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Grassland Farming

by

Liter E. Spence

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Know Agriculture! ***Grow Grass!***

Cooperative Extension Work In Agriculture and Home Economics, D. R. Theophilus, Director, University of Idaho College of Agriculture and United States Department of Agriculture Cooperating.
Issued in furtherance of the acts of May 8 and June 30, 1914.

Grassland Farming

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Liter E. Spence

Grass is universal in its distribution and has faithfully served man through the ages, but little thought has been given to it as a crop. The poorer land is devoted to grass, little attention given to its requirements for full production, and the measurement of its production has been in terms of the grazing animal.

Now a change is taking place. Farmers and ranchers are learning that grass is a crop to be grown with the same consideration we give to any other crop. It will produce a profit equal to or exceeding any other crop we can grow on dry or irrigated land. Farmers are also learning that the amount of stubble maintained in our pastures the year round has a good deal more to do with grass production than whims of weather. Grassland farming is becoming important in farmers' eyes.

The term "grassland farming" refers to the use of grasses and legumes in a cropping system to fit the needs of each farm or ranch. It has "come of age" because of the recognized need for increasing and maintaining the soil's organic matter to aid in controlling erosion and conserving water. Complementary effects on crops following a grassland rotation include improvement in soil structure or tilth, water absorption, water-holding capacity, drainage and increased production of successive crops. While legumes have been used considerably for this purpose, grasses are a valuable addition and, as a team with legumes, offer many advantages.

Tilth and nutrients primarily determine high production from a soil viewpoint. The extensive fibrous root systems of grasses literally till the soil when growing vigorously and abundantly. On the average, the ratio of top growth to root growth in our grasses is nearly one to four. For every ton of top growth produced, grass also produces 4 tons of root growth. A large part of these roots dies each year leaving many tiny channels for the rapid penetration of water into the soil. These decaying plant parts add organic matter to the soil to increase its water-holding capacity. When this occurs, the soil takes up water more rapidly and needs less time for proper irrigation.

Grassland farming is more than using grasses and legumes adequately in the cropping system. To obtain the fullest value of grasses and legumes in the rotation, make sure that they grow vigorously. This results in a maximum of top growth for forage and a corresponding increase in the amount of root growth or organic matter which the grasses add to the soil each year.

To grow grass as a crop we need to know and understand why

and how it grows and develops as it does. Livestock growers understand fat livestock. The grazing animal is a processing plant using grass as the raw material. We can fatten cattle or starve them. Grass is also a processing plant, using water, air, and minerals as its raw materials. The machinery for processing these raw materials is located in the top growth where the plant foods are manufactured. We can fatten grass or starve it depending upon the amount of top growth maintained year round.

The sods in Figure 1 were taken from pastures. The "fat" grass had 2 years' protection from grazing; the "lean" grass had 1 year's protection; and the "starved" grass had been grazed to time of sampling. This can be compared to the maintenance of varying stubble heights resulting from grazing. The pictured sods were 3 inches thick when removed and planted in containers, allowed to grow for 6 weeks in a greenhouse, then removed and washed free of soil. The resulting root growth produced was in proportion to the plant foods stored in the roots and crowns of the plants. Same grass, same soil, same moisture.

The amount of plant foods or "grass fat" stored each year in the roots and crowns depends upon the maintenance of adequate stubble the year round. Fat grass in turn produces fat soil, for where it grows the soil is less subject to erosion, conserves water better, maintains an increased nutrient supply, and increases production on successive crops.

In this respect, native, dry-land pasture and range operate on the same principles of plant growth as do our irrigated pastures. Under dry land conditions, only one crop of forage can be harvested. Production is limited because the supply of available moisture is limited. On irrigated pastures, we harvest two or more crops.

Figure 1

A vigorous, healthy pasture will be largely weed-free and will prevent invasion of undesirable plants. The soil shown in Figure 2 is 18 inches deep. This is native bunchgrass range. The spacing of the bunches is determined largely by available moisture. Note the extensive growth of fibrous roots throughout the profile. There is no evidence of undesirable plants. This range

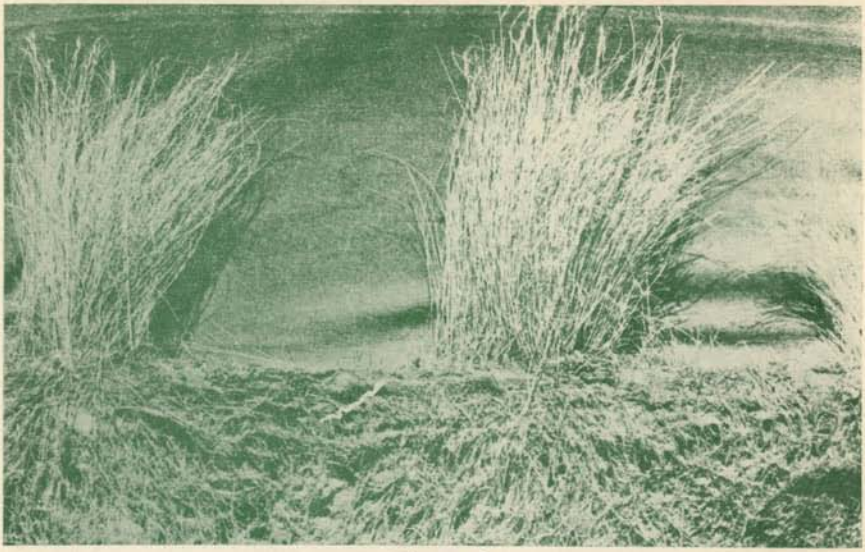

Figure 2

is in "fat" condition. Soil and water losses are reduced to a minimum.

Forage is not the only value received from cropland pastures, for the full benefit is not received until the pasture is plowed up and successive crops grown. This residual effect can pay all the costs of the pasture. A Canyon county farmer reported that his pastures, maintained in vigorous growing condition before being plowed up, increased his sugar beet crop by 10 tons per acre. To this farmer, 500 pounds of beef produced per acre on pasture is net profit.

GROWTH REQUIREMENTS FOR PERENNIAL GRASSES

Moderately cropping a pasture favors production. Nature provides grasses with two types of buds. A seasonal bud functions with the seasons without further stimulation. The emergency buds are stimulated to growth only when the plant is injured. Cropping is a type of injury. Thus stimulated, these buds may produce both top growth and root growth. In Figure 3, the shoot on the right grew from a seasonal bud. The stem to the left was cropped, and emergency buds produced a top growth shoot and a root shoot. Because of this characteristic, pastures maintained with an adequate stubble produce significantly large amounts of forage compared either to closely grazed pastures or those that remain ungrazed.

Top Growth

The best single guide to use for producing the most profitable

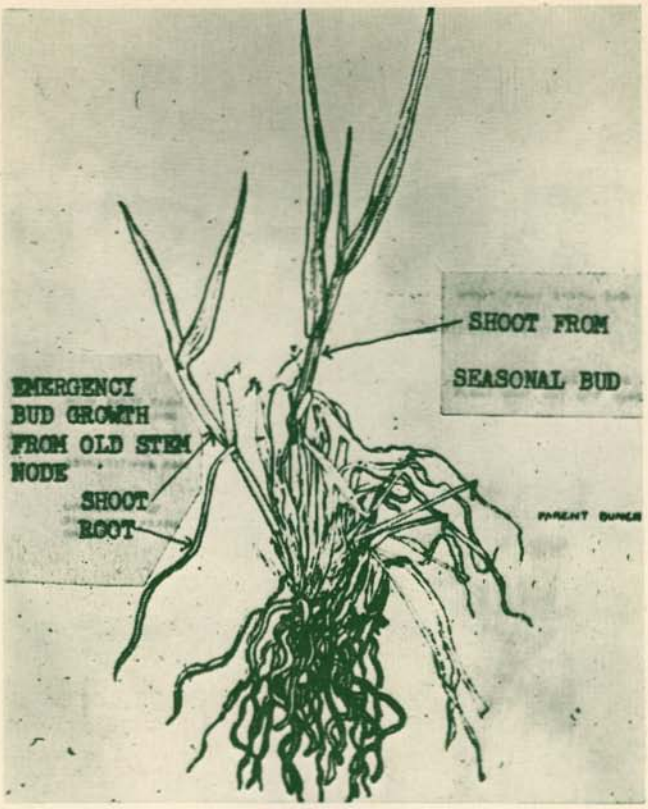

Figure 3

pasture is to maintain an adequate stubble. This guide answers the questions of how long to graze and pasture. Let's examine further some of the reasons for maintaining a comparatively high stubble the year round.

Grasses and legumes have two cycles of growth or activity. At the time seed heads begin to appear, the production of plant foods exceeds the demands of the plant and begins to be translocated to the roots and crown of the plant for storage. This storage of excess plant foods continues until after seed is produced. Sometime during the fall, a large percentage of the roots die, and new roots grow back in their place. New buds are produced for next year's growth. All this growth is dependent largely on the food reserves in the roots. During this period, the movement of plant foods from the top growth to the roots continues. Thus, throughout the fall and winter, the plant continues to profit from the high stubble it has grown and which we have left for it.

After the growing season, and again until the seed heads begin to show, plant functions are supported largely by plant foods

Figure 4

stored in the roots. Even the rapid and abundant spring growth is largely the result of stored plant foods. Actual growth may start 30, 60, or 90 days before the snow leaves. It is this growth that is so important in shortening the livestock man's expensive winter feeding period, but it is possible only with adequate plant food storage. Thus we see that the treatment we give a pasture or hay field this season influences next year's production far more than the whims of weather.

Is such management, maintaining a 5 to 7 inch stubble, profitable management? Idaho farmers report that it is. Take, for example, two Idaho dairymen having similar operations but with quite a difference in the quality of their soils. The one with the poorer soil maintained adequate stubble; the other kept his stubble at less than half an adequate height. The careful farmer, even with the handicap of poor soil, computed his pasture's production at more than twice the income of the operator who maintained less than half as much stubble. Poor land or finest land will produce a grass crop with profits equal to or exceeding any other crop we can grow. Since the top growth is where plant food is manufactured, we increase production when we increase and maintain the amount of top growth or stubble. Root growth increases as the top growth is increased and decreases with the decrease in top growth.

Research on grasses is yielding new selections that are much improved in earliness or lateness in growth, production, and adaptability. Figure 4 indicates improvements in leafiness and production in selection of orchard grass.

To obtain the results from these better grasses, good grass management is essential.

MANAGEMENT PRACTICES

Management of grasslands is based on the growth requirements of the forage species as it is in growing other crops. If an operator has enough pasture for the grazing season, he will have an excess during the spring when growth is most rapid. In order to utilize the forage when it is most nutritious and acceptable to livestock, this excess can best be harvested as hay or put up as silage. In harvesting forage by grazing this is likewise the desire.

Rotation grazing is, in general, a profitable practice on dryland and irrigated pastures. Rotation usually occurs once a season on dryland and several times on irrigated pastures. The practice usually results in more uniform grazing of all forage present. It permits grazing or harvesting the forage when most palatable and nutritious to livestock. On irrigated pastures the intensity of rotation grazing can be carried on with 2-acre or 3-acre units. In turn, these rotation pastures may be further divided by electric fences to provide a new pasture daily. This system of daily or ration grazing is the newest development in pasture management.

Under a system of rotation grazing, the pasture is irrigated about once a week after grazing. The pasture soil dries before stock are turned in again and no real damage from trampling results. Dividing a single, large pasture into two units is a step toward better management. Successive divisions are further improvements.

Each farm or ranch operation presents its own problems. The likes and dislikes of the operator also help determine the pasture program. There is a combination of practices that will fit each farm or ranch for a program of improved forage production, but no one recommendation applies to all. In subdividing pastures it will simplify the operation if each pasture will carry about the same number of stock for the same length of time.

FERTILIZERS

Fertilizers are being used profitably on irrigated pastures of tame or native grasses. There is no fertilizer better for pastures than barnyard manure. Of the commercial fertilizers, nitrogen gives the greatest response to the grasses; phosphorus gives greatest results with the legumes. Keeping the two in balance has much to do with the sweetness of the forage and the readiness with which livestock eat it. A general pasture recommendation is 40 to 60 pounds of actual nitrogen and 80 pounds of actual phosphorus per acre annually. You may have soils tested by your county agent to help determine amounts for particular pastures. A split application of nitrogen, half in the fall or spring and half during the midsummer, gives a boost to late summer production. Only those pastures in a vigorous growing condition get the fullest value from fertilizers.