

Beef Cattle

The Effect of Added Calcium and Phosphorus with and without Added Protein in the Ration of Steers on Bluestem Pasture (Project 253-1).

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This experiment was designed to evaluate the desirability of supplementing bluestem pasture calves as indicated in the title.

Forty Hereford steer calves were divided into four lots of 10 each and fed the following experimental rations per head daily:

Lot 1. Two pounds of dehydrated molasses (a molasses product dried on soybean hulls).

Lot 2. Two pounds of dehydrated molasses and 39.1 grams of dicalcium phosphate.

Lot 3. One pound of dehydrated molasses and 1 pound of 41% corn gluten meal.

Lot 4. One pound of dehydrated molasses and 1 pound of 41% corn gluten meal plus 29.6 grams of dicalcium phosphate.

The trial was started February 18, 1961, with steers weighing about 445 pounds each. They were all pastured together on a 190-acre bluestem pasture, gathered each morning, divided into different lots and fed. This procedure was continued until October 5, 1961, when they were fed three times per week instead of every day. The ration was increased so three feedings provided the same ration as the previous seven. The experimental ration was discontinued August 21, 1962, and the cattle were started on feed consisting of ground sorghum grain, soybean meal and hay. September 7, 1962, the steers were moved into drylot and put on full feed until November 28, 1962.

The cattle were weighed every 28 days, and a blood sample was obtained from the jugular vein of each animal, and analyzed for calcium and phosphorus as soon as possible after collection. Hematocrit values were also determined.

At the beginning of the trial a bone sample was obtained from the coccygeal vertebra and a tooth was extracted to determine the effects of added mineral on the amount deposited in the bone and teeth. The procedure was repeated at the completion of the third and sixth months and at slaughter. These samples were placed in a sharp freeze and are being analyzed now.

The chemical analysis of the ration is presented in Table 1.

The approximate quantity of calcium and phosphorus received per day per 700-pound steer is shown in Table 2. Grass consumption was calculated on the basis of 2 pounds dry matter intake per 100 pounds live weight.

Blood calcium, phosphorus and hematocrit values for 17 months are shown in Table 3.

Table 1
Chemical analysis of ration ingredients.

Feeds	% Protein	% Calcium	% Phosphorus
Corn gluten meal	43.63	0.05	0.98
Molasses product	6.25	0.73	0.16
Little bluestem	5.32*	0.43	0.09
Dicalcium phosphate .....	.....	22.33	20.56

* During the winter months % protein was 2.80.

(20)

Table 2
Daily calcium and phosphorus allowance and ratios.

Lot	Calcium (gms.)	Phosphorus (gms.)	Ca-P-Ratio
1	23.95	7.17	4.7 - 1
2	42.69	15.21	2.8 - 1
3	30.87	10.89	2.8 - 1
4	37.47	16.97	2.2 - 1

The blood calcium and phosphorus varied, depending on the season of the year. Serum calcium reached a peak during April and declined during May, June and July. Then it slowly increased to another peak in October and November, and then declined to a low during January, February and March. Supplemental calcium had no apparent effect on serum calcium.

Blood phosphorus reached a peak during March and April and little fluctuation appeared until June and July, when the blood level declined

Table 3
Calcium, phosphorus and hematocrit values.
(Blood values in mgs./100 mls. blood)

Lot	Calcium	Phosphorus	Hematocrit
1	10.48	5.64	36.02
2	10.29	6.82	34.35
3	10.40	6.33	35.51
4	10.34	6.45	37.15

to a low in October and November, followed by a gradual increase to a peak the following March and April. In contrast to calcium, blood phosphorus supplementation tended to increase blood phosphorus.

Carcass grades were very uniform, with no apparent treatment differences. None of the steers graded choice, while 32 graded good and eight, standard. The standard grade was uniformly distributed among lots.

Average weights and daily gains are shown in Table 4. Adding protein to Lots 3 and 4 gave a highly significant increase in gain over Lots 1 and 2 for the entire period. Gain differences between Lots 1 and 2 or between Lots 3 and 4 were not significant.

Table 4
Weight gain as affected by added calcium and phosphorus on steers with and without added protein on bluestem pasture.

Lots	Starting wt. 2/18/61	Weight 8/21/62	Av. daily gain*		Av. daily gain 2/18/61 11/28/62
			2/18/61 8/21/62	8/21/62 11/28/62	
1	438	820	.69	2.15	.93
2	455	822	.67	2.19	.86
3	441	917	.87	2.13	1.08
4	457	922	.85	1.90	1.02

* Represents average daily gain while in drylot on feed.

(21)

Dicalcium Phosphate and Vitamin A for Calves on Winter Bluestem Pasture, 1962-63 (Project 253).

E. F. Smith, D. Richardson, F. W. Boren and C. L. Drake

The 40 steer calves, 10 per lot, used in this experiment were good to choice Herefords from near Fort Davis, Texas, and were assigned on a random-weight basis to their treatments. They were pastured together in a 190-acre bluestem pasture, penned three times weekly, divided into treatment groups and fed the experimental diets shown in Table 5. The lots receiving dicalcium phosphate (0.1 pound per steer daily) and vitamin A (10,000 I.U. daily) received it mixed with the soybean meal.

The results of the trial to date are reported in Table 6. Apparently dicalcium phosphate, Vitamin A or a combination of the two had no effect.

Table 5

Dicalcium phosphate and vitamin A for calves on winter bluestem pasture.

December 8, 1962, to April 1, 1963—114 days.

Lot no.	12A	12B	12C	12D
Treatment	Control	Dicalcium phosphate	Vitamin A	Dicalcium phosphate and vitamin A
No. of steers	10	10	10	10
Initial wt., lbs.	372	378	375	382
Daily gain per steer	.20	.23	.23	.23
Daily ration per steer, lbs.:				
Soybean meal	1.0	1.0	1.0	1.0
Ground sorghum grain	1.0	1.0	1.0	1.0
Dicalcium phosphate	.....	0.1	.....	0.1
Vitamin A, 10,000 I.U. daily	.....	.....	Yes	Yes
Bluestem pasture	.....	Free choice	.....	.....
Salt	.....	Free choice	.....	.....

The Value of Dicalcium Phosphate, Vitamin A, and Grinding Sorghum Grain for Calves Fed Prairie Hay, 1962-63 (Projects 253-4 and 253-6).

E. F. Smith, F. W. Boren, D. Richardson and J. E. Kramer

The 60 steer and heifer calves, six steers and four heifers per lot, used in this experiment, were good to choice grade Herefords from near Fort Davis, Texas, and were assigned on a random-weight basis to their treatments. All lots received all the prairie hay they would consume, 4 pounds of sorghum grain, and 1 pound of soybean meal per head daily. Where vitamin A (10,000 I.U. daily) and dicalcium phosphate (0.1 pound per head daily) were fed they were mixed with the soybean meal. In the lots fed ground sorghum grain, it was ground medium fine.

The results of trial to date are reported in Table 6. Grinding the sorghum grain fed to Lots 19, 21 and 23 increased gains on an average of 0.21 pound per animal daily, dicalcium phosphate increased gains about half this amount but vitamin A had no effect. Feed efficiency was directly related to rate of gain. The phosphorus and carotene content of the feeds used is reported in Table 6. The phosphorus content of the basic ration without dicalcium phosphate was estimated at about 12 grams daily and the carotene content of the basic ration without vitamin A added at about 115 mgs. of carotene; both equal or exceed the requirements published by the National Research Council.

Table 6
The value of dicalcium phosphate, vitamin A, and grinding sorghum grain for calves fed prairie hay.
December 7, 1962, to March 29, 1963—112 days.

Lot no.	18	19	20	21	22	23
Treatment	Whole grain sorghum grain, dical. vitamin A	Ground sorghum grain, dical. vitamin A	Whole grain sorghum grain, dical. vitamin A	Ground sorghum grain, dical. vitamin A	Whole grain sorghum grain, dical. vitamin A	Ground sorghum grain, dical. vitamin A
Animals per lot	10	10	10	10	10	10
Initial wt., lbs.	528	526	525	527	529	528
Daily gain, lbs.	1.01	1.15	.96	1.19	.84	1.11
Daily ration per calf, lbs.:						
Sorghum grain	4.0	4.0	4.0	4.0	4.0	4.0
Soybean meal	1.0	1.0	1.0	1.0	1.0	1.0
Prairie hay	12.4	12.3	12.6	12.5	12.4	12.5
Dicalcium phosphate	0.10	0.10	0.10	0.10	.....	.....
Vitamin A, 10,000 I.U. daily	Yes	Yes	.....	.....	.....	.....
Salt	.....	.....	.....	.....	.....	.....
Feed per cwt. gain, lbs.:						
Sorghum grain	392	343	414	333	471	357
Soybean meal	99	87	105	84	119	90
Prairie hay	1226	1068	1317	1048	1483	1126