

for all groups. The average gain for those fed plain salt (Lots 1 and 2) was 4 lbs. less than the gain of those fed trace mineralized salt (Lots 3 and 4), and those fed Aureomycin (Lots 2 and 4) gained 3 lbs. less than those not fed Aureomycin. Therefore, the provision of neither trace minerals nor Aureomycin was of any apparent value for increasing gains of yearling steers grazing native grass at the Lake Blackwell experimental range area.

Table 1.—Trace Mineralized Salt and Aureomycin for Grazing Yearling Beef Steers on Native Grass.¹

Lot number	1	2	3	4
Salt ²	Plain	Plain	T.M.	T.M.
Aureomycin ³	--	94 mg.	--	94 mg.
Number of steers per lot	18	18	18	18
Average weight per steer (lbs.)				
May 31, 1960	522	525	525	524
September 24	699	692	699	703
Gain (116 days)	177	167	174	179
Average daily intake				
Salt, gms.	20	20	14	20
Dicalcium phosphate, gms.	10	10	7	10
Aureomycin, mgs.	--	94	--	94

¹Allowed to graze in native grass pastures (Bluestem and associated grasses) which provided about 6 acres per steer.

²The salt fed in Lots 1 and 2 was Morton Farm and Ranch clear salt. Morton Trace Mineralized Salt was fed in Lots 3 and 4. In all lots two pounds of salt was mixed with one pound of dicalcium phosphate and fed ad libitum in the pastures.

³Aureomycin furnished as Aurofac 25. Mixture available in Lots 2 and 4 was 6900 gms. salt, 3,450 gms. dicalcium phosphate, and 625 gms. Aurofac 25 (55 mg. chlortetracycline per gm.) in the early part of the test. The quantity of Aurofac 25 was 580 gms. in the later part of the test.

Lysine Supplementation of Rations for Sheep

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It is well accepted that the first limiting amino acid in the various sorghum grains is lysine. It is also common knowledge that expeller processed cottonseed meal also is deficient in this amino acid, thus a ration composed primarily of the sorghum grains and expeller meal is deficient in lysine. When this ration is fed to non-ruminants, supplemental lysine causes a significant increase in growth. Many workers have reported, however, that lysine supplementation of ruminant rations in which all the ration nitrogen was supplied by urea was not effective in stimulating gains, indicating that ruminant microflora are able to synthesize lysine readily. Recently, workers at Purdue University and Pfizer's Agricultural Research Laboratory reported that lysine supple-

mentation of cattle fattening rations caused increase growth rate, thereby reopening the question of rate of lysine synthesis in the rumen. Thus it appeared desirable to determine the effect of added lysine upon gains of lambs fed fattening-type ration composed primarily of sorghum grain and expeller cottonseed meal.

Experimental Procedure

The composition of the basal ration (ration 1) is shown in Table 1. The experimental ration (ration 2) contained in addition, 445 mg. of L-lysine monohydrochloride per lb. of feed.

Twenty lambs weighing on the average 76 lbs. were divided on the basis of weight into two balanced groups and individually-fed the rations *ad libitum*. The animals were weighed and feed consumption data tabulated at 14-day intervals during the 45-day trial. A 16-hour shrink period during which time, feed, and water were not available preceded the initial and final weights.

Table 1.—Composition of the Basal Ration

Ingredient	Percent
Cottonseed hulls	10.00
Alfalfa meal	10.00
Molasses	5.00
Ground, milo	69.30
Cottonseed meal	5.00
Urea	0.20
Sodium Chloride	0.25
Calcium Carbonate	0.20
Vitamins A and D*	0.05

*Quadrex, Nopco Chemical Co., Harrison, New Jersey. Supplied 20,000 I.U. of Vitamin A and 2,500 USP units of Vitamin D₂ per gram.

Results and Discussion

The results are summarized in Table 2 and it is evident that lysine supplementation did not affect rate or efficiency of gain. These results support the earlier results from Cornell University, in which they found that the rumen fluid from sheep fed urea as the sole source of ration nitrogen contained high levels of lysine, indicating that the rumen microflora were able to synthesize lysine quite readily if non-protein nitrogen and a readily available carbohydrate source was provided in the ration. Later results by Oklahoma and Iowa workers indicate that lysine supplementation was of no benefit when fed to sheep receiving a purified diet in which the ration nitrogen was supplied by urea.

These results are not in accord with results reported by the Purdue

steers receiving 10 grams of lysine per day in a low protein ration did not perform any better than the control animals; however, when lysine was added to a ration containing a higher level of protein, gains were significantly improved by the same level of lysine. These workers interpreted their results to indicate that a lysine deficiency in ruminants became limiting only if rapid gains were being obtained. Because the sheep in the present experiment were gaining at a fast rate, our results do not support that idea; however, there were differences in ration composition that might have a bearing. Their rations contained ground corn instead of ground milo. Also there were minor differences in the composition of the rations. Basically, it is felt that these differences are not important in the rationalization of the overall problem; however, differences in experimental design may be important. As their animals were group-fed in a single pen for each treatment, the possibilities of pen location affecting gains were much greater than in our experiment in which the animals were individually-fed.

Table 2.—The Effect of Supplementary Lysine Upon Weight Gains and Feed Efficiency by Sheep

Rations	1 Basal Ration	2 Basal Plus Lysine
Total gain	234.00	230.00
Days on feed	45.00	45.00
Gain per animal	23.40	23.00
Average daily gain	0.52	0.51
Feed per 100 lb. gain	701.00	704.00

The Purdue workers reported that lysine supplementation improved gains when urea was included in fattening rations of steers. Again ration differences make a direct comparison impossible; however, it must be pointed out that they obtained increased gains in more than one group of cattle. The major grain in their trial was corn. Even though the preponderance of basic research results would indicate that lysine supplementation does not benefit ruminant animals, there still remains some doubt. Further carefully controlled feeding experiments will be necessary to answer this question.

Summary

Supplementation of a high energy ration containing sorghum grains and expeller processed cottonseed meal with 445 mg. of lysine per lb. of feed did not affect the gains or feed efficiency of lambs in a 45-day