

ing ration of sorghum grain, prairie hay, and a protein concentrate. Improved performance has been obtained when trace minerals were added to fattening rations of corn, prairie hay, and a protein concentrate. Ground limestone has been fed in all the fattening trials to furnish adequate calcium.

Experimental Procedure

Forty-nine head of good to choice Hereford heifers were divided on the basis of previous treatment and weight into 5 lots, 9 in 1 lot and 10 in each of the other 4 lots. The heifers were purchased as calves in the fall of 1957 near Clovis, N.M., and had been wintered and summer grazed on bluestem pastures near Manhattan prior to the experiment. They were fed corn on pasture for about 10 days before being moved to dry lot and starting on experiment.

Lots 1 and 2 were fed the control ration of corn, protein supplement, prairie hay, and ground limestone, lots 3, 4, and 5 received added trace minerals and lot 5 received bonemeal instead of ground limestone to observe the value of added phosphorus.

The corn was self-fed and prairie hay was fed daily in quantities readily eaten. Soybean meal was fed once daily with the daily allowance of ground limestone, or bonemeal in the case of lot 5, mixed with it.

The trace minerals were fed as a trace mineral premix and were added to the soybean meal to furnish these quantities in milligrams per head daily: cobalt 1.25, copper 3.65, iodine 1.97, iron 46.13, manganese 56.3, and zinc 3.42.

Observations

The addition of trace minerals to the rations of the heifers in lots 3 and 4 increased the gain an average of 0.33 pound per head daily, with only a slight improvement in efficiency of gain over lots 1 and 2. The carcasses in general were about the same; however, carcasses from lot 3 (a trace mineral lot) graded slightly lower.

Additional phosphorus, about 9 grams per head daily (lot 5), failed to improve performance.

The improvement in gain, noted in this test where trace minerals were fed, was slightly lower than the average of 0.47 pound per head daily achieved in two previous trials.

Table 9

The value of supplementary trace minerals and trace minerals plus bonemeal in a fattening ration.

August 7, 1958, to November 10, 1958—95 days.

Lot number	1	2	3	4	5
Number of heifers per lot	10	10	9 ¹	10	9
	No supplementary trace minerals	No supplementary trace minerals	Trace minerals added ¹	Trace minerals added ²	Trace minerals ² and bonemeal added
Management					
Initial wt. per heifer, lbs.	778	780	775	792	789
Final wt. per heifer, lbs.	1021	1034	1058	1069	1075
Gain per heifer, lbs. ..	243	254	283	277	286
Daily gain per heifer, lbs.	2.56	2.67	2.98	2.92	3.01
Daily ration per heifer, lbs.:					
Ground corn, self-fed	17.3	18.0	18.3	19.2	19.3
Soybean meal	1.5	1.5	1.5	1.5	1.5
Prairie hay	3.7	3.8	3.9	3.7	3.9
Salt	.05	.03	.04	.05	.04
Ground limestone ..	0.10	0.10	0.10	0.10	
Bonemeal					0.17
Trace minerals ²	No	No	Yes	Yes	Yes

Table 9 (Continued)

Feed per cwt. gain, lbs.:					
Corn	677	672	616	657	642
Soybean meal	59	56	50	51	50
Prairie hay	144	141	130	128	130
Cost of feed per cwt. gain ⁴	\$18.60	18.38	16.81	17.78	17.71
Total feed cost	\$45.20	46.68	47.58	49.26	50.65
Selling price per cwt. ⁵ ..	\$24.26	24.29	23.96	24.76	24.55
Dressing percent	58.6	58.3	58.2	59.6	60.0
Carcass grades, USDA:					
Low choice	1	3		2	2
High good	2	5	4	5	5
Av. good	3				1
Low good	3	2	3	3	
High standard	1		2		1
Av. thickness of finish, score ⁶	3.9	3.8	3.8	4.1	3.7
Av. degree of marbling, score ⁶ ..	7.7	6.9	7.4	7.2	7.0
Av. size of rib-eye, score ⁷	4.3	4.2	4.2	4.5	4.1

1. One heifer died, cause unknown.

2. These quantities were fed in mg. per head daily: cobalt, 1.25; copper, 3.65; iodine, 1.97; iron, 46.13; manganese, 56.3; and zinc, 3.42.

3. See table on inside back cover page of bulletin for feed prices.

4. Selling price was computed on the basis of carcass grade, weight, and carcass price: choice, \$42.50 cwt.; high and av. good, \$41.50; low good, \$41; and standard, \$40.50.

5. Scores for thickness of finish: moderate, 3; modest, 4.

6. Scores for degree of marbling: small amount, 7; slight amount, 8.

7. Scores for size of rib-eye: modestly large, 4; slightly small, 5.

Feeding Two Levels of Alfalfa Hay to Heifer Calves on Winter Bluestem Pasture, 1957-1958, and a Three-Year Summary, 1955-1958. Project 253-2.

E. F. Smith, B. A. Koch, F. W. Boren, and D. L. Good

This experiment was designed to collect data in regard to the optimum level of alfalfa hay feeding for calves wintered on bluestem pasture. One group of heifers was fed twice as much alfalfa hay as another, but the supplemental total digestible nutrient intake was maintained at about the same level by feeding grain to heifers on the lower level of alfalfa hay. Two previous tests are reported in Circulars 349 and 358.

Experimental Procedure

In the third experiment reported here, 20 heifers, originating near Clovis, N.M., were assigned to the following experimental treatments on the basis of weight:

Pasture 8. Fed 4 pounds of alfalfa hay and 2.6 pounds of ground corn per head daily.

Pasture 13. Fed 8 pounds of alfalfa hay per head daily.

The 4 pounds of alfalfa and 2.6 pounds of corn fed to heifers in pasture 8 furnished approximately the same amount of total digestible nutrients as the 8 pounds of alfalfa hay fed to the heifers in pasture 13.

Sufficient old grass was available in both pastures, and the heifers had free access to salt and a bonemeal and salt mixture of equal parts by weight.

After the wintering period, the heifers were grazed without supplemental feed until July 19.

Observations, 1957-1958

Apparently 4 pounds of alfalfa hay furnished adequate protein and other nutrients that are supplied by alfalfa hay since the heifers receiving this treatment, with supplementary total digestible nutrient intake equalized, gained 0.17 pound more per head daily than heifers receiving 8 pounds of alfalfa hay per head daily.

For the winter and summer periods combined, heifers fed 4 pounds of alfalfa hay and 2.6 pounds of corn per head daily gained about 10 percent more than heifers fed 8 pounds of alfalfa hay.

The economy of the two rations would depend on the relative cost of hay and grain. With current prices, the all-alfalfa hay ration would be fully as efficient a ration as the alfalfa and grain combined.

This test demonstrates how alfalfa hay feeding on winter pasture can be reduced from 8 to 4 pounds per head daily with satisfactory results, if the difference in hay intake is made up by feeding about 2½ pounds of corn.

Table 10

Two levels of alfalfa hay for wintering heifer calves on bluestem pasture.
Wintering—December 14, 1957, to April 19, 1958—127 days.

Pasture number	13	8
Number of heifers	10	10
Initial wt. per heifer, lbs.	525	518
Gain per heifer	73	94
Daily gain per heifer	0.57	0.74
Daily ration per heifer, lbs.:		
Alfalfa hay	8.0	4.0
Ground shelled corn		2.6
Bluestem pasture		Free choice
Salt		Free choice
Bonemeal and salt		Free choice
Feed cost per heifer ¹	8.13	11.65

Grazing—April 19, 1958, to July 19, 1958—91 days.

Initial wt. per heifer	598	612
Gain per heifer	164	171
Daily gain per heifer	1.80	1.88
Feed cost per heifer	\$16.00	16.00

Summary—December 14, 1957, to July 19, 1958—218 days.

Initial wt. per heifer	525	518
Final wt. per heifer	762	783
Gain per heifer	237	265
Daily gain per heifer	1.09	1.22
Feed cost per heifer ¹	\$24.13	27.65
Feed cost per cwt. gain ¹	\$10.18	10.43

1. Feed prices may be found on inside back cover.

Three-Year Summary, 1955-58

For the three-year summary (Table 11), the 3.7 pounds of alfalfa hay and 2.2 pounds of corn fed per head daily to the heifers in pasture 2 produced .20 pound more gain per head daily during the winter and 9 percent more gain for the winter and summer combined than the 7.3 pounds of alfalfa hay fed per head daily to pasture 1. This trend has been the same in each of the three years tested.

Apparently 3 to 4 pounds of alfalfa hay furnishes adequate protein and other nutrients supplied by alfalfa hay, since this lot, when fed 2-2.5 pounds of corn per head daily to equalize total digestible nutrient intake, gained as much or more than heifers fed 7 to 8 pounds of alfalfa hay per head daily.

A comparison of costs of production with the two rations would depend on the relative cost of hay and grain. When alfalfa hay is unavailable or high in price, this test demonstrates a low level that can be fed with satisfactory results.

Table 11

Three-Year Summary

A comparison of two levels of alfalfa hay for wintering heifer calves on bluestem pasture, 1955-1958.

Wintering—December to April—126.7 days (average)...

Pasture number	1	2
Total number of heifers in test	31	30
Initial wt. per heifer, lbs.	492	488
Gain per heifer	43	68
Daily gain per heifer	0.34	0.54
Daily ration per heifer, lbs.:		
Alfalfa hay	7.3	3.7
Ground shelled corn		2.2
Bluestem pasture		Free choice
Salt		Free choice
Bonemeal and salt mixture		Free choice
Feed cost per heifer ¹	\$11.75	14.22

Grazing—107.7 days.

Initial wt. per heifer	535	556
Gain per heifer	196	194
Daily gain per heifer	1.82	1.80
Feed cost per heifer	\$16.00	16.00

Summary—234.4 days.

Initial wt. per heifer	492	488
Final wt. per heifer	731	750
Gain per heifer	239	262
Daily gain per heifer	1.02	1.12
Feed cost per heifer ¹	\$27.75	30.22
Feed cost per cwt. gain ¹	\$11.61	11.53

1. Feed prices: Alfalfa hay, \$20 per ton; corn, \$2.50 per cwt.; pasture, \$16 for summer and \$0.50 per head monthly for winter use.

Different Methods of Managing Bluestem Pastures, 1958. Projects 253-3 and 258-5.

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This experiment is to determine effects of different stocking rates, deferred grazing, and pasture burning on cattle gains, productivity of pastures and range condition as determined by plant population changes. In addition to the yearly report, a summary of cattle gains for the past nine years of the study is included.

Experimental Procedure

Two-year-old Hereford steers with an average USDA feeder grade of High Good were used to stock the pastures. They had been purchased as calves from near McRose, N.M., and had been used in this study as yearlings during the summer of 1957. During the winter of 1957-58 they were wintered on bluestem pasture and supplemented with about 2 pounds of soybean pellets per head daily until mid-January and were then moved to drylot and fed prairie hay with about 4 pounds of alfalfa hay per head daily. This ration was continued until May 1, 1958.

The method of management of each pasture was:

Pasture 1. Normal stocking rate, 4 acres per head.

Pasture 2. Overstocked, 3 acres per head.

Pasture 3. Understocked, 6 acres per head.

Pastures 4, 5, 6. Deferred grazing, 4 acres per head.

All steers in the deferred group were held in pastures 4 and 5 until June 16, then turned into deferred pasture 6 until August 16. From August 16 until September 2 the steers were in all three pastures. Sep-