornmeal-preserved alfalfa silage and non-preserved silage plus corn were practically equal (Lots 3 and 4).

3. The substitution of .96 pound of cottonseed meal for an equal amount of ground shelled corn increased the average daily gains .08 pound but the difference was not statistically significant (Lots 4 and 5).

Fattening Heifers on Milo Grain and Sorghum Silage.

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

Milo grain and sorghum silage are extensively used in fattening rations for beef cattle in Kansas. A fattening ration composed of milo grain and sorghum silage contains sufficient protein to meet the recommended protein allowances of fattening beef cattle. It seems possible that the protein supplement fed with such a ration could be materially reduced if not completely eliminated.

Feedstuffs commonly used for fattening cattle in Kansas contain sufficient trace minerals to prevent deficiencies. However, numerous field reports suggest that the addition of trace minerals to a fattening ration may improve cattle gains.

An experiment has been initiated to study the protein and trace mineral needs of beef cattle fattened on milo grain and sorghum silage. Twenty Hereford heifers were divided into four lots of five heifers each. The heifers of Lot 14 are fed only sorghum silage, milo grain, and 1/10 pound of ground limestone per head daily, while those in Lot 15 are fed the same ration plus a trace mineral mixture containing manganese, iodine, cobalt, copper, iron, and zinc. The heifers of Lots 16 and 17 are fed 1 pound of cottonseed meal in addition to the respective rations of Lots 14 and 15. The milo grain is being self-fed to the heifers, while the remainder of the ration is fed once daily.

No conclusion can be made at this time; however, the results to date indicate that cattle gains can be increased by adding protein to a milo grain-sorghum silage ration and that trace minerals are not beneficial in such a ration.

Wintering, Grazing, and Fattening Heifers; Wintering Heifer Calves To Be Fattened for the Fall Market, 1953-54.

PROJECT 253-2

E. F. Smith, F. H. Baker, D. L. Good, R. F. Cox, D. L. Mackintosh

This is a progress report on the wintering phase of this test. Following this phase, the heifers will be grazed together on bluestem until July 15, then full fed 100 days in drylot. The purpose of this test is to determine if heifers can be wintered on dry grass or a low plane of nutrition, grazed during the early summer, and produce satisfactory slaughter animals for the fall market after a short full-feeding period.

Experimental Procedure

Twenty good quality Hereford heifer calves, 10 head to a lot, were used in this study. They originated in the vicinity of Pueblo, Colo., and were delivered to Manhattan, Kan., for 18.5 cents a pound. About one week after arrival, they were branded and vaccinated. One week later, December 17, 1953, they were started on test.

The system of management planned for each lot follows:

Lot 7—wintered on dry bluestem pasture supplemented with 1 to 2 pounds of cottonseed cake per head daily; grazed on bluestem pasture May 1 to July 15; full fed in drylot 100 days.

Lot 8—Wintered in drylot on Atlas sorgo silage. 1 pound of cottonseed meal, and 2 pounds of milo grain per head daily; grazed on bluestem pasture May 1 to July 15; full fed in drylot 100 days.

A bonemeal and salt mixture was offered free choice to all lots.

Lot 8 was fed 1 pound of cottonseed cake per head daily all winter, except during March and the first part of April, when the cake was increased to 2 pounds per head daily.

Table 9.—Wintering Heifer Calves To Be Fattened for the Early Fall Market.

Phase 1—Wintering—December 17, 1953-April 7, 1954—112 days

Lot number	7	8
Place of wintering	Dry bluestem pasture	Drylot
Number of heifers per lot	10	10
Initial wt. per heifer	360	357
Final wt. per heifer	450	547
Gain per heifer	90	190
Daily gain per heifer	.80	1.70
Daily ration per heifer (av.):		
Cottonseed meal or pellets	1.32	1.00
Milo		2.00

Atlas sorgo silage		23.46
Dry bluestem	Free choice	
Mineral (salt, bonemeal)	Free choice	Free choice
Salt	Free choice	Free choice
Feed cost per heifer[1]	$8.55	$20.31
Feed cost per 100 lbs. gain[1]	9.50	10.69

1. Feed prices may be found on page 27 of this publication.

Observations

1. The winter was mild, open, dry, and favorable for wintering on dry grass.
2. The heifers in Lot 7 wintered on dry grass made a favorable gain at a rather low feed cost. They had sufficient dry grass to winter on, in pastures that were lightly stocked the previous season.
3. Exceptionally good gains were made by the heifers in Lot 8 and they show more "fleshing" than those in Lot 7.

Ratio of Roughage to Concentrate for Fattening Heifers, 1953.

PROJECT 222

D. Richardson, E. F. Smith, R. F. Cox, and E. K. Keating

Beef cattle are naturally large consumers of roughage. The relative cost of producing or purchasing roughages throughout Kansas is normally less than for grain and other concentrates. 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. This is the second trial in an experiment which was 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 selling price. This trial was planned also to determine the effect of previous wintering rations on fattening ability, the relative value of milo grain and corn for fattening, and effect on carcass quality.

Experimental Procedure

Fifty Hereford heifers were divided into five lots as equally as possible on the basis of weight, size, conformation, and previous treatment. These heifers were wintered as calves on the following rations: (1) alfalfa hay, (2) Atlas sorghum silage, 2 pounds of corn and 1 pound of soybean oilmeal pellets, (3) Atlas sorghum silage and 3 pounds of special supplement, (4) prairie hay, 4.9 pounds of corn and 1.25 pounds of soybean oilmeal pellets, (5) corn cobs, 4.9 pounds of corn and 1.9 pounds of soybean oilmeal pellets.

There were 10 animals on each of these rations. Each of the five lots in this experiment had two heifers from each of the five previous treatments.

A mixture of one-half alfalfa and one-half bromegrass hay which had been chopped to facilitate mixing was used as the roughage. Coarsely ground corn and milo grain were used as the concentrates except in Lots 2, 4, and 5, where soybean oilmeal was added to maintain the same level of protein in all lots. Chemical analyses of feeds used in this experiment are shown in Table No. 36 in the back of this circular. 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 following rations:

Lot 1—3 pounds of milo grain to 1 pound of hay.

Lot 2—moving ratio started with 1 pound of corn to 1 pound of hay for first 28 days and each succeeding 28 days the corn was increased by 1 pound so that at the end of the feeding period the ratio was 4 pounds of corn to 1 pound of hay.

Lot 3—1 pound of corn to 1 pound of hay.

Lot 4—3 pounds of corn to 1 pound of hay.

Lot 5—5 pounds of corn to 1 pound of hay.

The feeding period was from May 14 to August 13, 1953. Table 10 gives a summary of the results. Table 10a gives the average daily gain of the 10 animals per lot when summarized on the basis of their wintering ration.

Table 10.—Ratio of Roughage to Concentrates for Fattening Heifers.
(May 14-August 13, 1953—91 days.)

Lot number	1	2	3	4	5
Ratio of roughage to concentrate	1 hay 3 milo	changing ratio	1 hay 1 corn	1 hay 3 corn	1 hay 5 corn
No. heifers per lot	10	10	10	10	10
Av. initial wt., lbs.	638	638	639	638	637
Av. daily gain per heifer, lbs.	2.27	1.77	1.83	1.97	2.34
Total days on feed	91	91	91	91	91
Total feed, lbs., per head:					
Milo grain	1561				
Corn		1092	1035	1263	1435
Hay	657	698	1045	663	507
Soybean oilmeal		16.9		23.5	36.8
Average daily feed per head, lbs.:					
Milo grain	17.1				
Corn		12	11.4	13.9	15.8
Hay	7.2	7.7	11.5	6.2	5.6
Soybean oilmeal		.19		.26	.40
Feed per 100 lbs. gain:					
Milo grain	754				
Corn		674	623	706	674
Hay	318	431	630	370	238
Soybean oilmeal		10.4		13.1	17.3
Feed cost per 100 lbs. gain*	$26.28	$26.79	$28.06	$26.82	$23.97
Selling price per 100 lbs.	21.00	19.50	20.50	21.00	22.00
Av. dressing percent (including cooler shrink)	59.4	58.0	58.3	58.8	60.0
Carcass grades:					
Low prime	1		1		
High choice					1
Av. choice		1		2	1

* Corn per bu., $1.60; milo grain per cwt., $2.80; soybean oilmeal per ton, $95; bromegrass hay per ton, $25; and alfalfa hay per ton, $40.