1965

4-H Range Management Project--Unit 2, grades 7-9 : Extension Circular 1-32-65

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E.C. 1-32-65

4-H Range Management

UNIT 2
grades 7-9

PROPER GRAZING, RANGE IMPROVEMENT

EXTENSION SERVICE
UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE AND HOME ECONOMICS
AND U. S. DEPARTMENT OF AGRICULTURE COOPERATING
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4-H RANGE MANAGEMENT PROJECT, UNIT 2, grades 7-9

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CONTENTS

The American Society of Range Management was created in 1947 to foster advancement in the science of Range Management. Under its direction, a basic youth manual "Range, Its Nature and Use" was developed in 1957. Considerable material presented in this 4-H circular was taken from this youth manual as well as from "The Nebraska Handbook of Range Management", E. C. 60-131 by Donald F. Burzlaff. Cover photo by S.C.S.

INTRODUCTION

In this unit you will learn how range plants, range soils, and range animals affect each other. Forage plants and livestock can never be considered by themselves on the ranch. The rancher must provide a favorable "home" for both. Both must live together and remain healthy and productive.

To manage a ranch wisely you must learn how to determine range condition and how to set initial stocking rates. Meeting drought emergencies, grazing livestock properly on range, and improving poor condition range are other important jobs the rancher does. Unit II will help you learn how to do these things.

Lesson 1. How Plants Live and Produce

Range plants are living organisms which require food, air, water, and light to live and produce. If any one of these is missing, the range plant will die. Ranchers know that they can't raise fat stock without adequate food. Healthy or vigorous grass also must have proper food supplies. Healthy grass outproduces "starved" grass and withstands drought better because its roots grow deeper.

A green grass plant is nature's food factory. For power, this factory uses energy from the sun. The raw materials it uses in its manufacturing processes are water, air, and minerals. The finished products from this factory include carbohydrates (energy food) and protein (needed for growth). Its waste products are oxygen, carbon dioxide, and water.

Let's follow, step by step, the materials used by the world's greatest food manufacturing plant, "grass" (Figure 1).

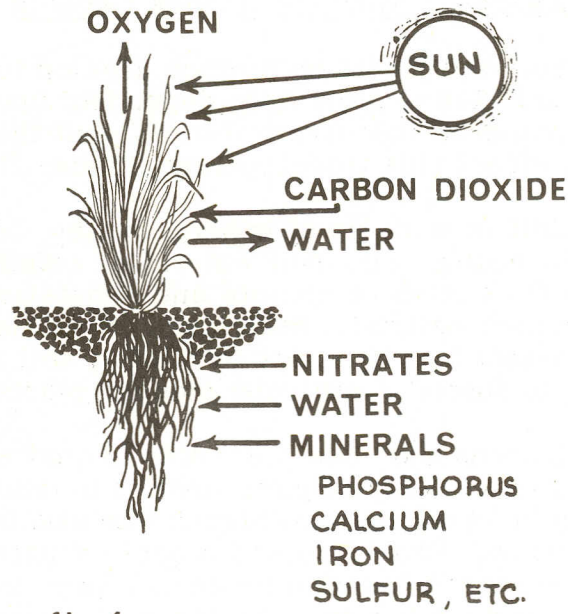


fig.1

Water. Water makes up 70 to 90% of the weight of green grass and from 8 to 25% of dry grass. Grasses need large amounts of water to produce a pound of dry forage. In the semi-arid areas, range grasses need from 300 to 1,000 pounds of water to produce one pound of dry forage.

Most of the plant's water is absorbed through the roots. A small amount is taken in by the leaves. Water is used by the plant as a carrier in the movement of nutrients into and throughout the plant. It also serves as a nutrient because it unites with other substances to form important foods. The process by which water in plants unites with carbon dioxide to form carbohydrates is called photosynthesis. Sunlight must also be present for photosynthesis to take place.

Air. Carbon dioxide is taken by the plant from the air through stomata (very small pores) on the leaves. Inside the plant cells, the carbon dioxide, together with other raw materials, is made into starches, sugars, fats, and protein that the plant needs to live. Plants take in carbon dioxide and give off oxygen.

Minerals. At least 13 mineral elements are required for plant growth. These are calcium, nitrogen, phosphorus, potassium, iron, sulphur, magnesium, cobalt, manganese, zinc, boron, molybdenum, and chlorine. Each mineral element has a definite place in the life of a plant.

Nitrogen is in a free state in the air but cannot be used by green plants. Soil organisms take nitrogen from the air, combine it with other elements, and deposit it in the soil in the form of organic matter. Plants get their nitrogen as well as the other 12 essential mineral elements from the soil through their roots.

The tops or "shoots" of plants are like a small factory. This is where the food is manufactured for the plant and also for the animals that graze the plant. It is important that some of the leaves are left after grazing to manufacture food for the plant to store for future use. If there are no food reserves, the plant will die and its place will be taken by some unproductive plant.

Lesson 2. How Top Ranges Develop

Soil and plants on a range develop together. Range plants are dependent upon the proper development of soils, but they also affect this development (Figure 2).

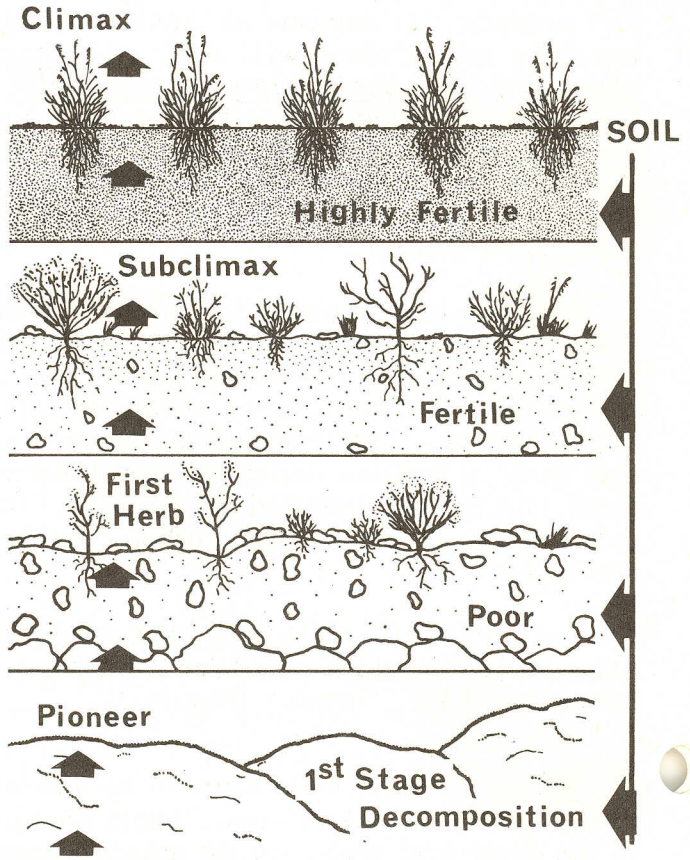
Soil is made up of mineral matter, organic matter, air, and water. It results from the action of climate and vegetation upon rock material. Each stage of soil development from bare rock to a loamy soil is able to support a particular group of plants.

Lichens and mosses are able to grow on solid rock. They help the weather in gradually breaking down solid rock into smaller particles. They also add organic matter. This makes it possible for annual forbs and grasses to come in. As the soil further develops, a few perennial grasses and forbs are able to grow.

It takes thousands of years for "top" range to develop. But finally, the plants on the range are in balance with the soil and the climate. This is referred to as the climax stage. The climax has a mixture of plants which make good use of the available soil nutrients, soil moisture, and energy from the sun.

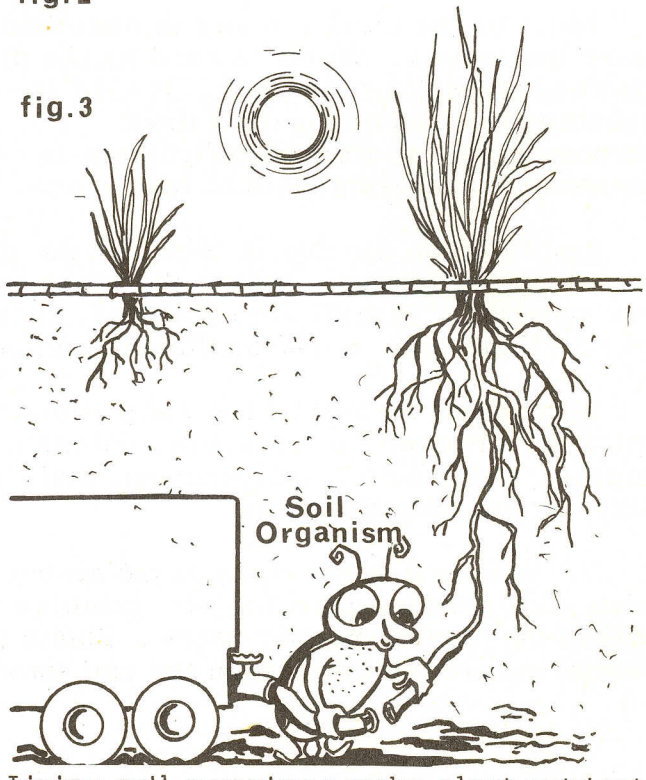
To keep range soils productive, something has to be returned to the soil. At the end of the grazing season, some vegetation should be left on the range. This remaining vegetation is not wasted. The remaining leaves and stems of the range plants dry and drop to the ground as mulch.

Mulch protects the soil against wind and water erosion. The plant materials break up, decay, and become a part of the soil. Roots of plants also die and contribute organic matter to the soil. Millions of little living plants and animals called soil organisms are found in the soil. These organisms are constantly breaking the organic matter into nutrients which can be used by the range plants (Figure 3).



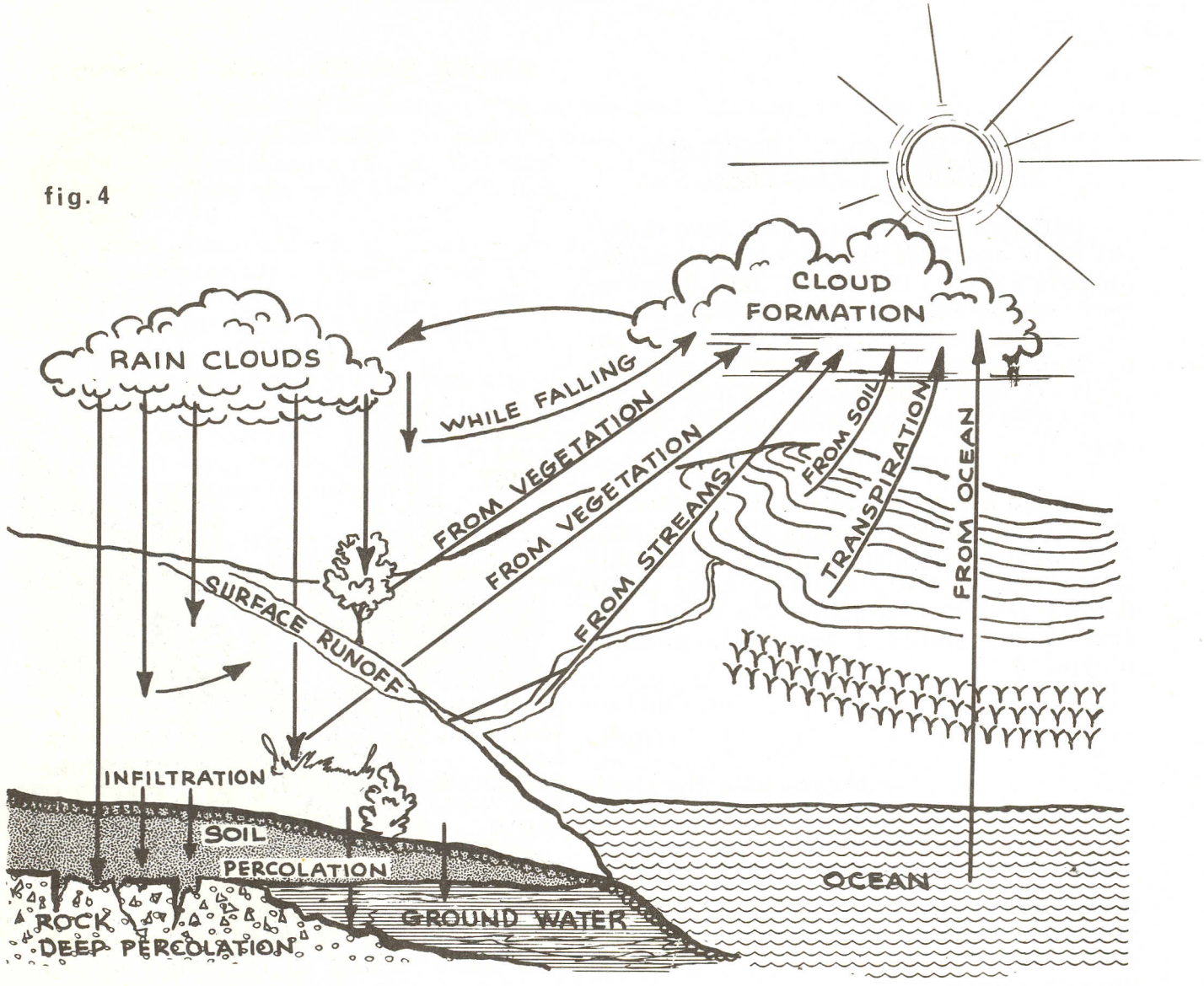
PLANT STAGES
fig.2

fig.3



Living soil organisms make plant nutrients available

fig. 4



Have you heard about the natural water cycle (Figure 4)? Water evaporates from the surface of the ocean into the atmosphere. The moisture is lifted by air currents. As warm, moist air rises it cools. The moisture condenses to form clouds. Air currents move the clouds over the land. The moisture in the clouds eventually falls back to the land or ocean as precipitation. This precipitation may be in the form of rain, snow, hail, or fog.

Some of the precipitation evaporates as it falls. That which reaches the ground either enters the soil or is lost as surface runoff. Part of the water that enters the soil adds to the ground water supply. The rest is held in the soil and is either used by plants or lost by evaporation. Water is also lost to the atmosphere from plants through a process called transpiration.

Water lost by surface runoff is of great concern to the range manager. If water runs off quickly after a rain rather than seeping into the soil, less water is available to produce forage. Not only is this water lost to the plants, but it also carries away valuable topsoil. Soil and water losses cause Nature's plant and soil development to go in reverse.

The wise range manager looks for ways to reduce surface runoff. He has found that one of the best methods is to maintain a vigorous cover of range plants. Perennial grasses work best, but all plants help reduce surface runoff. The vegetation protects the soil from the erosive force of falling raindrops. Plants and litter slow down the movement of water over the surface. This permits more water to soak into the soil. A good cover of plants and litter also will reduce losses due to evaporation of moisture from the soil surface.

Lesson 3. Natural Factors that Affect Range Forage Production

Different areas on the range have different soils and different growing conditions for plants. On rock slides, soil development may be stopped at a very early stage. Adjacent soils on overflow bottomlands may be deep and fertile. Areas with deep fertile soils are able to produce much more forage than areas where but little soil has developed.

Before a rancher can decide whether his range is producing what it should or not, he must first determine what it is capable of producing. Let's consider some of the factors which determine the kinds and amounts of plants a range can produce (Figure 5).

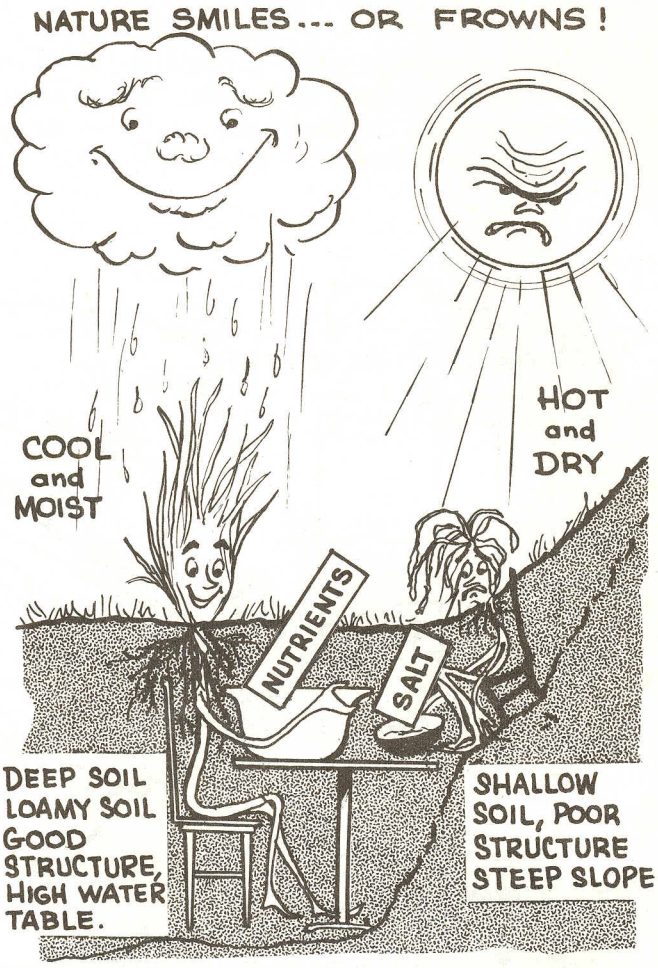


fig. 5

Nature sets the limits

Climate. Amount of precipitation greatly affects the productivity of range sites. Even under ideal moisture conditions, extreme temperatures, either high or low, will normally decrease production. Average annual rainfall in the range area of Nebraska varies from 26 inches at the eastern edge of the Sandhills to 15 inches along the Wyoming line.

Slope. The amount of slope also affects a range's ability to produce forage. A steep slope is much less productive than a gentle slope. Water drainage from a steep slope is usually high. This causes the soil to be drier. Soils on steep slopes are shallower and less developed than on gentle slopes, and erosion is often greater. Grazing steeper slopes is more difficult, and care must be taken that grazing does not cause steep slopes to erode.

The amount of slope is the number of feet the land rises or falls per 100 feet of horizontal distance. It is expressed as a percentage. For example, a 20 percent slope is much steeper than a 6 percent slope while a 0 percent slope is level.

The direction of slope also is important. You have seen how the kinds and amounts of plants on the north side of a choppy sandhill differ from that on the south. Slopes that face south and west receive the most sunshine. As a result south-facing slopes are not only warmer and drier but also usually have shallower, less developed soil and are less productive. A steep slope makes a south exposure even more dry.

Soil texture. Soil texture refers to the size of the soil particles. Soil texture is determined by the percentage of gravel, sand, silt, and clay particles in the soil mixture. Gravel is the largest sized particle; clay the smallest. Soils are a mixture of different sized soil particles.

Loamy soils (soils of intermediate texture) are ideal for forage production, take water easily, and have good moisture holding capacity. In clay soils moisture penetration is slow and runoff may be high. Sands allow water to penetrate quickly but have a low water holding capacity and lower fertility.

The name given to a soil is based on the size of particles most abundant. For example, a very fine sandy loam means that the texture was mostly silt and clay with a considerable amount of very fine sand. A loamy fine sand would be a soil consisting mostly of fine sand with some silt and clay.

Soil structure. Soil structure refers to the arrangement of the soil particles, whether they clump together or remain single. The most productive soil is one where the soil particles clump together. This allows water, air, and roots to travel through the soil and gives the soil good water and nutrient-holding capacities. Well-clumped soils help prevent wind and water erosion.

Root zone depth. The depth to which roots can grow before reaching a layer they cannot go through also affects how well a range produces. Such restrictive layers may be rock, shale, or gravel. A large amount of top growth results from a large amount of roots. A deep soil allows maximum growth of roots.

High water table. Range sites with a high water table produce a different kind and amount of vegetation than do those with deep water tables. Water tables in many low places in the Nebraska Sandhills are a few inches to a few feet below ground level. A high water table increases forage production from 2 to 4 times, increases the proportion of tall grasses, sedges, and rushes, and results in a high organic matter content of the soil. Land covered with water is referred to as marsh and considered non-range.

Salinity. Soil with poor drainage and high water tables often becomes salty. On such sites evaporation of the water leaves the salts on the ground surface. If the salt accumulation is slight, the amount of total herbage produced may be high even though salt tolerant plants predominate. If the salt accumulation is very high, no vegetation may be able to grow and the ground may be bare.

Range sites

Plants of various kinds group into separate but related communities somewhat as people do. The "individuals" in each community work together and compete with each other. Some are good, hard-working and productive plants; others are lazy and produce very little. There are tall ones and short ones. There are those which are "solid citizens", and there are those that are here today and gone tomorrow (Figure 6).

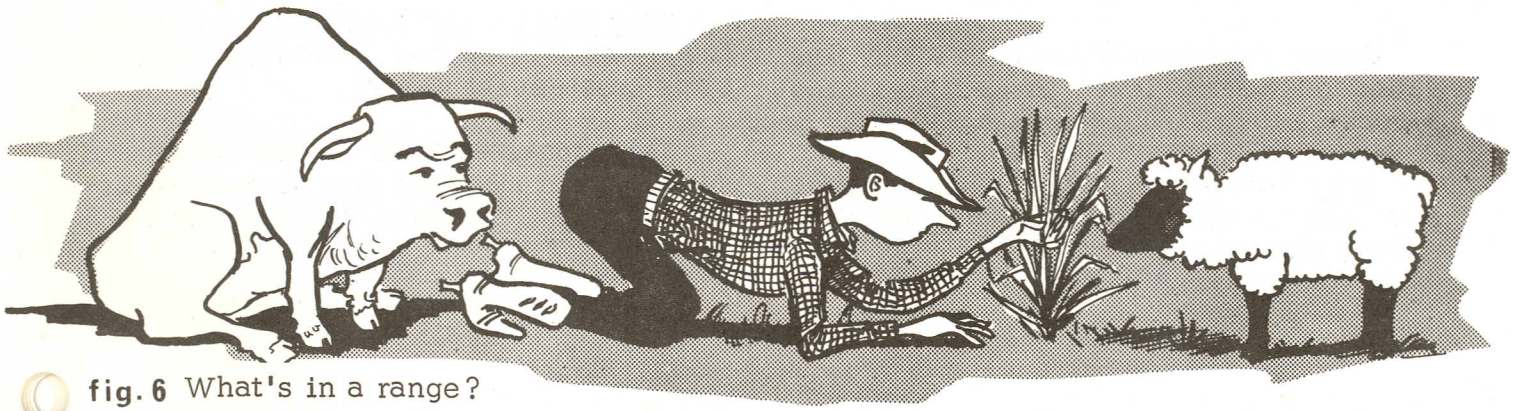


fig. 6 What's in a range?

The plant community never stands still. Even if the changes are slow, they are always taking place. These changes may be good or bad. The successful range manager must be able to recognize these changes. He must determine whether they are good or bad, and he must know if they result from a normal change in the weather or from his management practices.

Rangeland with similar vegetation, soils, and climate throughout is called a range site (Figure 7). Each range site produces distinct kinds and amounts of plants under natural or climax conditions. Different sites often require different management. The range site and its potential is the ideal against which present condition of a range is judged.

There are 13 important range sites in Nebraska. These are (in order of natural productivity of herbage with the most productive listed first):

fig.7

Three range sites on the North Platte Experiment Station: thin silty site on the tops, thin loess on the sides, and overflow in the bottom.

Wet Land (poorly drained) - high spring water table within 10 inches of soil surface. May be flooded during short periods.

Subirrigated - water table within 10 to 60 inches of surface during major part of growing season.

Saline subirrigated - subirrigated lands affected by salt accumulations.

Overflow - receive additional water from stream overflow or run-in from higher slopes.

Sands - sands and loamy sands on nearly level to rolling slopes.

Sandy - fine sandy loams to loamy fine sands on nearly level to gently rolling slopes.

Silty - very fine sandy loams, loams, silt loams, and silts on nearly level to rolling slopes.

Clayey - sandy clay loams, clay loams, silty clay loams, and clays.

Choppy sands - excessively drained sands on steep irregular slopes.

Thin silty - silt loams to silty clay loams on smooth, rolling slopes. Surface soil thin and limy.

Shallow - all soils 0 - 20 inches deep over rock, shale, or coarse gravel.

Thin loess - silt loams on very steep, rough, broken slopes. Catsteps or land slips on steepest slopes.

Thin breaks - soil of various depths and mixed parent material that outcrop at different levels. Irregular slopes of 20 to 65 percent.

Lesson 4. How Grazing Affects Plants

Effect on Individual Plants

If range forage plants are to remain vigorous and produce well, enough of the shoots must be left each year so that the grass can manufacture food for its own use and build materials to make strong roots.

A common phrase is take half and leave half of the annual forage production from the good and fair forage plants. If the plants are vigorous and soil erosion will not result, or grazing is limited to the winter, slightly more may be taken. However, half of the current year's production may be too much in times of severe drought.

Any amount of grazing affects a plant. However, range plants fortunately produce an extra amount of foliage which can be removed by grazing without permanent harm to the plant. Only when too much of the plant is removed does the plant suffer. If a plant is grazed and then allowed to make top growth again, it won't be seriously hurt. But if the shoots are kept grazed close to the ground, the plant suffers.

Where the shoots are kept down, the roots are shortened also. A deep system is essential if range plants are to survive droughts. Since heavy grazing greatly reduces root development, such plants are severely injured by drought (Figure 8). Continued heavy grazing can kill the forage and also reduce the number of young plants available to replace normal death losses of the older plants. On the other hand, research indicates that properly grazed plants are as productive as ungrazed plants.

fig. 8

Grass plants from three adjoining pastures. Same grass, same soil, but grazed differently. In six weeks the moderately grazed center plant produced six times as much tops and five times as much roots as the heavily grazed plant on the right. The lightly grazed plant on the left produced 16 times as much tops and 14 times as much roots as the heavily grazed plant on the right.

Grasses are better able to tolerate grazing than most broadleaf plants. The terminal bud or growing point of the grass plant is close to the surface of the ground. Seldom do livestock remove the growing point by grazing. Even if the terminal bud of the grass plant is removed, buds at the base of the stem will begin to develop new shoots to take place of the original stem.

The growing point of the grass leaf is also located to favor grazing. It is located at the collar and at the base of the sheath. If a grass leaf is grazed before it is fully developed it will continue to grow from the base of the blade or sheath. Have you noticed that the ends of grass blades remain blunt after grazing even though the blade is still growing longer? If a grass leaf is grazed when fully developed it will not continue to grow.

Effect on Plant Communities

Plants group themselves together in natural communities. The plants in a community not only help each other but they also compete for moisture, sunlight, and minerals. The taller plants and those with the largest root systems have the advantage until grazing becomes excessive.

All plants are not affected the same way when the range is grazed. Plants that animals like best are grazed first while the less palatable plants often go ungrazed. If the desirable plants are excessively grazed, they will be handicapped in competing for moisture and nutrients with the unpalatable, ungrazed plants around them. Some plants can withstand closer grazing than others.

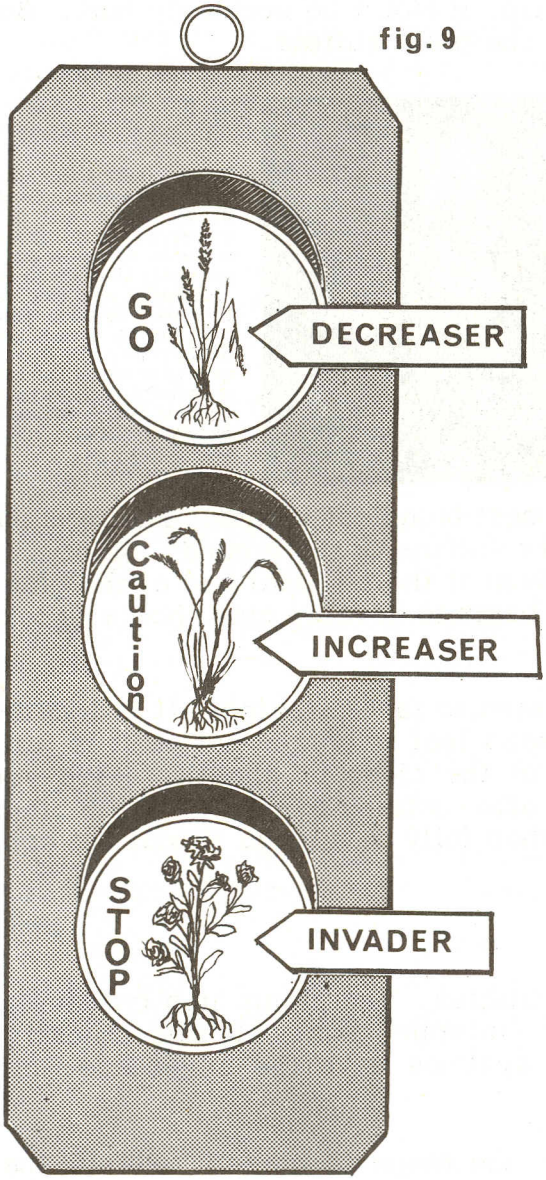
Range plants in Nebraska are grouped by how they respond to heavy grazing by livestock. The three groups are decreasers, increasers, and invaders.

Decreasers are range plants that decrease in number under heavy grazing. They are palatable to livestock and usually perennials.

Increasers are range plants which increase in number as the decreaser plants are weakened and die. They are usually less palatable than the decreasers. In some cases, as in the short grasses such as blue grama and buffalo grass, the plants act as increasers because they withstand grazing better rather than being less palatable.

Invaders are undesirable range plants which invade and take over a range after the decreasers and increasers are largely gone. They are plants not present in the climax vegetation or there in small amounts only (2 1/2 percent or less).

fig. 9



WATCH THE TRAFFIC !

Most people think of the same thing when they see the different colors of traffic signals. Each has its own meaning. Green means go. Yellow means caution. Red means danger, stop!

Let's apply these same colors and their meanings to range plants (Figure 9). We might call the decreaser plants the "green group plants", the increaser plants the "yellow group plants", and the invader plants the "red group plants."

An ample supply of green group plants on the range indicates your grazing program is going well.

Yellow group plants are the ones to watch with caution. If the amount of forage produced by increaser species is getting larger each year at the expense of the decreasers, a change in management may be necessary.

The red group plants simply mean "DANGER" on the range so far as production is concerned.

Eliminating the cause of range deterioration may restore the vegetation in a few years. The cause of deterioration in most cases will have been improper management of grazing. Prolonged drought, extreme temperatures, insect attacks, or repeated burning also may have played a part. If no desirable plants remain to seed the area, artificial seeding will be required. If the soil deteriorated along with the vegetation, permanent damage to the range will have resulted.

Lesson 5. Range Condition

Range condition indicates how healthy a range is. It measures how close to its best a site is producing from the standpoint of both forage quality and quantity. In effect, it is nature's recorded history of a range. It tells the range manager the effects of past use of the range and how his management practices are working. Experience in range judging helps (Figure 10).

fig.10

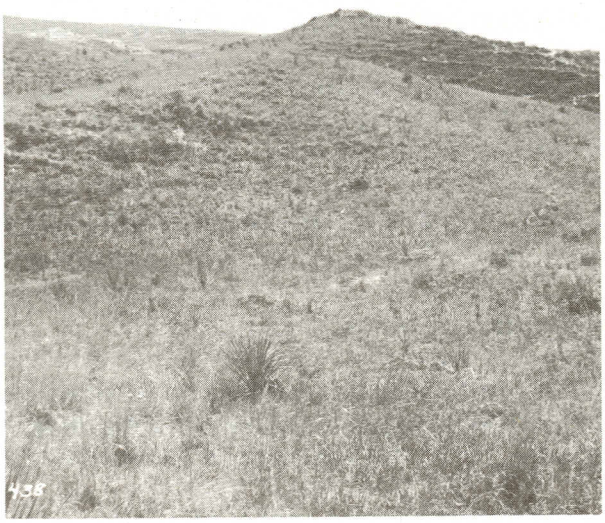
Actual experience in judging range condition helps in deciding what range management practices are needed to make range most productive.

Standard classes for range condition are excellent, good, fair, and poor. (See Figures 11 to 14 for pictures of different range conditions on a choppy sands range site.)

fig.11

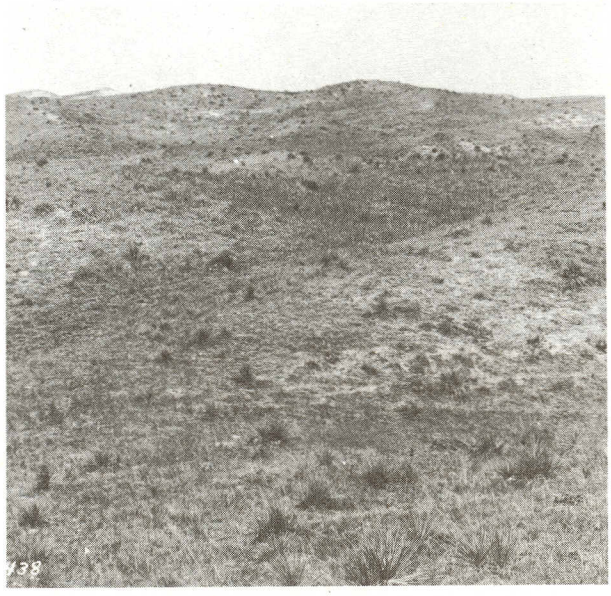
Excellent - range on which 76-100 percent of the forage yield is from climax vegetation. The ground is covered with a heavy mulch. Precipitation soaks in rapidly. Little or no erosion.

fig.12



Good - range on which 51-75 percent of the forage yield is from climax range plants. A light mulch covers the ground. Important range plants are vigorous. Slight to moderate erosion.

fig.13



Fair - range on which 26-50 percent of the forage yield is from climax range plants. Important range plants are in a weakened condition. Very little ground is covered by mulch. Moderate to heavy erosion. Low production of forage.

fig.14

Poor - range on which only 0-25 percent of the forage yield is from climax vegetation. Annual grasses and forbs are abundant. Undesirable forbs and shrubs are common. Soil is poorly protected. There is heavy erosion of soil due to wind and water action. Soil fertility is lowered.

A range in excellent (top) condition has a maximum carrying capacity and produces a higher percentage of highly palatable forage species than lower condition range. It sells for a higher price per acre; it's worth more. It produces maximum pounds of beef or lamb per acre, higher calf or lamb crops, and has less livestock death losses. It also has greater water absorption by the soil, and erosion is less.

Determining Range Condition

Judge range on the basis of how well it fits your ideal of perfection for the range site. The farther a range departs from the ideal, the lower you place it in range condition.

To determine the range condition score you must have a range condition quide. Range condition guides are found in Tables 3 and 4. A sample range condition scorecard is shown in Table 5. (Refer to back of manual).

The first step in using the range condition scorecard is to list the different kinds of plants growing in an area. Arrange them in the proper group (decreaser, increaser, or invader). The range condition guides and a copy of EC 64-161 "Common Range Plants in Nebraska," published by the University of Nebraska Extension Service, will help you place them in the right group.

Now estimate the percent that each plant species contributes to the total forage production. Place these values in the second column--opposite the name of the plant.

To find the percent to be counted toward condition score, use the range condition guide for the appropriate precipitation zone in your area. In the example in Table 5 we used the guide for the 15 to 19 inch precipitation zone (Table 3). Nebraska counties included in the 15 to 19 inch precipitation zone include all Panhandle counties plus Keith, Arthur, Perkins, Chase, and Dundy Counties.

For decreasers use the total percentage recorded for each species. Write these amounts in the right hand column.

For increasers enter the percentage recorded for each species unless it is greater than the tolerated amounts listed in the guide. In the example, we recorded 35 percent for prairie sandreed. The guide shows that in this precipitation zone, prairie sandreed on a sandy site should not exceed 30 percent. Thus we can only count 30 percent toward the condition score, although more was present.

For invaders no percent is allowed to count toward the range condition score.

When all values have been recorded in the right hand column, enter the total in the box labeled "Total Score." The range condition score in this instance was 80 or excellent.

Although plant composition is given primary emphasis in determining range condition, attention is, in practice, also given to total forage production, soil erosion, and ground cover. If there is not enough plant cover or if there is too much soil erosion, it may be necessary to lower the condition class rating based on plant composition.

Special Adaptation of Range Condition

The method of determining range condition just described was developed for native range. However, on many ranges today you find mixtures of both native plants and desirable, introduced forage plants. Such desirable introductions are commonly being interseeded in native range or included in mixtures for reseeding. This trend is common on both upland and lowland ranges.

In this group of desirable forage plants are found cool season grasses such as crested wheatgrass, intermediate wheatgrass, tall wheatgrass, Russian wildrye, and smooth brome. Alfalfa, red clover, and sweetclover are also included.

When desirable, introduced grasses and legumes occur on range sites where they are recommended for seeding, include them in your condition score. Evaluate the grazing response of such plants on how they respond to grazing once they have been established. Most of the introductions mentioned above can be considered as decreasers.

Trend in Range Condition

If there is a definite change in range condition taking place, it is important that this be recognized. This current happening on the range is called trend. It indicates whether the range is improving, deteriorating, or remaining about the same. Trend is more difficult to evaluate than range condition. Only an estimate of range trend can be made on a single visit to a range.

Relative vigor of the decreaser, increaser, and invader plants and soil movement are possibly the best two points a rancher can use in evaluating the trend of his range. On a range which is improving (upward trend), decreasers are vigorous, erosion is decreasing, and gullies are healing. On a range going downhill, decreasers will lack vigor and many will die and be replaced by less desirable ones. Gullies are apt to be active and erosion is evident.

The rancher is fully armed to manage his range if he knows its condition and its trend. The use of range condition and trend greatly simplifies range management. It serves as the basis for stocking a range, for determining livestock management changes needed, and for pointing up needed range improvements.

Lesson 6. Determining The Best Initial Stocking Rate

Before you can figure stocking rates, you must learn two new terms--animal units and animal unit months.

An animal unit is one mature cow, pregnant or dry, or its equivalent.

An animal unit month (AUM) is the forage or feed necessary to carry an animal unit for one month.

You can compare the carrying capacity of your ranch with the forage and feed requirements of your range livestock by figuring in AUM's.

Use the following "animal equivalents:"

Class of livestock*	No. of animal units
Mature cow, dry	1.00
Mature cow with calf (birth to 4 mo.)	1.25
Mature cow with calf (4 mo. to weaning)	1.40
Two-year-old steer	.90
Yearling (18-24 mo.)	.80
Yearling (12-17 mo.)	.65
Weaner calf (to 12 mo.)	.50
Bull (mature)	1.25
Horse (mature)	1.25
Sheep (mature)	.20

Using Stocking Rate Tables

After you have determined your range condition you are ready to figure an initial stocking rate.

The best method to set an initial stocking rate is to use stocking rate tables. Suggested initial stocking rates are given in the lower section of the range condition guides (Tables 3 and 4). Be sure you use the right stocking rate table for your precipitation zone. These suggested initial stocking rates are based on range site and range condition and average annual precipitation.

* Replacement heifers and young bulls ages 24 months and over are considered 1.0 and 1.25 A. U. respectively.

Stocking rate tables give the AUM's of grazing per acre. This means the length of time in months that one cow or her equivalent in other classes or kinds of livestock can graze on one acre of range. For example, in the 15-19 inch precipitation zone, the suggested initial stocking rate on a silty range site in good condition is .55 AUM per acre.

Figuring Animals per Pasture

After determining initial stocking rates, the next thing to determine is the number of usable acres in the pasture. Do this by subtracting the heavily timbered, very steep, barren, or rocky areas from the total acreage. Acres not open to grazing also must be subtracted. Determine number of usable acres for each range site and each range condition. Ignore different range condition classes or range sites less than 40 acres except on wet land and subirrigated sites. Refer to example in Table 6 and map in Figure 26.

You are now ready to determine the number of animal unit months the pasture will provide. Do this by multiplying the usable acres by the animal unit months of grazing per acre. Do this for each range site and condition. Add AUM's for all sites and conditions to get the total for the entire pasture.

The last step is to find out how many animal units the pasture will graze for the grazing season. Do this by dividing the total number of AUM's by the number of months in the grazing season.

In the example a pasture with a 504 animal unit month carrying capacity is to be used for a five months' grazing season. Five hundred and four divided by five equals 101. One hundred and one animal units can be grazed for five months in the pasture.

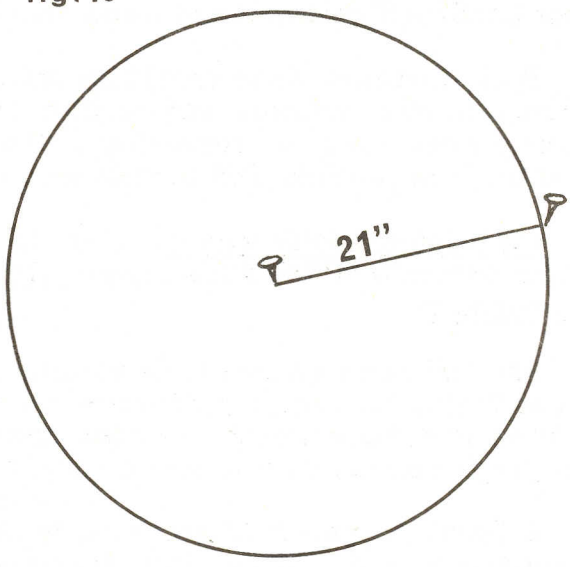
Mechanical Measurement of Range Forage Yield

A second method used to estimate an initial stocking rate is based upon a direct measurement of forage yield. This method might be a good demonstration project for a club tour or meeting, but you must wait until after the end of the growing season or you will underestimate forage production.

Mark off a circle with a 21-inch piece of string with a large nail in each end as shown in Figure 15. Clip at ground level all forage in the plot produced by decreaser and increaser plants. Allow the forage to become air-dry and weigh in grams (453.6 grams equals one pound). Multiply the number of grams by 10 to get pounds per acre. For example, if you clip 60 grams of air-dry forage from the plot, you have 600 pounds of forage per acre (60 x 10 equals 600). The 600 pounds can be used in estimating an initial stocking rate.

Clip several plots on each site and use the average forage production between the plots. Since forage production on different sites varies, clip a new set of plots for each range site in the range unit.

fig. 15



How to determine yield of range forage.

Let's determine the initial stocking rate for a range site producing 600 pounds of forage per acre. First multiply the 600 pounds by 1/2; this gives 300 pounds. (Grazing one-half and leaving one-half is proper use of grass. If half the forage on summer range is proper use, grazing 2/3 of the forage produced will be proper on winter range).

Since a mature cow eats about 20 pounds (air-dry) of grass each day, an AUM would be equivalent to about 600 pounds of forage. Our estimate of stocking rate for this range site would then be .5 AUM's per acre (300 divided by 600).

Your estimate of stocking rate using this method may be very high or very low if forage production has recently been unusually high or low. Thus, for this method to be accurate, you may need to determine forage production over several years and use the average production in determining an initial stocking rate.

Local Experience

Local experience may also help in setting an initial stocking rate. Check with a rancher who has a range similar to yours and has maintained his range in high condition over the years. If he has kept good stocking records over many years, his advice will be most helpful. However, remember that a hasty guess may be very misleading.

Lesson 7. Adjusting the Stocking Rate

Adjustments in stocking rates should be based on range condition and trend. After stocking is made at the initial rate, check what effect this has on the key areas. Watch the decreaser and increaser plants to see how they react. Further changes in stocking rates may be needed from time to time. Keep detailed grazing records for each pasture, giving AUM's of grazing and when grazed each year.

If the rancher finds his range going downhill, livestock management changes or cultural range improvements should be considered. A range, in any condition, will cause concern to the range manager if the trend is downward.

A range, in fair condition, with a distinct upward trend may cause no concern, but care should be given so that the condition improves at least to good condition. Either poor condition or downward trend should serve as a red flag of warning.

Poor condition range should be improved through management or range improvements. A range in poor condition may require range rehabilitation such as brush control, erosion control structures, or reseeding. On the other hand, even good condition range may benefit from fencing and further water development.

Carrying capacity varies. Carrying capacity varies from year to year and even from month to month on the same range. No range has a single, permanent, unvarying carrying capacity.

Rainfall alone causes wide variation in forage production. It is not uncommon in the Great Plains for forage production on native range to be three times as great in a good year as in a drought year. Rainfall also varies from month to month. This causes actual carrying capacity of a range to vary rather than being fixed.

A flexible system of stocking is necessary to meet variations in forage production resulting from droughts, late spring seasons, and insect damage. One method is to operate a cow herd of a size the range can carry in low forage years. Use excess forage in average and good years to keep calves until they are yearlings.

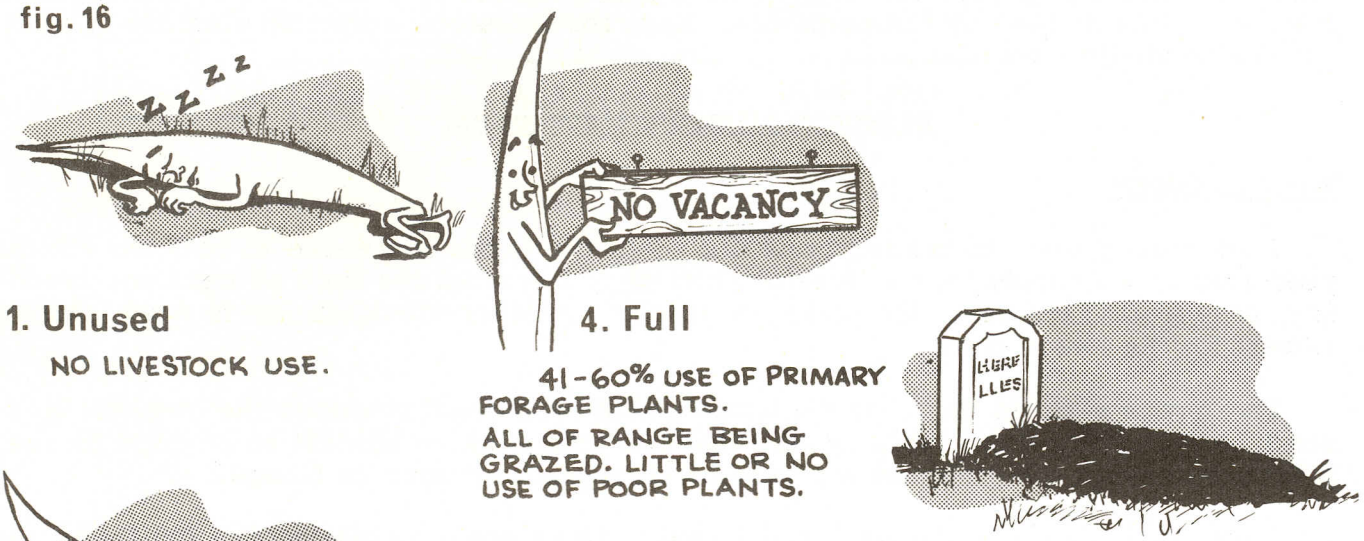
With a straight cow-calf operation conservative numbers of livestock (often set at 75 percent of average forage production) must be grazed to prevent excessive abuse to the range during low-producing years. The ability of many Sandhill ranches to produce hay also gives flexibility.

The carrying capacity of a range depends also upon the type of management. Ranges grazed with the wrong kind of animals or at the wrong season of the year will have less carrying capacity than if grazed properly. Obtaining good stock distribution over the range will increase the carrying capacity of the range. A good manager can graze more cattle on the same range than can a poor manager.

Degree of use check. A running check should be made by the rancher on his range as the grazing season progresses. This is to determine how closely the primary or key forage plants have been grazed during the current grazing season. The range manager will base his management on these key plants. These checks will give a better idea of how much further grazing can be done before the range reaches proper use. It will help in maintaining the long-time range condition at a high level.

A guide for making a degree of use check is given in Figure 16.

fig. 16



1. Unused

NO LIVESTOCK USE.

2. Slight

0-20% USE OF PRIMARY FORAGE PLANTS.

PRACTICALLY UNDISTURBED.

3. Moderate

21-40% USE OF PRIMARY FORAGE PLANTS.

MOST OF RANGE BEING GRAZED. LITTLE OR NO USE OF POOR PLANTS.

4. Full

41-60% USE OF PRIMARY FORAGE PLANTS.

ALL OF RANGE BEING GRAZED. LITTLE OR NO USE OF POOR PLANTS.

5. Close

61-80% USE OF PRIMARY FORAGE PLANTS.

ALL OF THE RANGE SHOWS USE AND MAJOR SECTIONS ARE CLOSELY GRAZED.

SOME USE OF LOW VALUE PLANTS.

6. Severe

81-100% USE OF PRIMARY FORAGE PLANTS.

LOW VALUE PLANTS CARRYING THE GRAZING LOAD.

If all plants are grazed to the same height, the short ones will have the advantage over the tall ones. Let's look at a tall (12 inch) grass and a short (3 inch) grass growing side by side. If both were grazed down to the same height, say 2 inches, what fraction of the tops of each would be lost to the plant? In the case of short grass, grazing it to the height of 2 inches would remove about one-fourth of its total weight. In the case of tall grass, the 2-inch grazing height would result in more than three-fourths of the top being removed.

To review, a properly grazed summer range should have about 50% of the palatable plants utilized. The other 50 percent is not wasted. It is left as necessary litter and to maintain vigor of the plants.

Grazing too close produces an increasingly less desirable plant cover which often is less dense, less productive, and shorter lived. This requires grazing animals to expend more time and energy in obtaining feed, and they will probably eat less forage. Close grazing often forces animals to eat stemmy plant parts low in nutritive value. Healthy animals and maximum production cannot be expected from sick ranges.

Adjust the grazing load on the range according to weather. Grazing management should be aimed at proper use of the whole area. Adjust stocking load by making utilization checks on the key forage plants. Keep the livestock operation flexible to withstand extended dry weather.

Lesson 8. Grazing Management

When to Graze

In deciding when to graze, consider when the range is needed to balance out the year-long forage supply for the livestock and when a special use such as calving, breeding, or preparing livestock for market is needed. Another consideration is when grazing is best for the forage plant.

The forage plant is the most nutritious in the spring and produces the greatest livestock gains at this time. This is also the time it is working hardest to produce forage. What are some of the problems a perennial plant has in producing forage?

There is a rhythm in the way plants grow. The roots grow first, then the tops, and so on. When a perennial plant is full grown, during early July in most cases, it begins to get ready for the cold winter through which perennial plants must live so that they can produce well the next year.

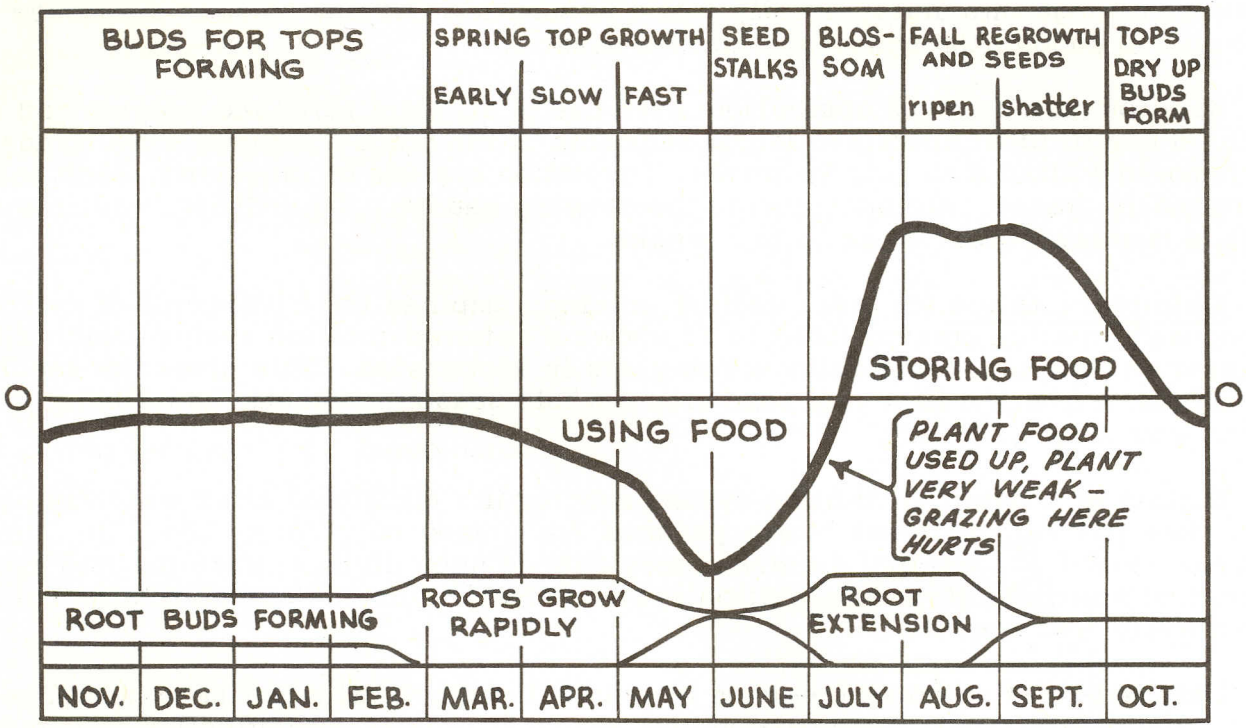
Perennial range plants store food for later use in the roots, crowns, and seeds while annuals store food only in the seeds. The diagram of perennial plants (Figure 17) shows how top growth, food storage, and root growth are related.

From this diagram you can see that the plant lives through the winter on stored food. Root growth in the spring comes from stored food. Food reserves are lowest as the seed stalks begin to form. Only after the top growth is produced can the plant begin to manufacture and store food to replenish the depleted root reserves, produce seed, and make further top and root growth.

Plants are most easily injured by grazing when their food storage is used up and when the seedstalks and blossoms are forming. For this reason complete occasional rest from grazing during this period is one of the best ways to improve a range. Range scientists have found that grazing is easiest on the plant at the close of the growing season when the tops are curing and during the non-growing season.

fig.17

THE ANNUAL FOOD AND GROWTH CYCLES OF PLANTS



Research in Oklahoma indicates that it requires about 2/3 as much range to run a cow during the summer six months as for the entire year. Ranchers commonly figure it takes as much range of a similar kind to carry livestock through a 5-month summer grazing season as a 7-month winter grazing season.

Although yearlong grazing is practiced on some Nebraska ranges, a better practice is to graze six months and rest six months. This insures that an adequate forage supply will be left for winter range. Yearlong grazing under heavy stocking rates is very harmful to the range.

Livestock should not be turned out to continuous summer range until enough new growth has been produced to carry the livestock. This will be about 3 inches on the shorter grasses and 5 to 6 inches on the tall grasses. Grazing too early may pull up seedlings or trample them into the mud, compact the soil, and force heavier use of poisonous plants.

Specialized grazing systems

Delayed grazing until after the most important forage plants have reached a desired stage of development, often after seed-set, is called deferred grazing. This practice can cause rapid improvement on ranges where good forage plants remain but are in low vigor because of grazing pressures. Figure 18 shows a plan for deferred grazing.

fig.18 DEFERRED GRAZING SYSTEM

GRAZING: SPRING	SUMMER	FALL and WINTER
FIRST YEAR UNITS B&C	UNIT A	UNITS A, B &C
SECOND YEAR A&B	C	A, B &C
THIRD YEAR A&C	B	A, B &C

fig.19 DEFERRED - ROTATION GRAZING SYSTEM

GRAZING: SPRING	SUMMER	FALL and WINTER
1954 UNIT A	UNIT B	UNIT C
1955 B	A	C
1956 B	C	A
1957 C	B	A
1958 C	A	B
1959 A	C	B

Livestock are commonly placed on the range and allowed to graze continuously throughout the grazing season. Rotation grazing, or alternate grazing, involves subdividing a range into units, usually 3 or 4 in number. Grazing animals are moved from one unit to another throughout the grazing season.

Rotation grazing helps obtain more even use of all plant parts and species and more uniform use of local spots and larger segments of the range. Slightly more forage can be removed without damaging the plants. In rotation systems on rangeland, each pasture is normally grazed only once during the growing season. On irrigated pastures each unit is regrazed every three to four weeks.

Deferred-rotation (or rest rotation) grazing combines the advantages of deferment along with rotation grazing. Figure 19 shows a deferred-rotation system which allows grazing on each unit to be delayed two years in succession. This gives the seedlings which result from the first year seed crop a whole season to become established before being grazed.

Setting up a deferred-rotation system may require additional stock watering places and more fencing. In areas where pastures are grazed only during the 5 to 7 month summer period, occasional deferment may depend upon dividing pastures into smaller units and starting a deferred-rotation system. Here livestock can be rotated between units every 6 to 8 weeks.

Deferred-rotation grazing seldom increases livestock gains per head but range improvement may be rapid. Deferred-rotation grazing is usually more effective in improving low condition range than is light grazing (or underuse) alone. Guard against prolonged concentration of livestock in a small rotation pasture during drought.

Distribute Livestock

It is important that grazing be uniform over all parts of the range. When livestock are not kept well distributed over all the range, the areas grazed too much as well as those grazed too little become large in size while areas receiving proper use become smaller. Many ranges appearing overstocked in certain areas can be improved by more uniform grazing without a reduction in livestock numbers.

Even on properly stocked range there can be small areas where forage is wasted because of the great distance from water, difficulty of livestock access, or other factors. There also will be local areas grazed heavily close to water sources, main trails, and corrals. These "sacrifice areas" must be kept small.

Cattle tend to concentrate on level ground, on meadows, around water sources, and around trees. A stockwater shortage almost always leads to improper livestock distribution. Lack of cross fences or improperly placed fences may also cause distribution problems.

Improve distribution of grazing over all the range by:

1. Developing new stockwater facilities in undergrazed areas.
2. Cross fencing large pastures.
3. Fencing along range site lines and around seeded range.
4. Rotation grazing.
5. Feeding winter supplements in underused areas.
6. Planting shade, placing rubbing posts, and feeding salt away from water.
7. Mowing old grass in underused areas.
8. Hauling water in drought emergencies into undergrazed areas.
9. Herding livestock into underused areas.

Salting Practices

Grazing animals need more salt than they can get from plants. Supplemental feeding of salt to grazing livestock is a standard range practice the year around. Proper distribution of salt is one of the cheapest and most convenient methods of getting uniform use of forage in a pasture. Livestock need salt. They will travel a long way to find it.

Locate salting places away from water. These salting places can be moved to areas of the pasture where under-use is noticed. The salting places can be moved as often as necessary to get even use of forage. Locate salt boxes on areas that are not subject to severe erosion. On light soils, it may be necessary to move the salt box each time salt is put out.

Salt is usually placed in boxes to protect it from wind and dirt. Inexpensive salt boxes can be made from old oil barrels. The salt box shown in Figure 20 provides an interesting project for the 4-H club member. A portion of the barrel is cut out and folded back to make an awning over the opening. The hole in the barrel must be large enough for a bull with horns to get his head in and out.

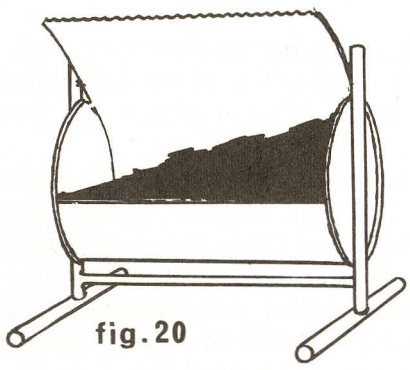


fig.20

Here are some suggestions for salting:

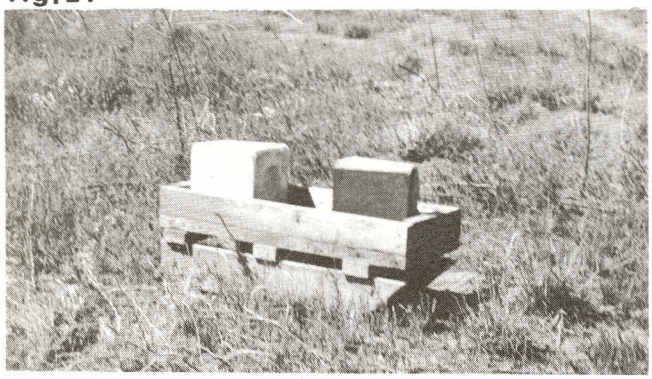
1. Allow 2 pounds per cow per month--1/2 pound per head per month for sheep

2. Place salt methodically over the range but not less than 1/4 mile from water. Move the salt according to the forage use.

3. Have one salt box or block for each 20-25 head of cattle.

4. If range forage is deficient in phosphorus, use a mixture of calcium phosphate or steamed bone meal and salt on a 50-50 basis.

fig.21



A salt box on skids so it can be easily moved by the range rider to areas of ungrazed forage.

Lesson 9. Stockwater Developments and Range Fencing

Stock Water Development

On most Nebraska ranges there are not enough natural water sources for the number of animals the range will carry. Even though there may be plenty of forage, enough stockwater to drink must also be present before the range can be grazed. Livestock should not have to travel long distances to water. Cattle will graze an area close to water again and again, rather than move a long distance to better forage.

Stockwater problems may arise from inadequate yield or storage of water, improper location and number of watering places, or wasteful stockwater developments. A combination of permanent water sources such as lakes, streams, springs, and wells with temporary supplies such as reservoirs or dugouts may be most practical.

The amount of water needed by livestock differs with the kind of range, the amount of salt consumed, the climate, the season, and the kind of stock. The average amount of water needed per day is ten gallons for cattle and one gallon for sheep.

Watering places require different spacings in rough or choppy hills than they do on gently rolling or level ranges. On steep, rough ranges cattle should not have to travel more than 1/4 to 1/2 mile for water. On more level ranges the distance from water to the farthest corner of the pasture should not be greater than one mile. Under most Nebraska conditions, the range manager should plan for at least one watering place per section for best distribution of grazing livestock.

Wells and Windmills. The most common type of water development in Nebraska consists of wells and windmills. The well has many advantages as a source of livestock water. Some of them are:

1. They can be drilled near the forage supply.
2. They furnish a more dependable water supply in dry seasons and in winter.
3. They are a safe place for livestock to get water in winter.

Wells should be located in areas where there is enough forage. They should not be located on soils subject to erosion. Figure 22 illustrates one of the hazards of locating a windmill and tank on an erosive site.

Often windmills are located along fence lines. This is good practice when the pasture size is small or when water development is needed in remote areas of two adjacent pastures (Figure 23).

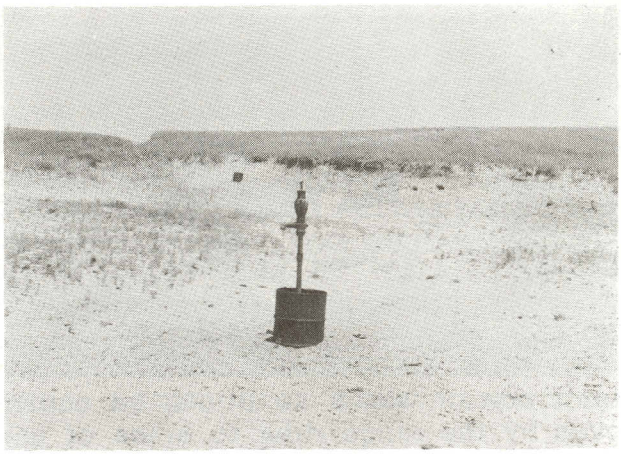


fig. 22

A highly erodable soil and too many cattle led to the abandonment of this watering place.

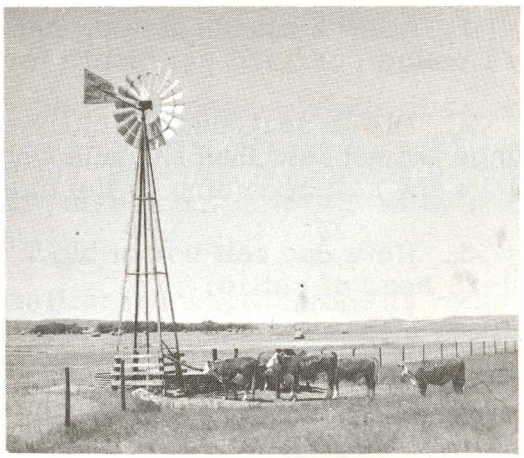


fig. 23

Location of the windmill and tank on a fence line permits this rancher to practice deferred grazing. He can also alternate the use of this range between hayland and grazing land.

Springs and Seeps. These may be developed into a dependable supply of clean, wholesome water throughout the grazing season. Such development often creates a good watering place from dangerous bogs and swamps.

To develop a watering place from a spring, remove the soil from the area down to bedrock or to the source of water. Construct a concrete or masonry box around the source of water with an outlet pipe several inches above the bottom. The outlet pipe should lead to a tank or trough that is somewhat removed from the collection box. This prevents livestock trampling in the vicinity of the water source.

In the development of bogs or seeps it may be necessary to lay a system of tile about the collection box. This will increase its efficiency.

The livestock watering tank should have an overflow which will deliver excess water far enough away from the tank to prevent mud holes or ice sheets from forming around the tank.

Stockwater Dams or Reservoirs. These are important sources of water in certain areas of Nebraska. Before such a structure is built, you should consider the kind of soil on which the water is to be held. Heavy clay or adobe soils are ideal because of their resistance to seepage losses. If dams are built on soils that permit seepage losses, use bentonite, a clay mineral, as a sealing agent for the bottom of the reservoir. Stockwater dams may be only a temporary source of water.

Other types of man-made stockwater developments include dugouts, catchment basins, and sand tanks (Figure 24). For further information on stockwater needs and developments, obtain a copy of E.C. 63-156, "Water for Range Livestock".

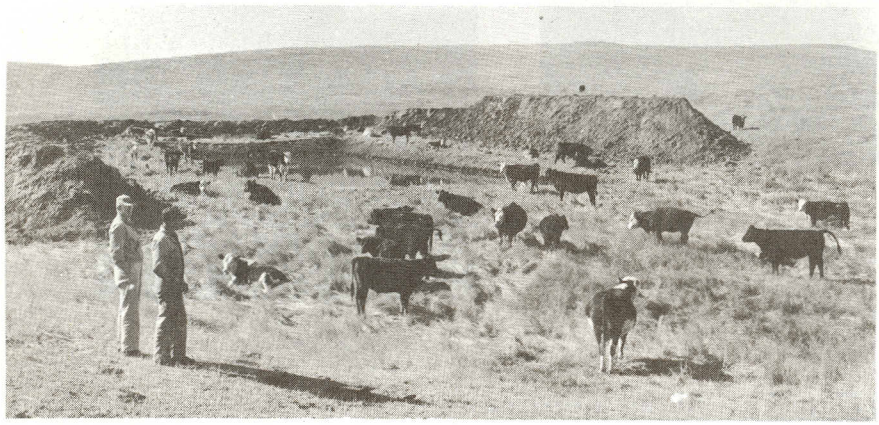


fig. 24

A stockwater dugout constructed with dragline on native range.

Range Fencing

There are five reasons why you should have good fences on the range:

1. Fences help prevent straying or trespassing of livestock.
2. Fences help to distribute livestock and provide more uniform grazing of forage.
3. Fences make deferred grazing possible or divide winter from summer range.
4. Fences make it possible to eliminate grazing or trampling on critical areas, such as blowouts and reseeded areas.
5. Fences make it possible to separate different classes of stock for better management and provide breeding pastures.

Build cross-fences to follow natural land features or range site boundaries. Plan cross-fences so that all range units have about the same potential stocking rates. When range units are large and contain different range sites, livestock concentrate on the range sites most easily grazed. This results in over use of forage on some portions of the unit and under use on other areas. Fencing on range site boundaries allows application of management practices needed for the best production from each range site.

The size of pastures on Nebraska ranches have been determined, to a large extent, by the convenience of a certain size to the operation of the ranch. Convenience in operations certainly should be considered, but more important is the efficient use of forage produced on the range. The larger the pasture the more inefficient the use of the

forage by livestock. There are few circumstances that justify pastures larger than two sections.

A mile of 4-strand, barbed-wire fence requires 16, 80-rod spools of wire and 320 posts. This could be the most convenient range improvement you could add to your ranch. See a new type of fence -- the suspension fence -- in Figure 25 .

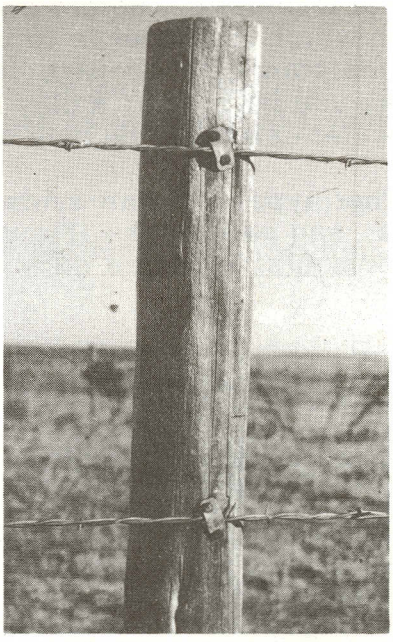


fig. 25
A new suspension fence costs less to build, is easier to keep up, and is very effective.

Lesson 10. Range Seeding

Thousands of acres of rangeland in Nebraska need reseeding. These areas represent land that was at one time farmed and then abandoned. They include, also, rangeland that has been severly misused. The combination of drought and overgrazing has often resulted in destruction of the vegetation and in a low state of productivity on some ranges.

Reseeding is an expensive range improvement practice. It is recommended only on those sites where the native vegetation has been destroyed to the point that it will not respond to improved management practices alone.

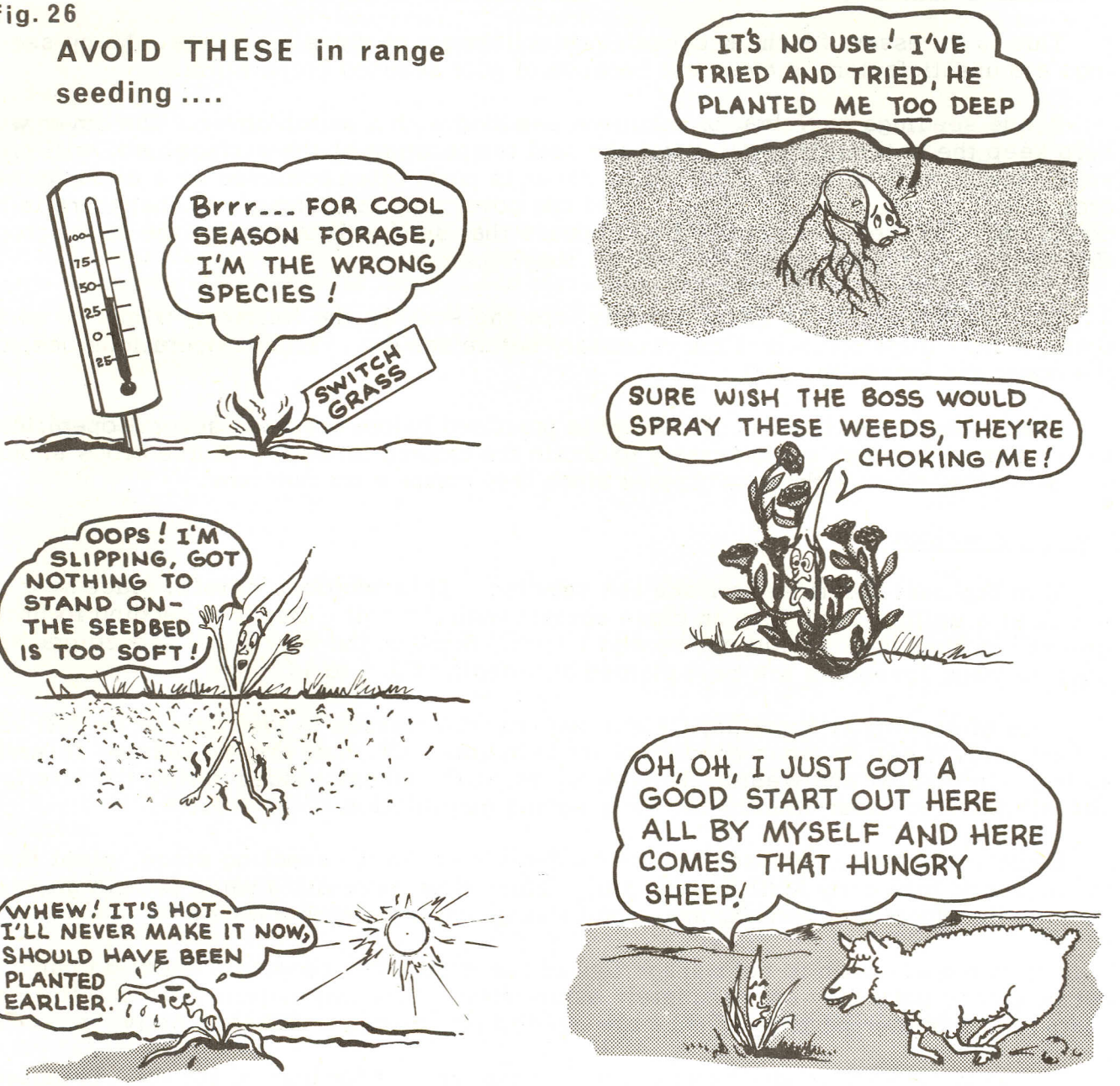
Planning

Planning is necessary for a successful grass seeding (Figure 26). Plans for the seeding should include:

1. Selection of the grass or mixture of grasses that will fulfill the purpose for which the seeding is to be made.
2. Preparation of a suitable seedbed.
3. Following the best seeding practices known.
4. Careful management after the seeding is made.

fig. 26

AVOID THESE in range seeding ....



Selecting the Grass or Grass Mixture

This will depend upon several things. The first is the purpose for which the seeding is to be made. Select cool-season grasses to extend the period in which green grass is available for your livestock. Use native, warm-season mixtures on tracts of abandoned farm land to be reseeded and included in native pastures after establishment.

A second consideration is to select grasses adapted to the soil and climate of your area. Crested wheatgrass, for instance, is best suited for the medium and heavy soils of western Nebraska. Switchgrass and little bluestem may be included in mixtures for most all of the range areas of Nebraska. Sand lovegrass is best used in mixtures on the coarse-textured soils of the state. Table 1 shows the region to which many of our common grasses are best suited in a reseeding program.

Seedbed Preparation.

This is necessary for the successful establishment of grass seedlings. Many seedings are unsatisfactory or even lost because of poor seedbed preparation.

Range seedings in Nebraska require a seedbed with a mulch cover. The cover will help keep the soil moist, will lower the soil temperature at the surface, and will prevent unnecessary erosion. The mulch cover is most often achieved by a close-grown crop of sudan, sorghum, or millet. Seed the cover crop late enough so that there is no chance for the seed to mature. If it appears that seed will mature on the cover crop, the seedheads should be clipped before they ripen.

The grass seeding is made directly into the stubble the following winter or early spring. No tillage operations are necessary before seeding. Tillage operations destroy the cover and loosen the soil.

The seedbed must be firm. If tillage is practiced before seeding, several operations with rollers or treaders are necessary to obtain the desired firmness. Nurse crops should not be planted along with range grasses since they compete for moisture.

Seeding Practices

Use the best practices to make the seeding. This includes careful placement of seeds at a uniform depth and in close contact with the soil. Depth of seeding for most grasses in Nebraska should not exceed 1 inch. Some of the very small seeded grasses such as sand lovegrass are best planted at a depth of 1/4 to 1/2 inch.

Time of seeding is important. Plant cool-season grasses in late summer for fall establishment, if soil moisture conditions are favorable. Or, they may be planted in early spring. In central and western Nebraska, plant the wheatgrasses during the late fall and winter (December-March) for early spring germination.

Since warm-season grasses are not frost-resistant in the seedling stage, plant them in mid spring from early April to early May. Plant slow germinating warm season grasses such as the bluestems, switchgrass, and Indiangrass at the earlier date.

Pay close attention to the management of the range after seeding. Seedlings should not be grazed until they are completely established. This may require from one to three years. The longer periods of time are needed for the warm-season, native grasses.

Competition from weeds is one of the common reasons for loss of stands. Broadleaf weeds in newly seeded grasses can be controlled with chemicals. Spraying new seedings with 1/2 pound of 2,4-D ester in the second week of June is recommended. There is no chemical recommended to control grassy weeds in new grass seedings. If foxtail or sandburs are a problem, the only solution is clipping.

When clipping for weed control, don't clip new seedings too closely. Clipping should be done at heights of 4 to 5 inches.

Lesson 11. Miscellaneous Range Improvements

Control of Undesirable Plants

Useless plants on the range cause lowered production of native grasses and less pounds of beef. Some brush plants use about four times more water for growth processes than do forage plants. Removal of undesirable plants from the range can increase forage production and stocking rates.

Undesirable plants growing on our Nebraska ranges include: western ragweed, sand sagebrush, green sagewort, ironweed, blue verbena, buckbrush, and skunkbush sumac. Wild rose, prickly pear and yucca may be problems in local areas.

Most of these plants can be controlled with applications of either 2,4-D or 2,4,5-T or silvex. For specific recommendations as to time of spraying and rates of chemicals contact your county agricultural agent. Ask him "Chemicals That Control Weeds." E. C. 65-130.

Although chemicals may be used to eliminate undesirable plants, remember that these plants have usually become a problem because of an error in management. Unless the cause of range deterioration is located and eliminated, control of the undesirable plants will not be effective. In any weed control program, grazing should be deferred during the current growing season. This will give the grasses a chance to increase in vigor and ground cover.

Sand Blowout Control

Many blowouts in the Nebraska Sandhills are still active. To heal these areas, sand movement must be stopped and a cover of grass must be established. Control of sand blowouts requires:

1. Fencing to keep livestock from trampling and grazing new vegetation on the blowout areas.
2. Leveling or shaping the sharp edges of the blowout into a gradual slope. The sharp embankments give the wind its swirling action.
3. Mulching to stop damage from blowing soil while the grasses are becoming established. Old hay may be spread over the surface. A disk or tiller will help work the hay into the sand. Feeding hay to cattle on the area will help trample hay into the sand.
4. Seeding the blowout to adapted grasses such as sand lovegrass and switchgrass.
5. Fertilizing infertile, sandy soils will hasten the growth of these grasses and legumes.

If mature hay, stacked after the seed has ripened, is used, some grass will grow from the shattered seed. In many cases this is the only seed applied to blowouts. Temporary crops such as rye and Madison vetch seeded the year before perennial grasses are seeded will help form a good seedbed.

To prevent new blowouts, avoid concentration of livestock around windmills and in fence corners and other critical points on the range.

Improving Production of Subirrigated Hay Meadows

You can improve the yield and quality of hay produced on many subirrigated grass meadows through the use of fertilizers. The introduction of adapted legumes to the stand increases the efficiency of the fertilizers. Improvement of meadow production includes:

1. Application of 40 to 80 pounds of P_2O_5 (17.5 to 35 pounds of available phosphorus) per acre. This should be done in the fall or early spring.
2. Interseed legumes (if not present in the stand) in the early spring. The legumes may be seeded with a "grassland type" drill with a fertilizer attachment. A common seeding practice is to broadcast the legume seed before grazing or feeding on the meadow. Some ranchers seed clovers by feeding mature clover-grass hay back on meadows where they wish to establish new stand.

Table 2 will help you select the proper legume and seeding practice for your meadows.

Range Pitting and Furrowing

Range pitting is helpful in making shallow depressions to trap runoff water on soils that do not take water readily. This results in an increased amount of moisture available to plant growth and lowered surface runoff. Contour furrows and terraces also help reduce surface flow after rains and get more moisture into the ground. Pitting or furrowing is most useful:

1. Where the soil is hard and it is hard for water to penetrate.
2. Where much of the rainfall normally runs off.
3. Where the terrain is rolling to moderately steep.
4. Where less than 20 inches of precipitation is received annually.
5. Where desirable forage plants are present to take advantage of the additional moisture.

Rodent Control

Rodents--particularly pocket gophers, prairie dogs, and jackrabbits--and even insects such as grasshoppers may become a serious problem on rangelands. These may become so numerous that they graze out forage stands. A mechanical burrow builder for placing poison bait in areas infested with pocket gophers has been effective.

Success in range seeding in areas with heavy populations of jackrabbits or pocket gophers may require some type of control before a seeding can be successful. Both poisoning and mechanical control have been used. See your County Agent for details.

Fertilization

Ranges seeded to cool season grasses such as smooth brome, intermediate wheatgrass, crested wheatgrass, or Russian wildrye may require nitrogen fertilization for top production. For best results apply 30 to 40 pounds of nitrogen per acre as soon as the frost is out of the ground in the spring.

Fertilization of upland, native range in central and western Nebraska with either nitrogen or phosphorus fertilizer is not recommended at present except in special situations.

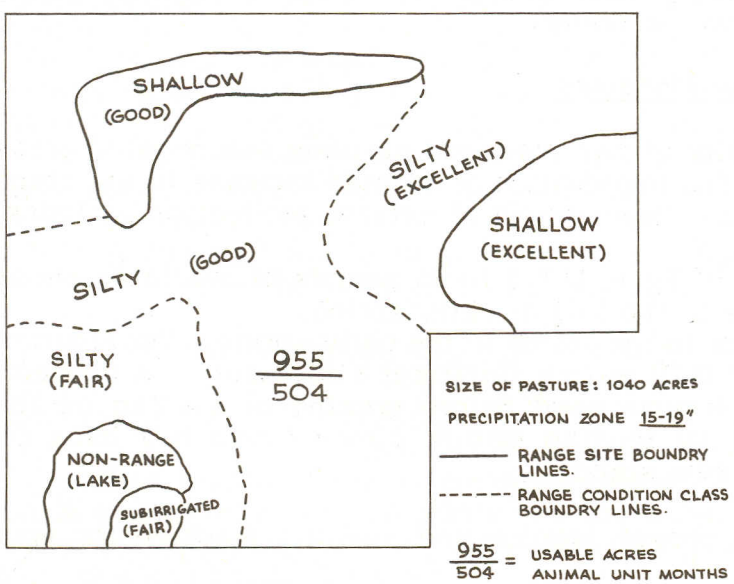


fig. 27

Map of pasture showing range sites and range condition classes.

TABLES

Table 1. Areas of adaptation of some grasses commonly used for range reseeding in Nebraska.

	Location								
	Eastern			Central			Western		
	Hardland	Sandy	Wet	Hardland	Sandy	Wet	Hardland	Sandy	Wet
Bromegrass	*	*	*			*			*
Tall Fescue	*	*	*			*			*
Orchardgrass	*	*	*			*			*
Intermediate wheatgrass	*	*		*	*		*	*	*
Tall wheatgrass	*		*	*		*	*		*
Crested wheatgrass				*			*		
Russian wildrye				*			*		
Blue grama				*	*		*	*	
Sideoats grama	*	*		*	*		*	*	
Big bluestem	*	*	*	*	*	*			*
Little bluestem	*	*		*	*		*	*	
Indiangrass	*	*	*	*	*	*			*
Switchgrass	*	*	*	*	*	*		*	*
Sand lovegrass		*			*			*	
Western wheatgrass	*	*		*	*	*	*	*	*
Canada wildrye		*		*	*		*	*	
Green needlegrass				*			*	*	
Reed canarygrass			*			*			*

Table 2. Guide to selection of legumes and seeding practices.

Depth to water-table (March) (inches)	Adapted legume	Rate of seeding	Time of seeding
0 - 6	None		
6 - 18	Alsike	3 - 5#	Early Spring Late Fall
18 - 30	Red Clover	4 - 6#	Early Spring Late Fall
30 - 60	Alfalfa or Sweet Clover	4 - 6#	Early Spring Late Fall

Table 3. Range Condition Guide (15-19" Precipitation Zone)*

Key species and their response to grazing as judged from climax or original type.

INCREASERS	Maximum Percent Dry Weight in Climax or Original Type by Sites												
	Wetland	Subirrigated	Saline subirrigated	Overflow	Sands	Sandy	Silty	Clayey	Choppy Sands	Thin Silty	Shallow	Thin Loess	Thin Breaks
Blowoutgrass	--	--	--	--	--	--	--	--	10	--	--	--	--
Blue and hairy grama	--	--	--	5	10	20	25	20	10	20	25	20	15
Buffalograss	--	--	--	--	--	--	5	5	--	5	5	5	5
Gray sageworts	--	--	--	5	5	5	5	--	--	5	5	5	5
Green muhly	--	5	--	5	--	--	--	--	--	--	--	--	d
Inland saltgrass	--	--	20	--	--	--	--	--	--	--	--	--	--
Needleandthread	--	--	--	10	15	25	20	d	10	20	d	d	d
Perennial threeawns	--	--	--	--	--	--	--	--	--	5	--	--	5
Prairie sandreed	--	--	--	20	30	30	10	--	30	d	d	d	d
Rosette panicums	--	--	--	5	5	5	--	--	5	--	--	--	5
Sandberg bluegrass	--	--	--	--	--	--	--	5	--	--	5	--	--
Sand dropseed	--	--	--	--	10	10	5	--	10	5	10	5	5
Sand paspalum	--	--	--	--	5	5	--	--	5	--	--	--	--
Sandhill muhly	--	--	--	--	5	--	--	--	5	--	--	--	--
Sedge family	25	15	10	5	5	10	10	5	--	10	10	--	10
Western wheatgrass	--	10	10	40	--	25	d	d	--	d	d	d	d
Forb increasers	5	5	5	5	5	5	5	5	5	5	5	5	5
Woody increasers	--	--	--	5	10	5	5	5	10	5	5	5	10

DECREASERS		INVADERS (Less than 2 1/2% in climax)	
Alkali cordgrass	Prairie cordgrass	All annuals	Ironweed
Alkali sacaton	Prairie junegrass	Broom snakeweed	Leafy spurge
Big bluestem	Reed canarygrass	Curlycup gumweed	Prickly pear
Canada wildrye	Reed grasses	Dandelion	Thistles
Green needlegrass	Sand bluestem	Foxtail barley	Tumblegrass
Indiangrass	Sand lovegrass	Green sagewort	Western ragweed
Indian ricegrass	Sideoats grama		
Little bluestem	Slender wheatgrass		
Plains muhly	Switchgrass		
Porcupinegrass	Forbs decreasers		
	Woody decreasers		

Recommended initial stocking rates--15-19 inch precipitation zone**

Range Site	Range Condition Percentage			
	100	75	50	25
Wet land	2.4	2.15	1.8	1.2
Subirrigated	1.6	1.45	1.2	.8
Saline subirrigated and overflow	.8	.7	.6	.4
Sands, sandy, silty, and clayey	.6	.55	.45	.3
Choppy sands, thin silty and shallow	.5	.45	.4	.25
Thin loess and thin breaks	.4	.35	.3	.2

*As modified from SCS Technicians Guide. The symbol "d" means the species is a decreaser on the site.
**All rates based on summer grazing. Rates may be increased somewhat if grazing is limited to the non-growing season.

Table 4. Range Condition Guide (20-24" Precipitation Zone)*

Key species and their response to grazing as judged from climax or original type.

INCREASERS	Maximum Percent Dry Weight in Climax or Original Type by Sites												
	Wetland	Subirrigated	Saline subirrigated	Overflow	Sands	Sandy	Silty	Clayey	Choppy Sands	Thin Silty	Shallow	Thin Loess	Thin Breaks
Blowoutgrass	--	--	--	--	--	--	--	--	10	--	--	--	--
Blue and hairy grama	--	--	--	--	5	10	15	20	5	20	20	15	10
Buffalograss	--	--	--	--	--	--	5	5	--	5	5	--	--
Gray sagewort	--	--	--	--	5	5	5	--	--	--	5	--	--
Green muhly	--	5	--	5	--	--	--	--	--	--	--	--	d
Inland saltgrass	--	20	--	--	--	--	--	--	--	--	--	--	--
Little bluestem	--	20	--	20	25	d	d	d	30	d	d	d	d
Needleandthread	--	--	--	5	10	20	15	d	--	15	d	d	d
Perennial threeawns	--	--	--	--	--	--	--	--	--	--	--	--	--
Prairie sandreed	--	--	--	15	25	25	5	--	20	--	d	d	d
Rosette panicums	--	--	--	--	5	5	--	--	5	--	--	--	5
Sand dropseed	--	--	--	--	5	5	5	--	5	5	5	5	5
Sand paspalum	--	--	--	--	5	5	--	--	5	--	--	--	--
Sandhill muhly	--	--	--	--	5	--	--	--	5	--	--	--	--
Sedge family	25	15	10	5	5	5	5	--	5	10	5	10	10
Sideoats grama	--	--	--	10	--	d	15	d	--	d	d	d	d
Tall dropseed	--	--	--	5	--	5	5	5	--	--	--	--	--
Western wheatgrass	--	10	20	20	--	15	20	30	--	20	20	20	d
Forb increasers	5	5	5	5	5	5	5	5	5	5	5	5	5
Woody increasers	--	--	--	10	10	5	5	5	10	--	5	5	10

DECREASERS		INVADERS (Less than 2 1/2% in climax)	
Alkali cordgrass	Prairie cordgrass		
Alkali sacaton	Prairie dropseed	All annuals	Leafy spurge
Big bluestem	Prairie junegrass	Broom snakeweed	Perennial threeawn
Canada wildrye	Reed canarygrass	Curlycup gumweed	Thistles
Green needlegrass	Reedgrasses	Dandelion	Tumblegrass
Indiangrass	Sand bluestem	Foxtail barley	Verbena
Leadplant amorpha	Sand lovegrass	Green sagewort	Western ragweed
Plains muhly	Switchgrass	Ironweed	
Porcupinegrass	Forb decreasers		
	Woody decreasers		

Recommended initial stocking rates--20-24 inch precipitation zone**

Range Site	Range Condition Percentage			
	100	75	50	25
	(Animal unit months per acre)			
Wet land	2.4	2.15	1.8	1.2
Subirrigated	1.6	1.45	1.2	.8
Saline subirrigated and overflow	1.0	.9	.75	.5
Sands, sandy, silty, and clayey	.8	.7	.6	.4
Choppy sands, thin silty and shallow	.7	.6	.5	.35
Thin loess and thin breaks	.6	.55	.45	.3

*As modified from SCS Technicians Guide. The symbol "d" means the species is a decreaser on that site.
**All rates based on summer grazing. Rates may be increased somewhat if grazing is limited to non-growing season.

Table 5. Range Condition Score Card.

Range Site Sandy
Name of Pasture No. 1
Precipitation Zone 15-19"

	Estimated % of Each Species in Total Forage Yield	% To Be Counted Toward Condition Score for This Range Site	Write % Of Each Species Allowed Toward Condition Score
DECREASERS			
Sand Bluestem.....	5%	ALL	5
Switchgrass.....	Trace	ALL	
Little bluestem.....	trace 5%	ALL	5
Prairie junegrass.....	Trace	ALL	
		ALL	
		ALL	
INCREASERS			
Prairie Sandreed.....	35%	30	30
Needle and Thread.....	30%	30	30
Sedge.....	5%	15	5
Sagewort.....	5%	5	5
INVADERS			
Downy Brome.....	5%	NONE	0000
Sixs Weeks Fescue....	5%	NONE	0000
Prickly Pear Cactus....	5%	NONE	0000
		NONE	0000
		NONE	0000
		NONE	0000
		NONE	0000
TOTAL ALL SPECIES	100%	XXXX	TOTAL SCORE 80 (Copy Total Score in Correct RANGE CONDITION CLASS Space)
		80	EXCELLENT 75-100
			GOOD 50-75
			FAIR 25-50
			POOR 0-25

Table 6. Example of figuring animals per pasture

Name of Pasture East Canyon
Year 1965
Precipitation Zone 15-19"

Name of site	Range Condition	No. of acres Total	No. of acres Usable	Initial Stocking rate, AUM's/acre	Number of AUM's
Silty	Excellent	300	290	.6	174
	Good	380	380	.5	190
	Fair	110	110	.4	44
Subirrigated	Fair	25	25	1.07	27
Shallow	Excellent	100	80	.5	40
	Good	80	70	.42	29
Non-range	—	45	0	—	0
Total	XXXXX	1040	955	XXXXXXXX	504

504 AUM's / 5 month grazing season = 101 animal units for the grazing season