TECHNICAL NOTES

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FERTILIZING DRYLAND PASTURE AND CRITICAL AREAS

There undoubtedly are several definitions of range management, perhaps nearly as many as there are groups working in the range field. However, from the standpoint of the livestock producer, range management may be defined as the continuing process of producing the greatest amount of palatable and nutritious feed for the class of livestock used during the grazing season. This would seem to indicate that not only are there several practices that might be combined to make up a management program, but that these factors may vary with the season of use and the class of livestock used in the range operation.

There are many aspects of range improvement and many tools that can be used to achieve better range management. We believe that pasture fertilization is one of these tools which may be combined with other tools to make up a management program. Other management tools of equal importance are stocking at the proper stage of plant growth, the leaving of adequate residues at the end of the grazing season, range seeding, both with annuals and perennials, brush and weed control, water development, and fencing, each of which is important in helping us achieve better range improvement.

When we speak of fertilizing, we are thinking of several types of fertilizing. Let me define them:

Fertilizing pastureland is the adding of natural or manufactured plant nutrients to the soil to maintain or improve the chemical or biological condition of the soil; to supply nutrients needed to stimulate plant growth and thereby help reduce soil and water losses. This is applicable on dryland pastures where rainfall is twelve inches or more, and soils are at least twenty inches deep. People usually evaluate fertilizing pastureland in terms of profit and gains; but profit and gains, and soil improvement, go hand in hand, and quite often the line between them is hard to distinguish.

Fertilizing rangeland is the adding of natural or manufactured plant nutrients to the soil to aid in the initial establishment of desirable plant species or improve plant cover for erosion control. This is applicable on all depleted or eroded rangeland where plant growth is too sparse to produce an adequate cover without fertilization.

Fertilizing critical areas is the adding of natural or manufactured plant nutrients to the soil to aid in the establishment of vegetative cover on silt-producing and severely eroded areas to stabilize the area so as to reduce damage from sediment and runoff to downstream areas, to prevent loss of soil by wind and water, and to improve wildlife. This is applicable on erodible soils such as gullies, slopes on diversion ditches; banks of roadfills and cuts; earth filled dams and their tops, slopes, spillway and borrow areas; dikes, levees, channel or waterway banks and bottoms, and any severely denuded area where vegetation is difficult to establish.

Now, let's talk about the weather.

The California climate in the winter range area is of the so-called "Mediterranean type" - that is, having mild, moist winters followed by long, hot, rainless summers, with a dry period of six or eight months. Few perennial species persist, and vegetation grown in the spring cures standing on the range to give a supply of dry feed for later use.

Under these conditions, annual grasses, legumes and forbs, which must start from seed each year, make up most of the forage. These include wild oats, soft chess, foxtail-like grasses and less desirable species, along with forbs such as filaree.

Grass growth on winter range starts soon after the first effective fall rains, usually in November or early December. Normally, it grows slowly during the winter. Winter temperatures are apparently too low to permit bacterial action which decomposes and mineralizes natural organic matter, thus releasing plant nutrients.

Nitrogen, therefore, seems to be one key to early grass growth, but it will be effective only if adequate supplies of phosphorus are present in the soil or are applied as fertilizer.

Tests have demonstrated clearly that supplemental nitrogen stimulates early and continued winter growth of annual grasses. Grass responds to nitrogen, even during the cold season when little growth would normally be expected.

Recently, the California Agricultural Experiment Station pinpointed the growth of soft chess during the winter with soil temperatures. Soft chess is our main range grass. It was found that soft chess growth increased very little when the average soil temperature dropped below 45° F. whether fertilized or unfertilized. The grass fertilized with nitrogen and phosphorus showed the greatest increase in growth compared with unfertilized grass when the average soil temperature was between 47° F. and 55° F. When the soil temperature went about 55° F., the difference between growth of fertilized and unfertilized grass decreased.

To understand this more clearly let us relate these soil temperatures to the growing season. Soil temperatures below 45° F. would usually occur during the months of December and January. This was the period of little grass growth. Soil temperatures of 47° F. to 55° F. generally occurred from February to the middle of March. This was the period of the rapid growth of grass fertilized with nitrogen and phosphorus as compared with the unfertilized grass. Soil temperatures above 55° F. occurred after the middle of March, and this is the period when the difference between the growth of fertilized and unfertilized grass decreased. This is the period when we have our rapid spring growth on our annual ranges.

This early feed from fertilizing will then provide grazing during periods when grasses normally don't grow, thus lessening the need for supplemental feeding of cattle. It lets your cattle put on gains earlier and over a longer period of time.

But equally important is the relieving of grazing pressure from the other rangeland and allowing it to produce strong feed and adequate cover for soil protection.

These findings back up the recommendations that the SCS has been using for years, and may help you explain better to interested persons why these differences occur.

Let's touch now for a few minutes on critical areas.

When we are working in critical areas, we are usually dealing with subsoils or areas that cannot adequately support plant growth. In these cases, one must add the essential nutrients needed for vegetative cover. We need a plant growth that is better than normal in order to provide the needed protection we want.

If adequate plant populations or seeds are present, then all that is needed is a good shot of fertilizer. If plant composition is not there -- and in most of our critical areas this is the case -- then seedings will have to be done in conjunction with fertilizing.

Time after time, I have seen critical areas seeded without the use of fertilizer, and in most cases the desired stand never developed. It is almost useless to expect larger yields or good cover unless you fertilize with the seeding.

One exception to this is when you have a wildfire or control burn. There are sufficient plant nutrients released after a fire to support good plant growth so that it is only necessary to seed. These available nutrients, after a fire, are nature's way of maintaining self perpetuation. However, this effect on nutrients, because of fire, lasts only one year. After the first year, you must supply the extra fertilizer needed, until you have the desired cover.

After we have seeded and fertilized the critical areas, and mulched the surface, if the situation so warrants, one has the tendency to think the job is completed. These areas need annual maintenance. This will be in the form of spot treatments of some areas, but most important is another shot of plant food. The fertilizing of these areas should be continued each year until such time as you have the desired protection.

Now, let's go back to pasture fertilization.

Fertilizers are expensive, and it would be uneconomical for a rancher to apply fertilizer to all of his range. We believe that a rancher should select the best range he has, and apply ample amounts of fertilizer to enough of the range to carry his stock for about four to six weeks. By doing this, the stock can be confined to the fertilized areas, giving the plants on the unfertilized parts of the range a chance to reach range readiness. In addition to the added amounts of feed you can get from the fertilized range, and the relieving of pressure on the unfertilized portion until it is ready to graze, you are reducing the amounts of supplements that would have to be fed during this period, and are at the same time making economical gains.

I mentioned that fertilization should be applied to the rancher's best rangeland. To get the most return for money invested, it is only logical that the better the soil, the more grass it will produce. Then, the selection of sites becomes an important factor. We have been able to correlate site selection with our soil classification and soil interpretations.

If we had two choices of where to fertilize, and one site had a potential of 1500 pounds of usable forage to the acre and the other had a potential of 500 pounds, which would we choose?

The site with the highest potential will pay off much more quickly than the site of lower potential. If we have too low a potential to start with, we can never get our money back, because, even under the best conditions, if just won't put out enough feed to pay off. However, the low, depleted sites can be highly benefitted by having the grazing pressure taken off and allowing them, through the years, to produce the maximum amount of feed, thus building up to their potential.

As a general rule, sites selected for dryland pasture fertilization should have an average rainfall of over 12 inches and the soils should be over 20 inches in depth. This is a good rule of thumb to use on any soils. Maybe more important in dryland pasture fertilization, is to know where not to fertilize. Sites that should not be fertilized would be shallow soil, droughty soils, areas of low rainfall, and soils with steep slopes. Soils that are very gravelly, highly acid, excessively wet, and severly eroded should not be fertilized, when your objective is to produce the maximum amount of forage for beef production.

As to the kinds and amounts of fertilizer to apply on the range, our work has shown that a combination of nitrogen and phosphorus has given the best results. The combination of the two has almost eliminated frost damage, and has promoted growth during the cool weather of early winter.

A minimum of approximately 30 to 40 pounds of nitrogen per acre, and an equal amount of phosphorus, applied annually in early fall, ahead of the first rains, have given the best results. However, the first time an area is fertilized, the rates should be doubled. This heavy initial application is needed the first year to overcome soil deficiencies and supply the elements to the plants, and is very important in maintaining maximum production the following years.

Here are some brief results of pasture fertilization:

Pleasanton found that you can expect a 3 1/2 to 4 times increase in forage production with fertilization.

The University of California found, in these tests conducted in many counties throughout California, that three times more beef was produced on fertilized pastureland.

One of our leading fertilizer companies found in their tests throughout California that they can expect four times more beef on fertilized pastureland.

In one test that is going on now with a District Cooperator in Merced County, four times more beef was produced last year on fertilized pasture than on unfertilized pasture.

Now, in summary, let us go over a few points.

Fertilizer must go on the field at the right time so that the grasses will respond. Grasses must be fed off at the right time. The right time occurs when enough new forage plants reach a height that will provide an adequate diet of nutrients and dry matter for grazing animals. Most of the forage intake may be made up of the past year's leached dry forage. When the range has been moderately used, the new forage plants provide most of the nutrients necessary for a balanced diet. Fertilizers must be applied at levels that will make grasses respond properly; and, at the same time, feeding must be regulated. Too heavy a feeding will not allow proper feed development, and therefore will shorten the life and usefulness of existent grasses.

The use of fertilizer on our rangeland can produce good results, but this use must be carefully regulated and planned. Otherwise, money can be wasted. When it has been applied correctly, pasture fertilization saves supplemental feeding, boosts forage production, increases nutrients in the feed, reduces the fluctuation in production between years, conserves moisture, reduces runoff and crowds out obnoxiuos weeds, as well as balancing out yearly range production and putting more money in the bank for the operator. But, equally important from a conservation standpoint -- and a point we should never forget -- is the fact that by pasture fertilization we are encouraging better overall grazing management by relieving the grazing pressure from the other rangeland, thus allowing it to produce strong feed, and providing improved cover for soil protection on the entire unit.