Phosphorus Requirements of Fattening Yearling Steers

L. S. POPE, JACK McCROSKEY, DWIGHT STEPHENS, A. D. TILLMAN, AND GEORGE WALLER

Recent basic research using the artificial rumen, radioisotopes, digestion studies and growth trials have raised questions as to the optimum amount of phosphorus in fattening rations for beef cattle. There is some indication that the amount of phosphorus required to maintain the health, normal blood level and proper bone development of growing and fattening steers may be less than that required by rumen bacteria for best utilization of fibrous feeds. Some workers feel that the phosphorus requirement of the rumen bacteria may be higher than that required by the host animal. Generally, fattening rations contain relatively large amounts of phosphorus since they are high in grain and protein supplements which are rich feed sources of phosphorus. Most fattening rations will run better than 0.2 per cent phosphorus, which has been considered ample for the steer. Whether or not this is optimum for the rumen bacteria remains to be shown.

To investigate this problem and more clearly define the phosphorus requirements of fattening cattle, a feeding test involving 60 yearling steers was initiated in September, 1957, at the Fort Reno station. The effect of different levels of phosphorus intake on the weight gains of fattening steers during a 150-day trial was studied.

Procedure

Sixty, long-yearling, Hereford steers from the Lake Carl Blackwell herd were used in these trials. An initial shrunk weight (18 hours off feed and water) was taken at the start of the trial. The steers were divided into six uniform groups on the basis of weight, feeder grade, previous treatment, and summer gain. Two groups were then selected at random and received one of three different levels of phosphorus in the ration.

The cattle were fed all the sorghum silage they would consume, plus 10 lb. ground milo and 1.5 lb. protein supplement per steer daily. The protein supplement was composed of soybean meal, urea, dried molasses and minerals. No phosphorus supplement was added to the ration fed the basal group (Lot 1), while additions of monosodium phosphate were made to Lots 2 and 3 to provide increasing levels of phosphorus. Thus the phosphorus intake from the protein supplement, milo and silage was approximately 0.2, 0.3 and 0.4 percent of the dry matter of the ration for Lots 1, 2 & 3, respectively. Where monosodium phosphate was added to the supplements fed Lots 2 and 3, sufficient calcium carbonate was included to maintain a constant calcium phosphorus ratio of approximately 1.5 to 1 in all rations. Salt was available to the steers of all lots.

The cattle were fed once daily, with the silage intake adjusted ac-

cording to appetite. At the completion of 150 days on test, a shrunk weight (16 hours off feed and water) was obtained. The cattle have been continued on their respective supplements and the milo has been increased to a full feed. They will be marketed in early April and further results and slaughter data obtained at that time. The results reported herein cover only the first 150 days of the trial.

Results

A summary of the results obtained with duplicate lots of steers fed rations containing different amounts of phosphorus are shown in Table 1.

The results at the end of 150 days on test indicate no beneficial effect from the addition of increasing amounts of phosphorus to the ration of steers in Lots 2 and 3. Gains of the steers were 2.34, 2.32 and 2.27 lb. per head daily when fed rations containing approximately 0.2, 0.3 and 0.4 percent phosphorus, respectively. Thus, increasing the level of phosphorus above that contained in the basal ration did not have any beneficial effect on the performance of the cattle.

It is also apparent from the average silage consumption as shown in Table 1 that the appetites of cattle in Lots 2 and 3 were not improved. Silage was fed according to appetite, but intake was essentially the same in all lots throughout the test. In certain early work, increasing

Table 1.—Effect of different levels of phosphorus in fattening rations of yearling steers (150 days).

Lot number % Phosphorus in ration (dry matter basis)	1 0.23	2 0.32	3 0.41
Number of steers per lot	20	20	20
Average weights (lb.)			
Initial 9/27/57	742	740	742
Final 2/24/58	1093	1088	1083
Average total gain	351	348	341
Average daily gain	2.34	2.32	2.27
Average daily ration (lb.)			
Sorghum silage	46.1	46.5	45.2
Ground milo	10.0	10.0	10.0
Supplement with stilbestrol[1]	1.5	1.7	1.8
Salt	.07	.07	.07
Feed required per cwt. gain (lb.)			
Silage	1970	2004	1988
Milo	429	431	440
Supplement	64	73	79
Feed cost per cwt. gain ($)[2]	20.67	21.21	21.51

[1] Supplements fed all lots supplied 10 lb. soybean meal, .088 lb. urea ("two sixty two" compound) and .41 lb. dried molasses per steer daily. Sufficient stilbestrol premix was included to supply 10 mg. per head daily. In addition, calcium carbonate was added at the rate of .024, .075 and .129 lbs., and monosodium phosphate at levels none, .087 and .173 lb. per steer daily for Lots 1, 2 and 3, respectively.

[2] No charge was made for the minerals added to the supplements fed.

the level of phosphorus in the ration tended to increase appetite. There was no apparent indication of such an effect in this test. Since the gains of all lots were similar, and the average daily feed consumption was essentially the same, little difference was observed in the feed required per 100 lb. of gain. Feed cost per 100 lb. gain was lowest for the basal lot, even though no charge was made for the additional minerals added to rations fed Lots 2 and 3. There was no apparent difference in appearance or slaughter condition of the cattle at the end of 150 days on feed.

Summary

A fattening trial was conducted involving sixty, long-yearling steers fed high-silage rations containing approximately 0.2, 0.3 and 0.4 percent phosphorus in the dry matter of the ration. Results from the 150-day test indicate that the basal ration, containing about 0.2 percent phosphorus, was adequate, as evidenced by daily gains, feed consumption, and feed required per 100 lb. gain.

Effect of Pelleting Roughage for Beef Calves

JACK McCROSKEY, L. S. POPE AND KENNETH URBAN

Increasing the consumption and utilization of roughage by beef cattle has been a critical problem for many years. Recent tests have indicated that pelleting feeds may increase feed consumption and efficiency of utilization. At present prices, the cost of fine grinding and pelleting of feeds limits the practical use of this method of feed preparation for cattle and sheep. However, increased costs of feed processing may be offset by greater gains and feed efficiency. A pilot trial was initiated at the Fort Reno station in the fall of 1957 to test the effect of pelleting a roughage mixture containing equal parts of finely ground alfalfa hay and cottonseed hulls on the consumption and utilization of roughage by steer and heifer calves.

Procedure

This test was designed so that comparisons could be made between pelleted and chopped roughage when either mixture was fed free choice, or in equal and controlled amounts. In addition, a palatability test was made to determine which form of roughage the calves preferred when both were offered on a free-choice basis. The roughage mixture was composed of equal parts of average quality alfalfa hay and cottonseed hulls, with 5 percent molasses added to each mixture. In order to pellet the roughage, fine grinding of the alfalfa hay was necessary. Pellets (¾ inch in diameter) were made from the mixture. The chopped roughage was identical to the pelleted roughage mixture except that the alfalfa hay was coarsely ground.

All lots received equal amounts of a concentrate mixture composed of milo and cottonseed meal to assure normal gains. A small