Fertilized Pastures

legumes and perennial grasses respond to split-fertilization in range tests

R. M. Love and Alfred H. Murphy

Experimental pasture showing effect of different fertilizer treatments. Nitrogen rates increase from left to right.

Forage production on improved dryland pastures fertilized with nitrogen and phosphorus was increased tenfold over untreated pasture during the midwinter period of feed shortage, in a recent study with sheep at the Hopland Field Station.

Shortage and abundance of forage at various seasons of the year are typical of much of the rangeland in northern California. From December until the warm weather of spring is one of the periods of feed shortage. On a sheep operation this is usually a critical period because most flocks are lambing. Best lamb production can be realized only when both ewes and lambs have plenty of nutritious green feed available. Fertilizers can assist in alleviating this feed shortage.

Nitrogen and phosphorus fertilizers generally yield the best forage production on the north coast ranges, but the amounts to use and the best time of application are factors to be determined.

As a result of the high rainfall in the north coast area, there is considerable leaching of fall-applied fertilizer. Therefore, tests were designed wherein a part of the fertilizer would be applied in the fall and a part in the spring.

Three pastures—23, 30, and 36 acres—of rangeland were selected for the tests. Much of the land—typical of the north coastal rolling terrain—produced cereal hay for many years. Lowered soil fertility resulting from the continual hay production, without use of fertilizers—plus moderate erosion—left the land in poor condition.

For the experiments, the three fields of former hay land were cultivated and seeded to a mixture of Hardinggrass, tall fescue, rose, subterranean, crimson clovers, narrowleaf trefoil, and alfalfa.

Four rates of a nitrogen-phosphate-sulfate—16-20—mixture, one rate of phosphorus, and four rates of nitrogen-sulfur were used in these trials. The nitrogen-phosphorus and the phosphorus treatments were applied in both fall and spring. The nitrogen-sulfur—as ammonium sulfate—was applied in the fall.

Ground condition greatly restricts the flexibility of using tractor-drawn spreaders. Generally by December, pastures in the test areas are too wet to support tractors; thus the first application to the test pastures was made in October. The greatest difficulty was encountered in attempting to make an early spring application. It was almost April before the ground was dry enough for the second part of the split-fertilization. Consequently—under such conditions—the spring application would generally come too late to give the maximum benefit. This difficulty can be solved by airplane application if area is large enough.

Forage yield tests were started during the second growing season after planting. A flock of 150 head of Corriedale yearling ewes—weighing on the average 70 pounds—was grazed on the treated pastures so both animal gains and forage production could be evaluated.

The ewes were weighed in group lots before and after grazing each pasture. To assure uniform conditions, the animals were put in dry lot for 12 to 18 hours before weighing; thus the shrinkage would be as nearly uniform as possible at each weighing. The animals were not supplemented, except that salt with phenothiazine was supplied.

Pastures averaged 4" or better in height at grazing time and grazed to an average of 1½" when animals were removed.

Forage production was measured by clippings before and after grazing. Cages made of chicken wire were placed on the various fertilizer treatments, so a small area of ungrazed forage could be sampled and compared with a sample of grazed pasture. In this way, total forage production in any grazing period was measured.

The grazing animals first used the pastures in January and then were rotated on the three pastures until the middle of July. Using this pattern of grazing, varying rates of plant growth were encountered. From January to March, plant growth is slow; thus there is low feed production. As shown in the accompanying table, the untreated control yielded 335 pounds of dry matter, compared with almost 4,000 pounds as the high ammonium-phosphate treatment. The data for the yields, as given in the table, are restricted to the usual midwinter period of feed shortage to emphasize the results obtained in these fertilization trials.

Pasture Forage Production During Period of Feed Shortage—January to March

Dry Weight in Pounds Per Acre

Nitrogen applied as:				No nitrogen applied
Nitrogen rate of fertilizer	Ammonium phosphate 16–20	Ammonium sulphate 21%	Single super phosphate 18% at 200#/acre	Untreated control
16#	1447	1276		
33#	2154	2032	666	335
48#	2296	2216		
83#	3938	2369		

Meat production during period of feed shortage for yearling ewes: pounds per head per day—0.29; pounds per acre—28.9.

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