Improved Pastures

both sheep production and forage yield increased by range improvement

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Increases in the growth of forage and in pounds of lamb produced per acre were achieved by the use of fertilizers and introduced range plants in a study made at the Hopland Field Station during the winter and spring of 1956. In the low feed production period—January and February—the improved pastures yielded about three and one half times as much forage as untreated native range. Ewes with lambs were maintained in better condition and lambs gained slightly faster during the early winter months on the improved range compared to native pastures. However, by the end of May, the average lamb weight was the same in both groups. Also, the pasture treatment resulted in an increase of 141 sheep days per acre for the five-month period ending May 28.

The range pastures used in this study are typical of thousands of acres in northern California. The critical feed period occurs in the winter months, during and following lambing. Forage available during winter months sets the limits as to the carrying capacity of the range and the thriftiness of the livestock, unless they are given supplemental feed.

The improved pastures consisted of an 89-acre area divided into four roughly equal pastures. These pastures were seeded in the fall of 1952 to Hardinggrass, tall fescue, intermediate wheatgrass, narrowleaf trefoil, rose clover, subclover, crimson clover and alfalfa. From the planting year until the start of the experiment in 1956, the pastures were fertilized annually with varying rates of nitrogen and phosphorus. For the study, fertilizer—equivalent to 400 pounds per acre of 12-38-0—was applied in September, 1955. The vegetative cover in the pastures consists principally of annual grasses and weeds mixed with some Hardinggrass and subclover.

The native pastures make up a total area of 289 acres, divided about equally into four pastures varying from open grassland to heavy live oak cover with practically no forage production. The grassland forage consists principally of annual grasses, filaree, and annual clovers.

To estimate available forage, square-foot quadrats were clipped—at 16 locations in each pasture—just before the sheep were turned in. After the sheep were removed, quadrats were again clipped—this time inside and near exclosure cages at 16 locations. Then the exclosure cages were moved to new locations. Total forage production and animal utilization throughout the season were estimated from these clippings, which also were analyzed for crude protein.

Early forage growth—in December—was relatively rapid in the improved pastures as compared to the native pastures. By the end of January, the improved pastures had produced about 1,100 pounds of dry matter per acre. Growth continued slowly until mid-March, when it increased sharply and by late May about 4,300 pounds of forage had been produced.

In the native pastures forage production was nearly stable at 250 pounds per acre during December and January. Then growth increased slowly until, by mid-March, nearly 500 pounds of forage had been produced. In late March the growth rate increased, and by the end of May slightly more than 2,000 pounds per acre had been produced.

Forage from the improved pastures contained more protein than forage in the native pastures, until the first part of May, when the values were about equal.

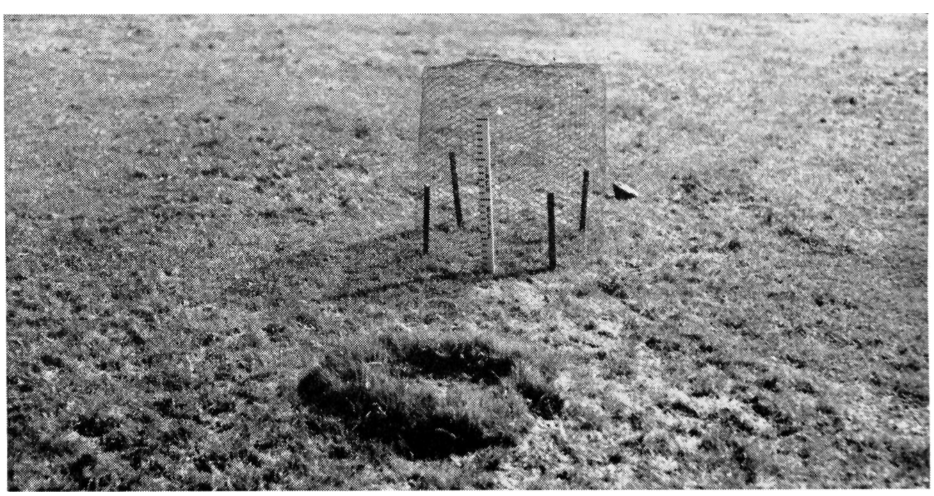
The increased production of high-protein forage in the improved pastures, particularly during the winter months, is attributed to fertilization. When fertilizer is not applied, the main source of available nitrogen in the soil is from the breakdown of organic matter. If temperatures are at or below 40°F the nitrogen-producing breakdown process takes place very slowly. Thus when temperatures are below 40°F the availability of nitrogen and mineral nutrients tied up in organic matter may be limited. The mean temperatures at Hopland Field Station were 43°F for December 1955, 41°F for January 1956, 40°F for February 1956 and 46°F for March 1956. Comparing those temperatures with the accompanying forage production, it seems reasonable to assume that the low temperatures limited the amount of nitrogen and phosphorus available for plant growth in the native pastures. Fertilization supplied these elements to the improved pastures and increased growth resulted.

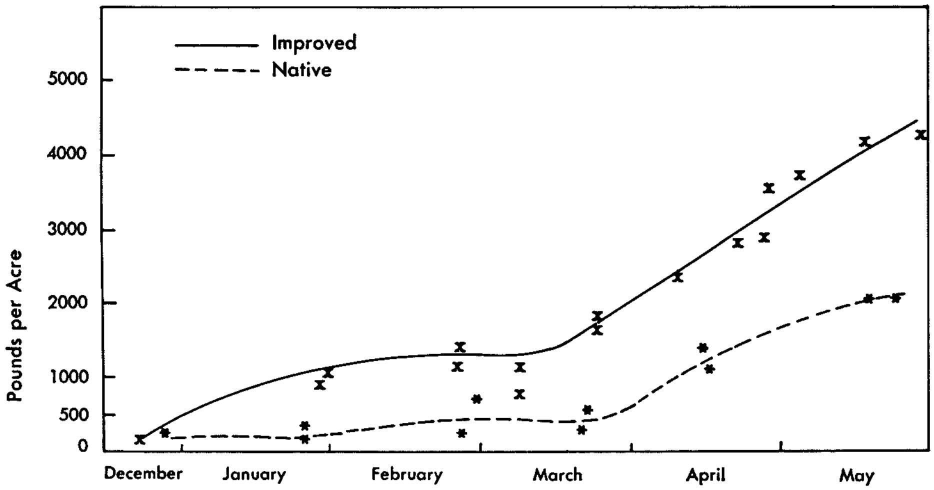
Estimates of deer use of one of the improved pastures—made by counting fecal droppings before the sheep went in and from actual deer counts in the pasture—indicated about 1.3 acres per head on the improved pasture and 5–6 acres per head on native range.

The lambs used in the experiment were from Corriedale ewes crossed with Southdown or Suffolk rams. The lamb weights reported are an average of the Suffolk-Southdown crosses. In each pasture type—improved or native—the ewes and lambs were rotated among the four pastures and individual animal weights were recorded each time the animals were moved.

Lambing began in late December and as the lambs were born the flock was divided into two groups. The first ewe in the Southdown group to lamb was put into the improved pasture. The second ewe in the Southdown group and her lamb went to the native range. The first ewe with a Suffolk lamb was put on the native range and the second ewe with her lamb went into the improved pas-

Experimental pasture showing a recently moved exclosure cage used to estimate forage production where sheep are grazing.



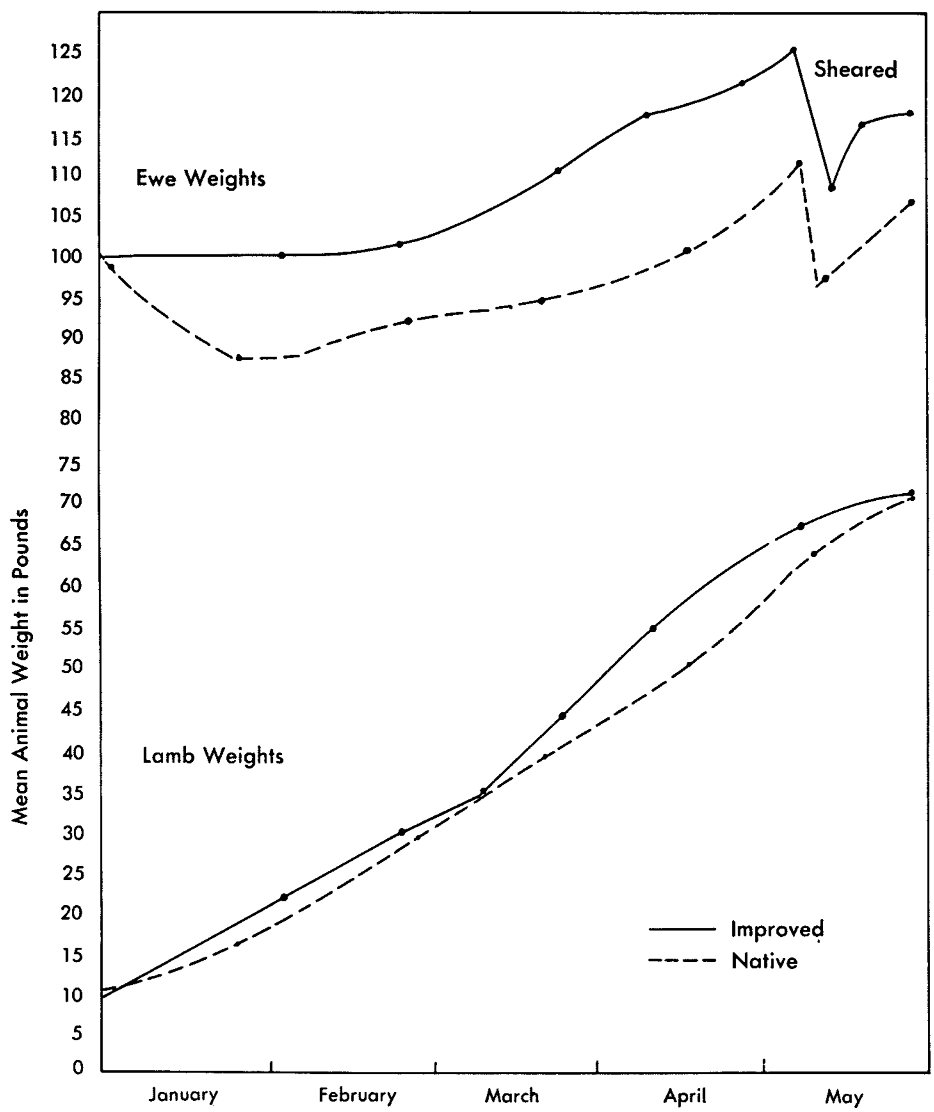


1956 cumulative forage production. Improved and native pastures.

ture. This alternating procedure continued until about 50 ewes with their lambs were in each type of pasture. These paired animals were used in making weight comparisons. Additional animals were put into the improved pastures until there were about 105 ewes with their lambs.

The most obvious difference between the two pasture types was seen in the pounds of lamb produced per acre. When the lambs were sold the improved pastures had produced 86 pounds of lamb per acre compared to 13 pounds per acre produced on the native range. During the five-month period of the experiment, wool production in the improved pasture amounted to 3.9 pounds per acre compared to 0.5 pound per acre on native range. In the same period, there were 172 sheep days per acre for the improved and 31 sheep days per acre for the native pastures.

1956 mean ewe and lamb weights. Improved and native pastures.



As shown in the larger graph on this page, ewes in the improved pastures maintained body weight through January 1956 and then slowly gained until the end of the experiment on May 28. Ewes on the native range lost nearly 10 pounds during January and continued to be 10–15 pounds lighter through May 28, when all ewes were returned to the range flock. By December 1, 1956, the average weight of ewes in both groups was the same.

The average lamb weight was higher in the improved pastures until the latter part of May, when the feed dried and the rate of gain dropped more than in the native pastures. There was no difference in lamb weights when they were removed from the pastures. At the end of the experiment the percentage of fat lambs was 27% for the native and 29% for the improved pastures.

The fact that both ewes and lambs weighed more early in the season in the improved pastures could be due to either a higher quality of feed in the improved pastures—as indicated by the higher protein content which lasted until about May 1—or to a greater quantity of feed available in the improved pastures or to a combination of the two conditions.

Forage clippings indicated that more forage was left in the improved than in the native pastures after the sheep were removed. The decreased rate of lamb weight gain during May in the improved pastures was thought to be due to the higher percentage of early-maturing annual grasses—such as foxtails, ripgut, nitgrass and others—than in the native pastures. These annual grasses are palatable before maturing, but tend to mature early and have little value as dry feed. The native pastures are also annual, but they contain a higher percentage of soft chess and filaree, which are more palatable and nutritious when dry.

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