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RANGE FERTILIZATION IN SAN LUIS OBISPO COUNTY

By

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FARM ADVISOR FACTS

THE FERTILIZATION ALTERNATIVE

With limits on the availability of rangeland and the high cost of buying or leasing such land, stockmen may consider range fertilization as a way of increasing livestock production without increasing acreage. For owners of small acreages the decision to fertilize may also be based on a cost comparison with supplemental feeds such as hay. Even for the commercial stockman, fertilization can reduce supplementation costs by increasing early green forage in the fall and winter and dry forage the next summer and fall.

RESULTS

The stockman first needs to know the expected response from fertilization on livestock gains so he can determine if the added income will be higher than the cost. The effects of fertilization on cattle gains and forage production as measured in research trials are summerized here:

Grazing trials

In 54 grazing trials conducted by University of California Cooperative Extension over a 15-year period, the effects of nitrogen fertilization were measured by weight gains of 7,650 cattle grazing on 16,800 acres of California rangeland in 21 counties. Hereford or Angus stocker steers weighing 350 to 600 pounds were used in most of these trials. The results were:

- -- Nitrogen fertilization increased carrying capacity from 38 head days per acre to 92.
- -- Beef production was increased from 60 pounds per acre to 170.
- -- Both first and second-year benefits were greater where nitrogen and sulfur or nitrogen and phosphorus were needed than where nitrogen alone was required. In two years, total extra beef per pound of nitrogen applied was 1.74 pounds from nitrogen alone, 2.75 pounds from nitrogen and sulfur, and 2.54 pounds from nitrogen and phosphorus.
- -- The number of grazing days was increased from 35 per season to 87-1/2.
- -- Greatest profit occurred in the 13 to 30-inch rainfall zone.

These tests results are reported in more detail in U.C. Agricultural Experiment Station Bulletin 846 entitled Effects of Nitrogenous Fertilizers on California Range as Measured by Weight Gains of Grazing Cattle, by W. E. Martin and L. J. Berry, September 1970.

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Forage trials

In various range fertilization trials conducted by Cooperative Extension during the 1960's and 70's in San Luis Obispo County, forage dry matter yields as measured by clipping or mowing were usually doubled or better by 40 to 80 pounds of nitrogen per acre plus phosphorus and/or sulfur if deficient.

These trials showed that the percent increase in yield can be greatest on years of low rainfall whereas the increase in pounds of forage is usually greatest on wet years. For example, in a trial south of San Luis Obispo, forage dry matter yields per acre were increased from 300 pounds to 1900 pounds (a 533 percent increase) with 80 pounds of nitrogen as 16-20-0 fertilizer on a low-rainfall year and from 2800 pounds to 7500 pounds (a 4700 pound increase) during a wet year.

For more information about the results of fertilization trials in specific locations, contact the Cooperative Extension office in San Luis Obispo.

ECONOMICS

We can see from the grazing trial results above that if one pound of nitrogen produces 1.74 or more pounds of beef, fertilization will pay for stocker cattle operations since a pound of beef is worth several times as much as a pound of nitrogen. The economics won't necessarily be the same for a cow-calf herd, however, since more forage is required per pound of gain than for stocker cattle while the value of calf gains is usually higher than for stockers.

Of course, the profitability of range fertilization will also vary with prices, soils, weather and management as well as the kind of livestock being grazed. Weather is especially variable. As shown by the results of the local trial mentioned previously, forage yields on fertilized range can fluctuate four-fold from one year to the next. So, although experimental results give us some basis for predicting the economics of range fertilization, these predictions are of limited reliability due to the number and variability of factors involved.

RECOMMENDATIONS

1. *Test for deficiencies.* This can be done with analytical soil and plant tests by a commercial laboratory. The soil should be tested for phosphorus. Soil tests for nitrogen and sulfur are not reliable indicators of the availability of these nutrients to plants. We assume that range plants will respond to nitrogen fertilizer unless a good stand of inoculated, nitrogen-fixing legumes is present. A plant analysis for sulfur will tell us if this element is needed.

   You can also fence several small areas and conduct simple exploratory tests for nitrogen, phosphorus and sulfur. Fencing the trials is a must since heavy grazing of fertilized plants will destroy the results.

   These tests are important because accurate answers will save you money. Suppose, for example, you learn that your forage will respond to an application of

* you should also test the soil for potassium (K) but it is seldom below levels needed for plant growth in our SLO Co. soils.

nitrogen and sulfur as well as to nitrogen, phosphorus and sulfur. Then you might apply 300 pounds of ammonium sulfate (21-0-0-24 1/). If, on the other hand, your range needed phosphorus in addition to nitrogen and sulfur, you would probably apply about 400 pounds of ammonium phosphate sulfate (16-20-0-15). The cost per acre of the 16-20-0-15 fertilization would be about twice as expensive as for the ammonium sulfate. Therefore, it is important to learn whether nitrogen alone, nitrogen and sulfur or nitrogen, phosphorus and sulfur give the most growth response.

You can't wisely select a fertilizer to apply unless you have the results of soil and plant laboratory tests or test plots to interpret. So, for fields you are planning to fertilize this year have a laboratory run a soil test for phosphorus now.* If the phosphorus level is 10 ppm or less (extracted by a sodium bicarbonate solution), an economical response from phosphorus fertilization can be expected. On fields you plan to fertilize in future years, put out test plots in the fall. Contact the Cooperative Extension office for information about these methods.

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2. *Fertilize before the first good rains.* A big advantage of range fertilization is the earlier production of green feed. So apply the material in time to do the most good.

3. *Don't skimp on the rate.* Apply 40 to 80 pounds of actual nitrogen per acre. Apply phosphate and/or sulfur in about the same amounts if they are required. Research has shown it is like swapping dollars to put on lighter rates of these elements. If you want to economize, decrease the acreage fertilized rather than the rate applied.

4. *Don't fertilize the same grass range year after year.* Residual response is often observed the second year after fertilization and possibly even the third year. So, applying nitrogen fertilizer every four years to the same field appears to be the best program. Fertilizing one-fourth of the acreage each year makes it easier to adjust cattle numbers to the forage production than if the entire acreage is fertilized every fourth year. This also spreads out the cost of fertilization.

5. *Graze the field in the same growing season the fertilizer is applied.* This will maximize the return on the investment in fertilizer.

6. *Stock enough animals to take advantage of the extra forage produced.* Since forage production is often doubled, it is suggested that the normal stocking density also be doubled.

7. *Remember that nitrogen fertilization is not for legume seedings.* All legumes (bur clover, sub clover, rose clover, vetch, barrel medic, alfalfa, etc.) thrive on phosphorus and/or sulfur but will supply nitrogen for themselves and

1/ These numbers stand for percentages of nitrogen, phosphate, potash and sulfur.

associated grasses if phosphorus, sulfur and the correct nitrogen-fixing bacteria are present. In fact, nitrogen fertilization of legumes results in the bacteria becoming lazy until the fertilizer nitrogen has been utilized by the plant. Then they begin to fix nitrogen again. It is, of course, much cheaper to let range legumes "grow" their own nitrogen than to buy it. So, for legume seedings, even when mixed with grasses, it is best to fertilize with phosphorus and sulfur, if deficient, but very little, if any, nitrogen. Because legumes store the nitrogen fixed in organic forms, they provide a longer residual effect than do the more soluble and easily leached inorganic nitrogen fertilizers.

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