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Nebraska Handbook of Range Management

UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE AND HOME ECONOMICS
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PREFACE

The American Society of Range Management was created in 1947 to foster advancement in the science and art of grazing land management. Under the direction of its Committee for Cooperation with Youth Organizations, a basic manual, "Range, Its Nature and Use," was developed in 1957. Material taken from "Range, Its Nature and Use" and used in this manual is gratefully acknowledged. This manual, extensively modified to meet the basic needs of the range industry in Nebraska, should find use not only as a youth manual but also as a handy reference on range management for college students and adults.

Nebraska Handbook of Range Management

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CHAPTER 1. What Is Range and Range Management?

Range--means large blocks of level, rolling, broken or mountainous land usually not suited to farming. These lands are covered with grasses and other plants best suited for grazing by livestock and wild game. Range may be privately or publicly owned, fenced or unfenced, and may support native or seeded vegetation.

Range management--means using range to get highest continuous production from grazing animals over many years. It deals with producing a range forage crop and converting this crop into livestock products which can be sold. However, this must be done so that soil erosion does not take place and so that the range forage plants remain healthy and productive.

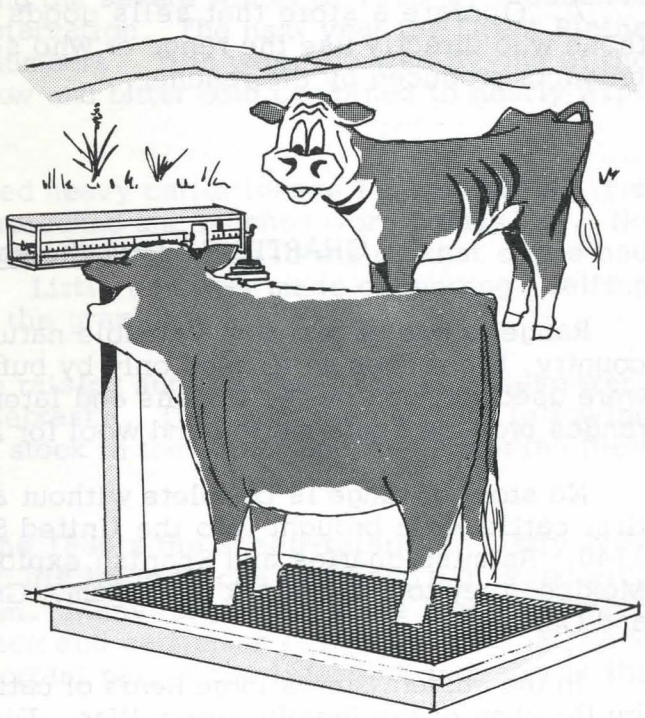
Feed-means any non-injurious, edible material having nutritive value for livestock. Includes range or other pasture forage, harvested forage, grain or processed feeds.

Forage--means browse or herbaceous feeds available for livestock grazing or harvested for feeding: similar to roughage.

Pasture--plant materials harvested directly by grazing livestock (pasturage); also a fenced grazing area.

When stockmen sell their products, they are paid for the pounds of beef, lamb or wool --not for the number of head sold. Pounds of products are the best measure of a range management plan.

It's pounds that count.



Key principles by which rangeland should be managed are:

1. Graze at the proper season or combination of seasons of the year.

2. Graze the kind or class of livestock that can make best use of the forage supply and be the most profitable.

3. Use every possible method to keep grazing animals spread out over the range.

4. Balance the number of animals with the forage supply--do not overstock.

5. Make range improvements such as seeding, brush or weed control, and stock-water developments where needed.

The basic resource of the rancher is his soil, which must be kept productive and in place on his range. But the crop the rancher produces is grass. This he markets through the cattle or sheep he raises. The rancher must use both science and "know-how" in deciding the best method of combining livestock, plants and soil for successful range livestock production.

Several uses may be made of a range at the same time. This is called multiple use and is particularly important on public lands. A range can be grazed by livestock to harvest the forage and at the same time be yielding water, producing game animals and tree products and providing recreation. However, these uses sometimes compete with one another. This requires that the stockman and other users of the range work and plan together.

Everyone in Nebraska should be interested in range. Each of us has a "steak" in the range. We all depend upon the range whether we:

1. Run livestock on the range

2. Raise grain or hay for fattening or wintering range livestock

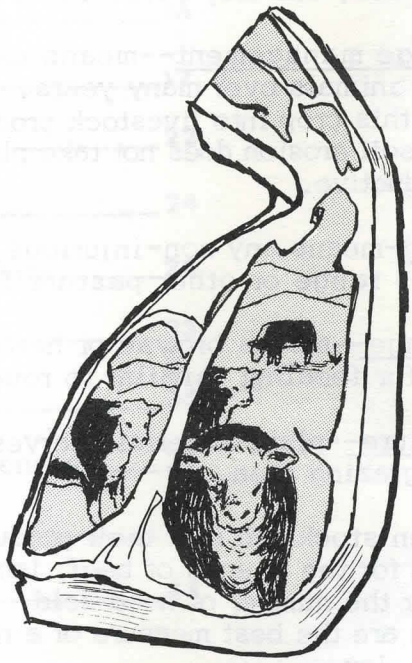
3. Enjoy beef or mutton or wear wool clothes

4. Operate irrigated land

5. Use water for drinking or in the home

6. Enjoy hunting, camping or fishing

7. Operate a store that sells goods to those who directly use the range or who sell products produced by the rancher.



A "steak" in the range.

CHAPTER 2. How the Range Livestock Industry Began

Range is one of our most valuable natural resources. Before white men came to this country, the ranges were used only by buffalo, deer, elk and antelope. These animals were used for food by the Indians and later by trappers and settlers. Today these same ranges produce beef, mutton and wool for America.

No story of range is complete without a review of the range livestock industry. The first cattle were brought into the United States by the Spanish explorer, Coronado, in 1540. As missionaries and Spanish explorers moved north into the Indian country from Mexico, they took livestock with them. Grazing of livestock became important in Texas and California.

In the eastern states large herds of cattle were grazing in Virginia and North Carolina by the time of the Revolutionary War. Did you know that one famous battle in this war

was called the Battle of the Cowpens? Cattlemen were often close behind the fur trappers in moving west. By Civil War times cattle moving west from the eastern states and cattle coming north from Mexico met in Texas. Before long there was not room for all of them on the range lands of Texas. New markets were needed.

Famous cattle trails.

The northern railroads offered outlets for cattle, and large trail drives began heading north from Texas about 1866. Cattle on trail drives averaged 15 to 20 miles per day and gained weight from eating the abundant grasses along the trail. Some of the most famous trails were the Chisholm, Shawnee, Ft. Griffin and Dodge City, Sedalia and Goodnight Trails.

Nebraska contributed its share to the history of the range industry. The Ft. Griffin and Dodge City Trail ended at Ogallala. Cattle moved from Ogallala by rail to markets in eastern United States. Many of the cattle were kept in Nebraska or trailed on to Montana and the Dakotas. Other cattle were brought to Nebraska from the East by settlers and by the "Forty Niners."

Stockmen coming to Nebraska first settled on "hardland" range along the Platte River. However, they soon learned that the Nebraska Sandhills could be an important cattle-producing area. Livestock lost or left in the Sandhills were often found fat and sleek the following spring. Trail herds held over for shipment at a later date gained well on the tall grasses of the rolling sandhills. Settlement of the area by cattlemen began and Nebraska ranges were quickly filled up with cattle.

Trouble was ahead for the cattlemen. During the severe winter of 1885-6, thousands of cattle died on the range from exposure and starvation. The next year the Great Plains had a severe drought, again reducing cattle numbers. This was followed by one of the severest winters yet recorded. High winds, snow and bitter cold combined to nearly wipe out many range herds.

Other factors besides severe weather caused heavy cattle losses in the 1880's. For example, many ranges had been carelessly overstocked and ranches were poorly run. No range was saved for winter grazing and no preparation was made to insure that cattle had forage and water during winter emergencies. Little use was made of fencing, salting and new stockwatering places to spread out the grazing.

Only stockmen with a true regard for cattle raising survived the 1880's. These were the pioneers of the present cattle industry in Nebraska. They saw the need for following better grazing practices, for providing for their stock in the winter and for improving their business by starting permanent ranches.

As hard times reduced cattle numbers in the 1880's the sheep-raising industry grew rapidly. The presence of the sheepman, with his large flocks and habits of wandering from place to place, was resented by cattlemen. Many range wars were fought between cattlemen and sheepmen. But finally sheepmen and cattlemen learned to live in peace and sheep production was accepted as an important part of the livestock industry in the West.

Settlers were encouraged by several government land settlement laws. The first Homestead Act was passed in 1862. This law gave land in 160-acre tracts to settlers after they had lived five years on the land. Most productive lands of the Middle West were in private ownership by 1870.

It was quickly learned that the 160 acres allowed by the Homestead Act was not enough to support a family in the West. So the Enlarged Homestead Act was passed in 1909 which gave 320 acres to settlers. Also, the homesteader now had to live on the land only three years to "prove up."

At home in the "soddy."

The Stock-Raising Homestead Act of 1916 was designed to settle far-western lands not suited to farming. Stockmen were given 640 acres of land under this act. This square mile, or "section", was supposed to furnish forage enough to carry 50 head of cattle. This, too, proved to be too small for a ranch and less than half of the people stayed long enough to own their own land during the first 12 years of the act.

None of the Homestead Acts allowed a man to homestead enough land for a ranch. Much land good only for grazing was plowed up. Many settlers went broke. Most Nebraska ranches of today were made by buying out other homesteaders and by buying railroad lands.

Although improper grazing and serious erosion still occur on some Nebraska ranges today, ranching has improved. Many ranchers know the importance of careful range management and are practicing it. Many rundown ranges are being restored to high production by range seeding, improved grazing practices and stocking at capacity while providing emergency feed sources. These ranchers are working together with range researchers to find new and better ways of producing livestock from range forage.

CHAPTER 3. Nebraska--A Range State

Nebraska ranks third only to Texas and Oklahoma in number of beef breeding cows among the 50 states of the U.S. In 1966 there were about 1.9 million beef cows two years of age or older in Nebraska. The total number of beef cattle in Nebraska amounts to about 6.2 million. Most of these cattle get all or part of their forage from the grazing lands of the state.

There are nearly one billion acres of range land in the United States. Most of it is in the 17 western range states, which include Nebraska. The western range area contains more than 700 million acres. Range lands in western U.S. are important because of the huge amount of land area used for grazing.

In Nebraska there are about 24 million acres of grassland devoted to the production of forage for grazing animals. Thus, about 50% of the land in farms and ranches in Nebraska is grassland. The larger blocks of range lie in the northcentral and western parts of the state.

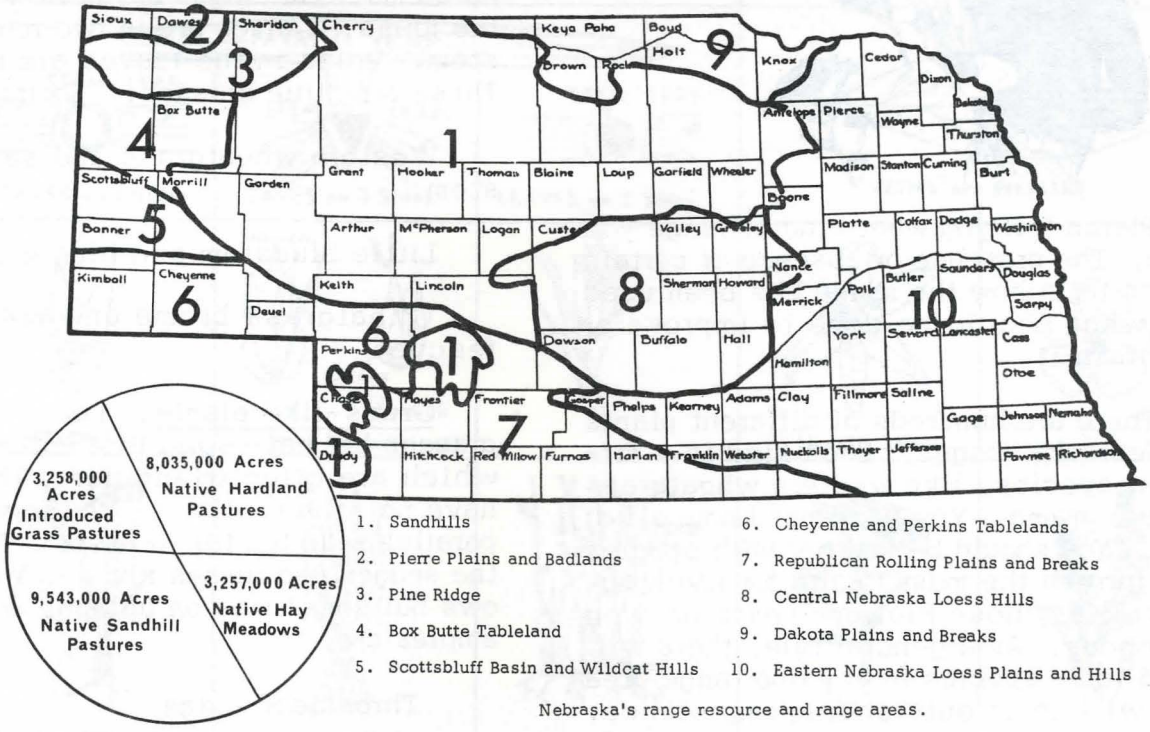
The Sandhills of northcentral Nebraska represent the largest undivided expanse of grassland in the United States. About half of all the grassland in Nebraska is in the Sandhills. Because of the sandy soil, the Sandhills are better suited for grazing than for crop production even though rainfall is high enough to produce field crops.

The Sandhills are known for their abundance of mid and tall grasses and for high quality beef cattle. Here are found many of the larger beef breeding herds in Nebraska. One large Sandhills County, Cherry County, has more cattle and calves than any other county in the U.S. Cattle are marketed as calves or yearlings and occasionally even as two-year-old steers. Most go to Corn Belt farms for fattening.

Wild hay is cut from about 1/5 of the Sandhills ranges, particularly from the highly productive wet land and subirrigated meadows. Some Sandhills ranchers winter cattle on hay and by pasturing regrowth on hay meadows. Other ranchers winter cattle on uncut forage and cottonseed cake or other high protein supplement. Hay is fed only in stormy weather on this kind of ranch.

Range livestock is also the main agricultural industry in the Pierre Plains and Badlands, the Pine Ridge and the Box Butte Tableland in Sioux County. Shortgrasses such as buffalograss and blue grama and a few taller grasses provide a major part of the range forage. Several bands of range sheep are run in this area.

In other sections of the Nebraska panhandle, range livestock production is in the rougher lands and river breaks. Only on wheatlands in central Box Butte Co. and on the Cheyenne and Perkins Tablelands, and in irrigated sections along the Platte and White River Valleys is cash grain production more important than range livestock production.



1. Sandhills
2. Pierre Plains and Badlands
3. Pine Ridge
4. Box Butte Tableland
5. Scottsbluff Basin and Wildcat Hills
6. Cheyenne and Perkins Tablelands
7. Republican Rolling Plains and Breaks
8. Central Nebraska Loess Hills
9. Dakota Plains and Breaks
10. Eastern Nebraska Loess Plains and Hills

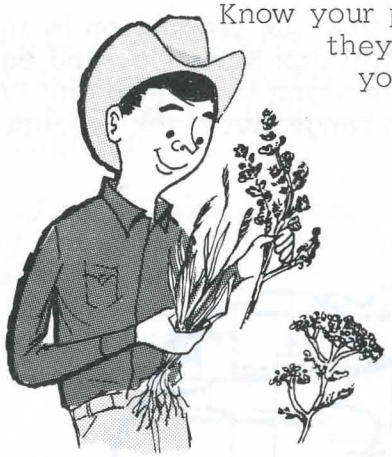
Nebraska's range resource and range areas.

About half of the land is grassland (1) along the breaks of the Republican River in southern Nebraska, (2) in the Loess Hills along the forks of the Loup River in central Nebraska, and (3) on the Dakota plains and breaks. Grassland pastures in these areas are usually smaller than farther west and are mixed with cultivated lands. Cattle are commonly grazed on these pastures in the summer and wintered on fodder, hay, silage or crop stubble. Poor management of grazing lands is more common under these conditions than in areas of straight range livestock production.

Range is much less important in the eastern Nebraska loess plains and hills. Small, scattered pastures are found here. However, each county has some range.

CHAPTER 4. Kinds of Range Plants

It is important that the rancher become familiar with the plants growing on his ranges. He should know them by name, and recognize their importance as forage producing plants.



Know your plants--
they are
your friends.

Plants tell you what kind of range you have. The presence or absence of certain plants tells how the range has been used and what should be done to improve or maintain it.

There are hundreds of different plants on Nebraska ranges. Each kind is a different species, like western wheatgrass or blue grama. You need not know all of them. You should be familiar with species that furnish the most forage for livestock as well as those that are pests or even poisonous. As a general rule, there will be 25 to 30 species in any one range area that will be of outstanding importance.

If you watch your cattle and sheep graze, they will show you which ones they like best. To be important, a range plant must be liked by grazing animals and there must be enough of it present to produce plenty of feed.

Since there are so many different kinds of plants that grow on the range, it helps to group them by their looks and growth habits. The four main kinds of range plants are grasses, grasslike plants, forbs and shrubs.

Grasses. These are plants with jointed stems. The stems are hollow between the joints. Leaves are in two rows on the stem. Veins in the leaves are parallel. These are "true grasses." Examples are:

Western wheatgrass and sand bluestem.

Little bluestem and blue grama.

Cheatgrass brome and six-weeks fescue.

Grass-like plants. These look like grasses but have solid (not hollow) stems which are often triangular. The stems have no joints. However, the veins are parallel as in the true grasses. These are the sedges and rushes found in wet meadows but sometimes on uplands also. Examples are:

Threadleaf sedge

Baltic rush

Forbs. Forbs (weeds and range flowers) have annual stems and tops. They are not grass-like but have net-like veins in the leaves and the leaves are often broad. The word "forb" is better than "weed" because weeds are usually thought of as pests. Many of the range forbs are not pests for they are valuable as forage. Examples are:

Purple prairieclover

Perennial sunflower

Bush morningglory

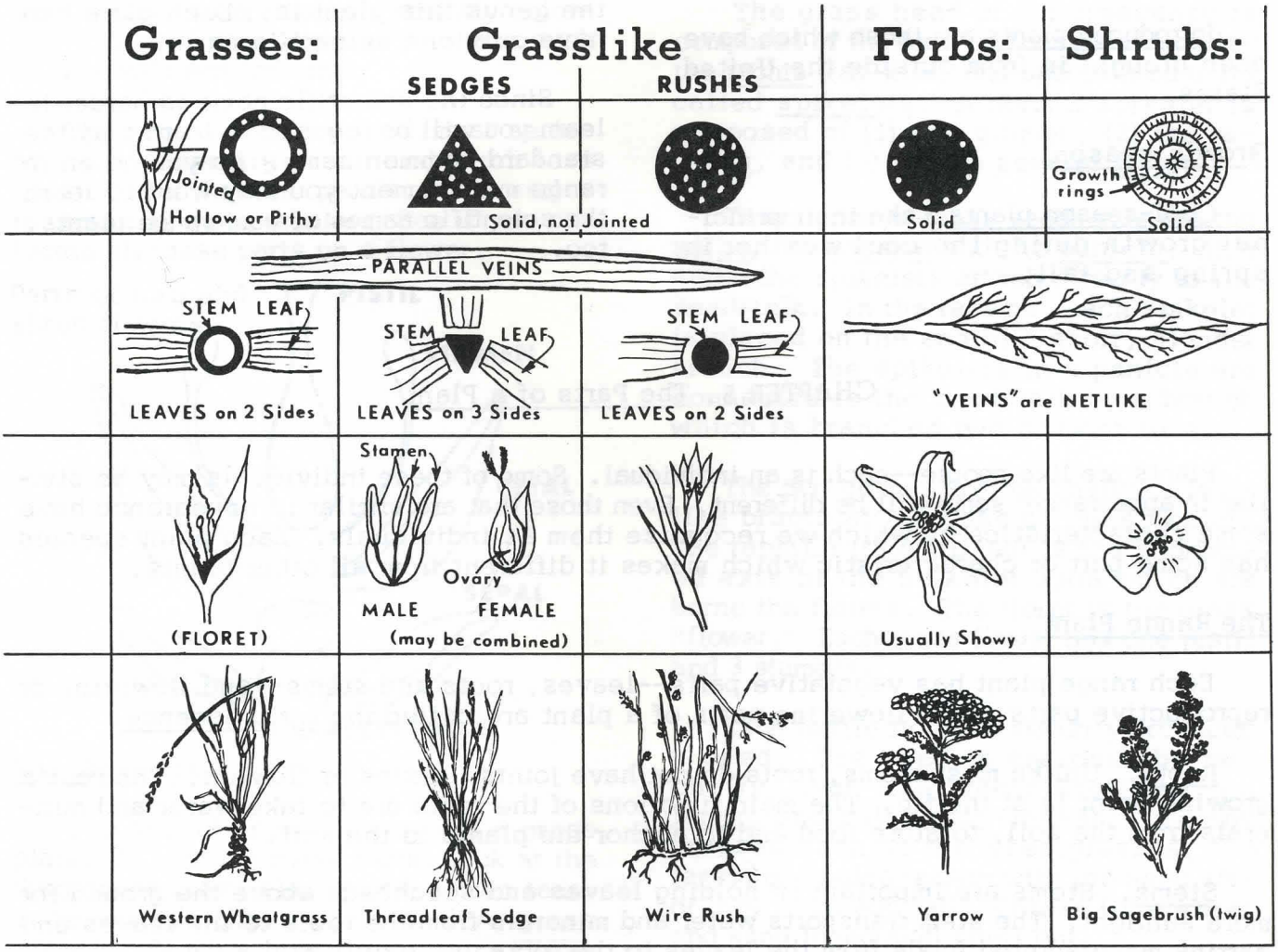
Shrubs. These are plants with woody stems which live over from one year to the next. New growth starts each spring from points above ground along the stem. Many shrubs do not have trunks but branch out from near the base of the plant. Examples of shrubs are:

Sand sagebrush

Yucca

Leadplant

IMPORTANT RANGE PLANT GROUPS



In addition to being classified on the basis of their life form or growth habits, range plants are also grouped in other ways:

Life span

Annual plants live only one season. They do not grow a second year from roots or crowns.

Biennial plants live two years.

Perennial plants live over from year to year. They produce leaves and stems for more than two years from the same crown.

Origin

Native plants are those which have always grown or have originated within the United States.

Introduced plants are those which have been brought in from outside the United States.

Growth season

Cool-season plants make their principal growth during the cool weather in spring and fall.

Warm-season plants generally make their principal growth during the frost-free period and develop seed in the late summer or early fall.

Scientific and Common Names

Each plant has two names: its scientific and its common name. Some plants have several common names. The weedy grass commonly called cheatgrass brome in Nebraska is also called Junegrass, bronco grass and downy brome. So it is necessary to choose one common name as the standard name so that everyone will know what plant you are talking about.

The scientific name always has two parts. The scientific name for cheatgrass is Bromus tectorum. Bromus tells us what genus the plant belongs to and tectorum tells us what particular species within the genus this plant is. Each plant can have only one scientific name.

Since the scientific name is harder to learn you will be required to learn only the standard common name. As you go on in range management you may want to learn the scientific names of your range plants, too.

CHAPTER 5. The Parts of a Plant

Plants are like people--each is an individual. Some of these individuals may be similar in appearance; some will be different. Even those that are similar in appearance have some characteristics by which we recognize them as individuals. Each plant species has some part or characteristic which makes it different from all other plants.

The Range Plant

Each range plant has vegetative parts--leaves, roots and stems--and flowering or reproductive parts. The flowering parts of a plant are called the inflorescence.

Roots. Unlike most stems, roots do not have joints, leaves or flowers. The root's growing point is at the tip. The main functions of the roots are to take water and minerals from the soil, to store food and to anchor the plants to the soil.

Stems. Stems are important in holding leaves and seedheads above the ground for more sunlight. The stem transports water and minerals from the roots to the leaves and carries manufactured foods from the leaves to the roots.

Rhizomes (rye-zoms). These are actually creeping underground stems since they have joints and leaf-like scales. Western wheatgrass, sand bluestem and prairie sandreed all produce large rhizomes. Stolons are like rhizomes except that they grow above the ground. Buffalo grass is a common Nebraska grass that has stolons. They, like rhizomes, store food and reproduce new plants.

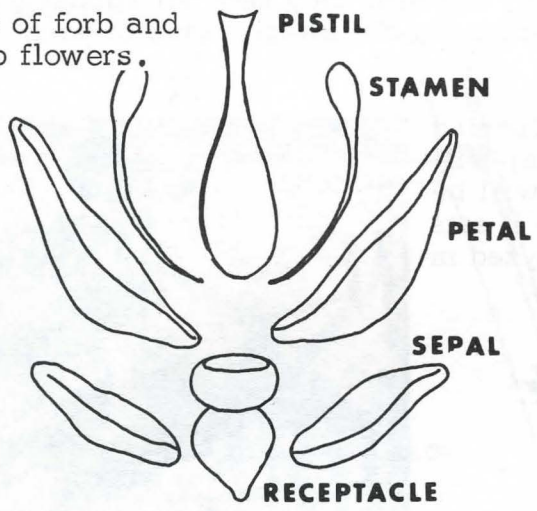
Flowers of forbs and shrubs. The flowers of most forbs and shrubs include five basic parts: receptacle, petals, sepals, stamens and pistil (often more than one).

The receptacle is the broadened support or base of the flower. The reproductive organs are the stamens which produce the pollen, and the pistils which bear the seeds.

The reproductive organs are generally enclosed by two kinds of leaf-like structures--the petals and the sepals. The petals make up the inner-most and upper-most series and are usually brightly colored. They are often irregular in shape such as in alfalfa and larkspur.

The sepals form the lowermost series and are generally green and much less conspicuous than the petals. This series is generally quite regular. See if you can locate all these parts on a flower.

Parts of forb and shrub flowers.



The Grass Plant

You should know the parts of a grass plant. In learning these parts, look at the diagram on grass plant parts. Then learn to recognize these parts on live grass plants. Notice how these parts differ slightly between different grasses.

The grass stem is made up of nodes (joints) and internodes (between the joints), and is usually hollow except at the nodes.

The grass leaf is made up of two parts: the sheath which fits closely around the stem and the broad expanded portion known as the blade. The region where the sheath and blade join is called the collar. On the inside of the collar, and sticking up above the sheath is a thin lining called the ligule. The ligule may also appear as a ring of hairs or may be entirely absent. Two ear-like tips which often grow from the collar, one on each side, are the auricles.

The grass head or inflorescence is composed of the axis or "backbone" called the rachis (ray-kiss) and specialized units called spikelets. A normal spikelet is composed of (1) two glumes, (2) the rachilla, and (3) one to several florets.

Three types of grass seedheads are the spike, the raceme and the panicle. In a spike the spikelets attach directly to the seedstalk. In the raceme, each spikelet is placed on the end of a short, slender branch. The spikelets in a panicle are connected to the seedstalk by a branch which is branched two or more times.

The two glumes are the chaffy or leaf-like bracts at the base of the spikelet. The rachilla (ray-kill-eh) is the shortened axis of the spikelet upon which are borne the florets. The floret is the grass "flower." Each grass flower has one pistil and 3 stamens.

Each fertile floret at maturity produces a seed. The seed is enclosed by two chaffy, leaf-like bracts known as the lemma and palea (pay-lee-a). In many grasses such as the wheatgrasses, the lemma and palea remain with the seed after they ripen and fall. Others (like wheat and sand lovegrass) shell out.

Identifying Range Plants

The first step in identification is to group your plants into grasses, grass-like plants, forbs and shrubs. Determine a plant's name by comparing the plant you have collected with word descriptions, drawings and photographs. Such things as flower color, shape of plant, and leaf peculiarities can be described. Several booklets are available to help you identify range plants.

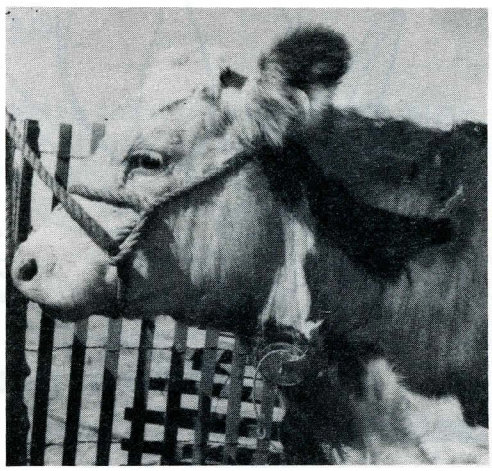
If the different parts of a plant are well-known, an identification key can be used. A key is an organized list of plants arranged according to their structure. Identify your plants locally if possible. Your County Extension Agent, Soil Conservation Service technician, Voc. Ag. teacher or 4-H Club leader can help you.

CHAPTER 6. Range Plant Forage Values

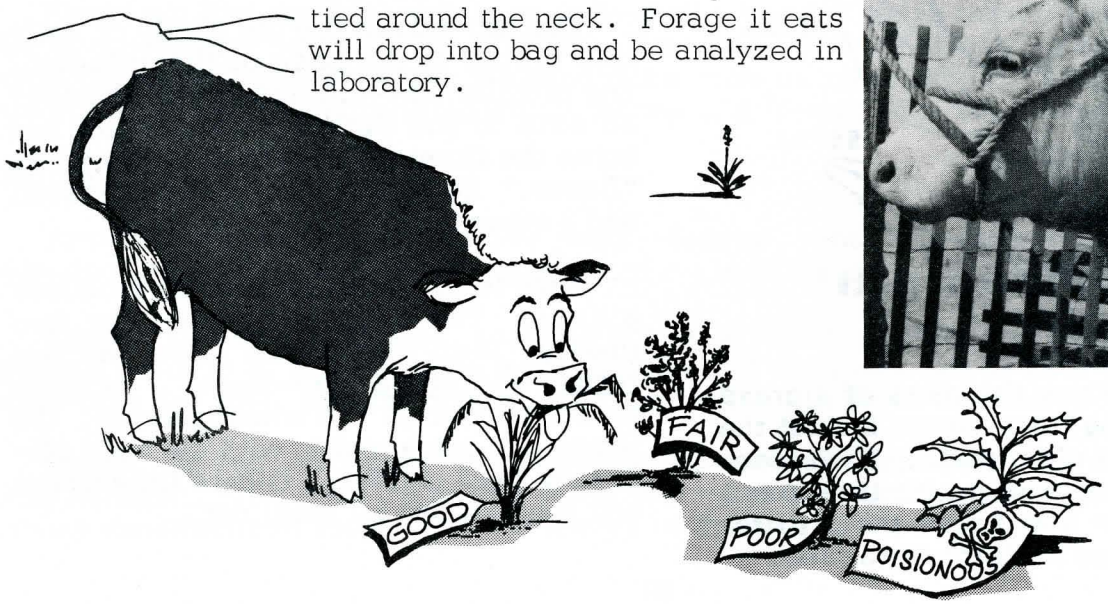
Our range plants are not all of equal value. A rancher must know not only the names of the plants on his range but also whether they are desirable or undesirable for grazing. Some range plants are valuable for grazing but others may be worthless or even highly poisonous.

Not all grasses are good for grazing. Examples of grasses almost worthless for grazing are threeawns, windmillgrass and stinkgrass. Neither are all shrubs poor for grazing. Shrubs such as leadplant and sand cherry are desirable range plants.

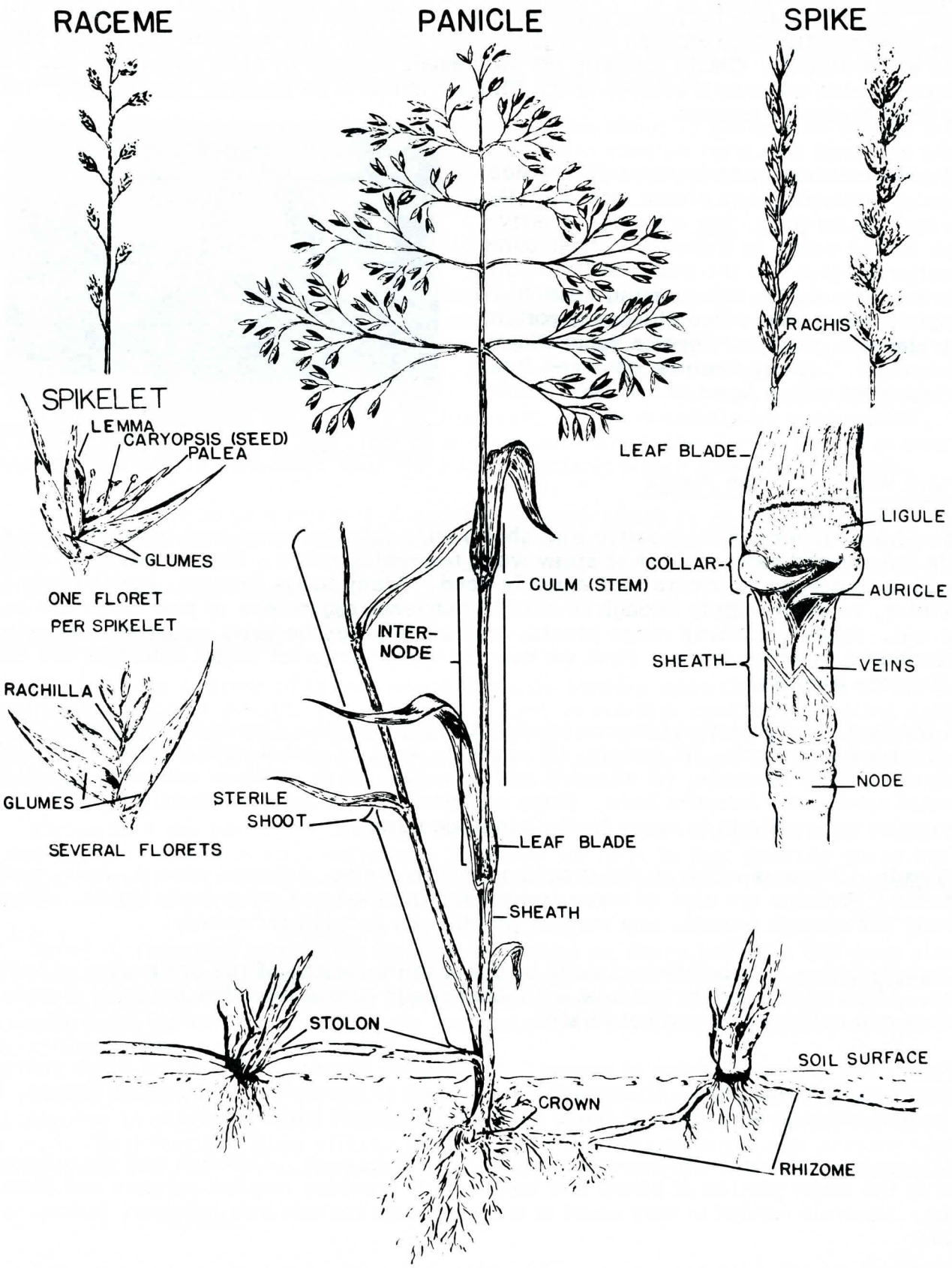
Livestock usually like range plants best when they are green, tender and growing fast. They are more nutritious then, also. However, grasses such as blue grama and buffalograss cure well on the ground for winter grazing. Annual plants are not desirable on range because they are less productive, less nutritious and are not readily eaten by livestock. In drought years, when forage is badly needed, they may not appear at all. All of these factors must be considered in determining the forage value of each range plant on the range.



Steer with special surgical opening into throat from outside. Cap will later be removed and a bag will be tied around the neck. Forage it eats will drop into bag and be analyzed in laboratory.



THE GRASS PLANT



Forage Value of Range Plants

Range livestock are similar to humans in that they like certain foods better than others. The palatability (or forage preference) of a particular range plant is how well it is liked. How readily range animals eat a given plant species also depends upon what other plants are available. Cattle normally eat very small amounts of sand sagebrush but may eat considerable amounts if starved to it. This we speak of as relative palatability--relative to what else is present.

To make it easier to compare the forage values of different range plants, we classify each species as good, fair or poor. In arriving at forage value in Nebraska, first consideration is given to the palatability of the plant to cattle during the growing season of the plant. The forage value of many important range plants is given in "Common Range Plants in Nebraska." A copy can be obtained from the County Extension Agent or Voc. Ag. teacher.

Winter feeding of high quality hay on snow-covered Nebraska ranges.

Nutrient Value of Range Plants

You have observed that cattle and sheep will gain far more on a given amount of alfalfa than on the same amount of straw when fed nothing else. This is because straw is lacking in certain nutrients that animals need. Many range forages, particularly in the winter, will not supply enough of certain nutrients regardless of how much the animals eat. However, these range plants, like straw, may be used satisfactorily when supplemented by other feeds. First we have to know just what these nutrients are and why they are needed.

A nutrient is any food substance needed to support life. Our range livestock need five classes of nutrients: (1) protein, (2) nutrients such as carbohydrates and fats which supply energy, (3) minerals, (4) vitamins and (5) water. Each of these nutrients supplies a special need in the animal's body. Since one nutrient will seldom substitute for another, we must know what is in range forage livestock need:

Protein. Proteins make up the greater part of muscles, internal organs, hair, wool and horns. Proteins are also of major importance in blood and other body fluids. When the body has enough protein, any surplus protein can be used for energy.

Carbohydrates. Carbohydrates make up about three-fourths of the dry matter of range plants. Much of the energy and heat an animal needs comes from this source. Sugars, starches and cellulose are carbohydrates.

Fats. Fat is also a source of energy. It furnishes about 2.25 times as much energy per pound as carbohydrates. Although the fat content is generally low in range forage, it may be quite high in supplemental feeds such as cottonseed meal.

Minerals. Minerals are important in all animal tissues. Calcium and phosphorus make up the major portion of bones and teeth. Salt provides needed calcium and phosphorus. Minerals needed in very small or trace amounts include iron, copper, iodine and cobalt.

Vitamins. Although vitamins are needed in very small amounts, they must be present for animals to live and produce. Vitamin A is important in keeping body membranes healthy, in fighting off disease, and for reproduction and growth in livestock. Vitamin A appears in forage as carotene which is converted in the animal's body to vitamin A. Vitamin D is required in bone formation and in the proper use of calcium and phosphorus. Other vitamins are also needed by ruminants but these are generally present in sufficient amounts in the forage or can be manufactured by rumen bacteria.

Water. Water is an important substance because about 75 percent of animal bodies and growing plants are composed of water. Water carries nutrients from one part to another in plants and animals. Water is also important in digestion, in controlling body temperatures and in eliminating waste products.

The Advantage of a Ruminant

Cattle, sheep and goats, as well as deer and elk, are ruminants. These animals differ from other animals such as man, dog and swine because they have a stomach divided into four major parts. Because of this special construction of the stomach, ruminants are able to use coarse roughages such as hay, range grass, browse and silage.

However, ruminants are not able to digest the coarse materials by themselves. This is broken down by bacteria and other microorganisms which live in the rumen or paunch. Thus, a ruminant is dependent upon the microorganisms which live in its paunch.

Horses do not have a rumen but do have a large pouch or caecum (see-kum) in the intestines where millions of bacteria can do their work. The hog has only a simple stomach with one compartment. It provides no special place for bacteria to live and help "digest" forage and roughages.

Nutrient Content Changes

The nutrient content of range forage depends largely upon the season of the year. During rapid spring growth, range forage is high in nutrient content. Grazing animals generally need no supplements at this time except salt. As the forage plants begin to mature and dry, the content of many important nutrients goes down and supplemental feeding is needed.

Throughout the year, the protein, phosphorus and carotene (vitamin A) contents in range grasses follow similar patterns. All three are high in fast growing grass but low in matured grass. As plants mature, they increase in fiber content. Heavy rainfall in the fall and winter may wash out many carbohydrates.

Great differences in nutrient content may also be found between different plants. Grasses such as wheatgrasses grow early in the spring and sometimes again in the fall. They are higher at these times in protein, phosphorus and carotene than warm-season grasses such as bluestems. Shrubs maintain higher levels of protein, carotene and phosphorus than grasses during the winter.

During drought there is generally a decrease in phosphorus, protein and carotene but an increase in calcium. When rainfall is plentiful and the weather is warm, the opposite is true. Soil fertility also affects the nutritive content of range and pasture forage. When soils are low in phosphorus, plants may also be low.

Supplementing the Diet

How do you know what to supplement range cattle and sheep with during the winter?

Supplements should be based on the kind and amount of nutrients cattle obtain from range forage. Remember that to supplement means to supply nutrients missing or low in the range forage. These supplements are fed to "fill up a gap" in the range forage rather than to replace it.

The following rules should serve as a guide in supplementing range livestock:

1. Supplement probable deficiencies in the diet. It is seldom a good practice to supply nutrients for which a dietary need has not been proven or for which a deficiency would not be expected in range forage.

2. Feed supplements that are economical. Supplements may increase weaning weights and calving percentages but not enough to be profitable.

3. Feed supplements so that each animal gets its share.

4. Method of feeding supplements must keep range animals moving and well distributed over the range.

Four nutrients which may be low in range forage on winter range are protein, phosphorus, vitamin A and substances such as carbohydrates that provide energy. Do not forget that water and common salt are nutrients also. Common salt and fresh water must be supplied range livestock throughout the year.

Diets high in matured grass may include ample energy but are usually low in protein, phosphorus and carotene (vitamin A). If a moderate part of the diet consists of browse, less protein and phosphorus should be supplied through supplemental feeds. Diets containing larger amounts of browse have enough vitamin A but may be low in energy.

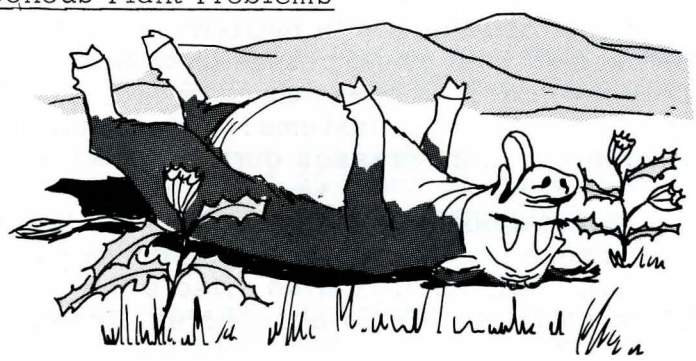
Cattle can store enough vitamin A in the liver to last three to six months on diets lacking this vitamin. However, this may not last through late winter until green grass comes. Particularly during drought years, vitamin A supplements may be needed by range livestock during the winter.

Supplemental feeds high in phosphorus commonly fed to range cattle are bone meal, dicalcium phosphate, cottonseed meal and leafy alfalfa. Protein supplements commonly fed include cottonseed meal, soybean meal and alfalfa. Supplemental feeds high in energy include oats, corn, barley and various milling by-products. All fresh, green, leafy forages are high in carotene.

CHAPTER 7. Poisonous Plant Problems

Some range livestock are lost each year in Nebraska from such plants as arrowgrass, locoweed, water hemlock, chokecherry, milkweeds and groundsels. However, livestock losses in Nebraska from poisonous plants are much lighter than on ranges further west.

Palatability is important in livestock poisoning. Many plants are poisonous only when eaten in large amounts and may be good, nutritious forage when eaten in



Prevent losses from poisonous plants by good range and livestock management.

smaller amounts. Generally, animals do not graze large amounts of highly poisonous plants when they have an abundance of other forage. Thus, it is very important that we graze our ranges so that they are kept in good condition and contain large amounts of palatable, non-poisonous forage.

Ways to Prevent Losses from Plants

1. Do not turn range stock out in the spring before good forage plants are well developed.

2. Graze moderately so that plenty of good range forage is available.

3. Use plenty of salt and phosphorus supplements when needed to guard against depraved appetite.

4. Feed roughages when range forage is in short supply as in drought or when trailing.

5. Graze the kind of stock not poisoned by the plant in question.

6. Graze during the season of the year when plants in question are least poisonous or are not eaten.

7. Eradicate or fence off local patches of poisonous plants.

8. Remove animals when poisoning first becomes evident. Put sick animals in corrals, if possible, and feed laxative feed.

9. Avoid areas infected with poisonous plants when bunching, trailing, bedding down or watering.

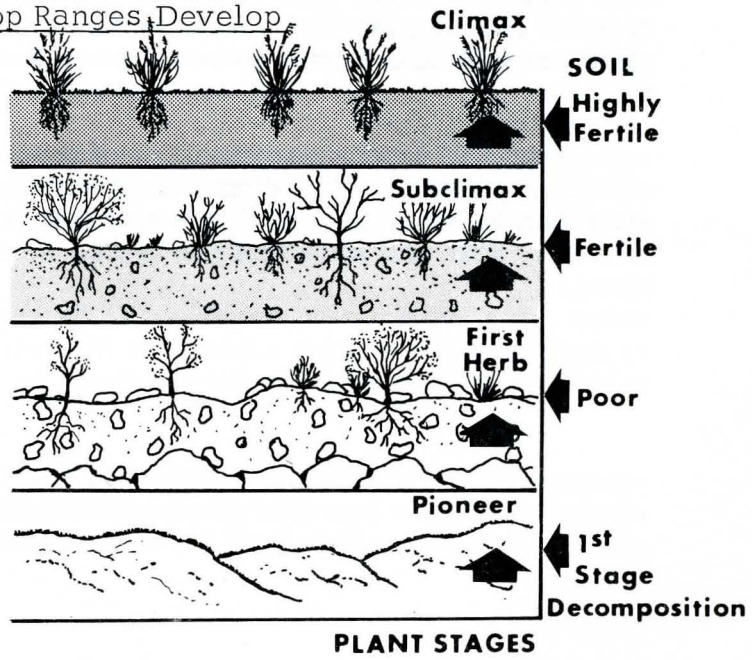
Obtain a copy of "Sixteen Plants Poisonous to Livestock in the Western States", U.S.D.A. Farmers Bulletin 2106, from your County Agent. It has pictures of most of the poisonous plants in Nebraska and gives further details on management to recognize and avoid poisonous plant losses.

CHAPTER 8. 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.

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

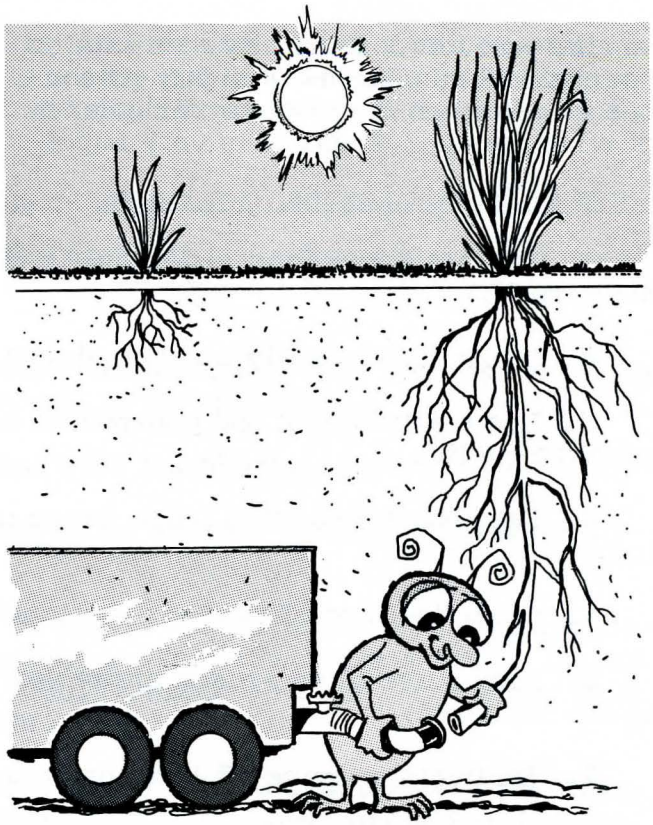


forbs and grasses to come in. As the soil further develops, a few perennial grasses and forbs are able to grow.

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.

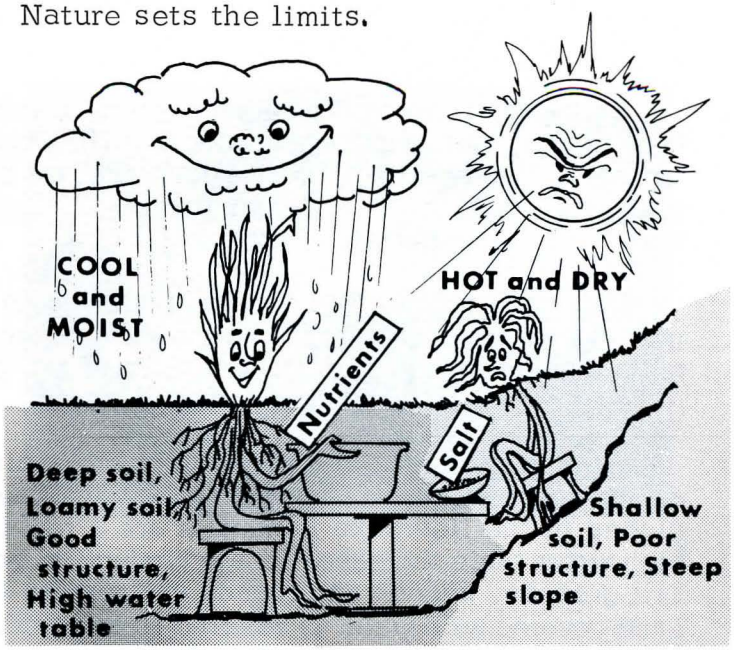


Living soil organisms make plant nutrients available.

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.

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.

Nature sets the limits.



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.

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.

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.

What's in a range?

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.

Rangeland with similar vegetation, soils and climate throughout is called a range site. 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 many range sites in Nebraska. The following is a list and brief description of 12 of the most important range sites arranged in order of decreasing productivity:

Wet land (poorly drained)--water table within 36 inches of soil surface. Generally flooded in spring.

Subirrigated--water table between 10 to 60 inches of surface during major part of growing season. Seldom flooded. Bluestems are adapted.

Saline subirrigated--subirrigated lands affected by salt accumulations.

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

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

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

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

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

Choppy sands--sands on steep, irregular slopes. Catsteps are characteristic.

Limy upland--sandy loams, silt loams, loams and silty clay loams. Calcareous (limy) in the surface soil.

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.

CHAPTER 9 How Grazing Affects Plants

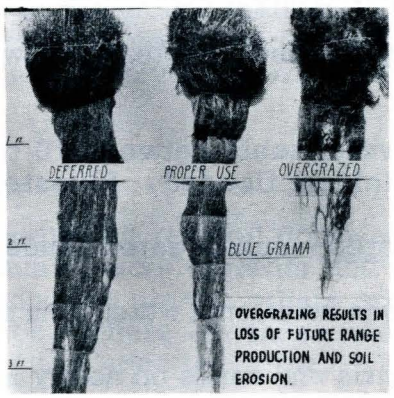
Effect on Individual Plants

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 forage plants are grazed and then allowed to make top growth again, they won't be seriously hurt. But if the shoots are kept grazed close to the ground, the plants suffer.

Where the shoots are kept down, the roots are shortened also. A deep root system is essential if range plants are to survive droughts. Since heavy grazing greatly reduces root development, such plants are severely injured by drought. 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.



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 closer to the surface of the ground. 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 climax range plants that decrease in number under heavy grazing. They are palatable to livestock and usually perennials.

Increasers are climax 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 climax vegetation or there in small amounts only (2 1/2 percent or less).

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!

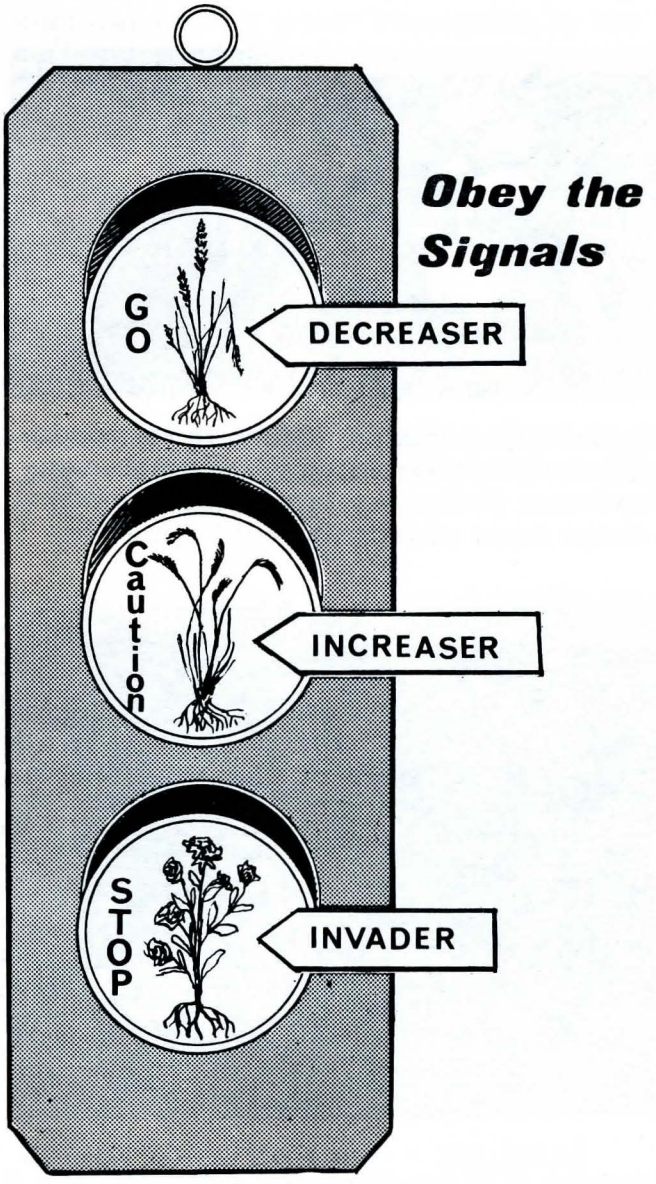
Let's apply these same colors and their meanings to range plants. We might call the decreaser plants the "green group plants", the increaser plants the "yellow group plants" and the invader plants the "red group plants."

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.



WATCH THE TRAFFIC !

CHAPTER 10. 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.

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

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

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.

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.

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.

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 guide. Examples of range condition guides are found in Table 1. A sample range condition worksheet is shown in Table 2.

The first step in using the range condition worksheet is to list the different kinds of plants growing in an area. Arrange them in the proper groups, i.e., decreaser, increaser and invader. Range condition guides and a copy of "Common Range Plants in Nebraska," a University of Nebraska publication, 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 example in Table 2 we used the guide for the 20 to 24 inch precipitation zone (Table 1).

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 25 percent. Thus we can only count 25 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 initially on plant composition.

Table 1. Guide for Determining Range Condition.

20-24" Precipitation Zone, North of Platte River

Maximum Percentage in Climax by Range Sites 1/

Increasers:	Range Sites											
	Wet Land	Subirrigated	Saline Subirrigated	Overflow	Sands	Sandy	Silty	Clayey	Choppy Sands	Limy Upland	Shallow	Thin Loess
Blue/Hairy grama	-	-	-	-	5	10	15	10	5	15	25	15
Buffalograss	-	-	-	-	-	-	-	5	-	5	-	-
Gray sagewort	-	-	-	-	-	5	5	-	-	-	5	-
Green muhly	-	5	-	5	-	-	-	-	-	-	-	-
Inland saltgrass	-	-	10	-	-	-	-	-	-	-	-	-
Little bluestem	-	d	-	d	25	d	d	d	30	d	d	d
Needleandthread	-	-	-	5	10	20	15	d	-	15	d	d
Prairie sandreed	-	-	-	-	25	25	5	-	20	-	d	d
Rosette panicums	-	-	-	-	5	5	-	-	5	-	-	-
Sand dropseed	-	-	-	-	5	5	5	-	5	5	5	5
Sand paspalum	-	-	-	-	5	5	-	-	5	-	-	-
Sandhill muhly	-	-	-	-	5	-	-	-	5	-	-	-
Sedge family	25	15	5	5	5	5	5	5	5	10	5	10
Sideoats grama	-	-	-	10	-	d	15	d	-	d	d	d
Tall dropseed	-	-	-	-	-	-	5	5	-	-	-	-
Western wheatgrass	-	10	d	20	-	15	20	30	-	20	15	25
Forb increasers	5	5	5	5	5	5	5	5	5	5	5	5
Woody increasers	-	-	-	5	10	5	5	5	10	5	5	5

20-24" Precipitation Zone, South of Platte River

Blue/Hairy grama	-	-	-	-	5	10	15	20	5	15	20	20
Buffalograss	-	-	-	-	-	-	5	10	-	5	-	-
Gray sageworts	-	-	-	-	5	5	5	-	-	-	5	-
Green muhly	-	5	-	5	-	-	-	-	-	-	-	-
Inland saltgrass	-	-	10	-	-	-	-	-	-	-	-	-
Little bluestem	-	d	-	d	25	d	d	d	30	d	d	d
Needleandthread	-	-	-	-	10	d	d	-	-	10	d	d
Prairie sandreed	-	-	-	-	20	25	-	-	20	-	d	-
Rosette panicums	-	-	-	-	5	5	-	-	5	-	-	-
Sand dropseed	-	-	-	-	5	5	5	-	5	5	5	5
Sand paspalum	-	-	-	-	5	5	-	-	5	-	-	-
Sandhill muhly	-	-	-	-	5	-	-	-	5	-	-	-
Sedge family	25	15	5	5	5	5	5	5	5	5	5	5
Sideoats grama	-	-	-	10	-	d	15	d	-	25	d	d
Tall dropseed	-	-	-	-	-	5	5	5	-	5	-	-
Western wheatgrass	-	5	d	20	-	15	15	25	-	10	10	15
Forb increasers	5	5	5	5	5	5	5	5	5	5	5	5
Woody increasers	-	-	-	5	10	5	5	5	10	5	5	5

1/ Legend for Maximum Percentages of Increasers in Climax
(d) Means decreaser on site.
(-) Means less than 2½% or did not occur.

5,L-24,204.4

Table 2. Range condition worksheet

Range site Sandy
Name of pasture No. 1
Precipitation zone 20-24"
County Logan

	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	15 %	all	15
Switchgrass	trace	all	
Little bluestem	trace 5%	all	5
Prairie junegrass . . .	trace	all	
Sand lovegrass . . .	5 %	all	5
		all	
Increasers			
Prairie Sandreed . . .	35 %	25	25
Needle and Thread . .	30 %	20	20
Sedge	5 %	5	5
Gray Sagewort	5 %	5	5
Invaders			
Downy Brome	5 %	none	0000
Six-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	Excelient 75-100
	Good 50-75
	Fair 25-50
	Poor 0-25

Special Adaptation of Range Condition

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

In this group of introduced, 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.

Whenever desirable, introduced grasses and legumes occur on range sites where they are recommended for seeding, you may want to include them in your condition score. If so, 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 then 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 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 prepared 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.

CHAPTER 11. 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
Cows	1.0
Cow and calf pairs	1.3
Two-year-old steers	.9
Yearling cattle (18-24 mo.)	.8
Yearling cattle (12-17 mo.)	.65
Weaner calves (under 12 mo.)	.5
Bulls (mature)	1.4
Saddle horses (mature)	1.25
Sheep (mature)	.2

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

Using Stocking Rate Tables

A good method to set an initial stocking rate is to use stocking rate tables. Stocking rate tables give the AUM's of grazing per acre during an average year. This means the approximate length of time in months that one mature, dry cow or her equivalent can graze on one acre of range each year.

Table 3 is used in setting an initial stocking rate. Section A (of Table 3) gives suggested initial stocking rates for the various range sites and precipitation zones when in climax or 100% range condition. Note how grazing capacity increases from lower to higher precipitation zones and from shallow and thin loess to subirrigated and wet land range sites.

Since most range will be lower than 100% range condition, it will also be necessary to refer to Section B (of Table 3). This graph shows that stocking rates are related to range condition. As range condition goes down, so does grazing capacity and vice versa.

You must know three things in order to obtain an initial stocking rate from Table 3. These are range site, precipitation zone and percent range condition. As an example, lets take a sands range site in the 20-24" precipitation zone that is in 75% range condition. From Section A it is found that this sands range site in 100% range condition would have a suggested initial stocking rate of .8 AUM per acre.

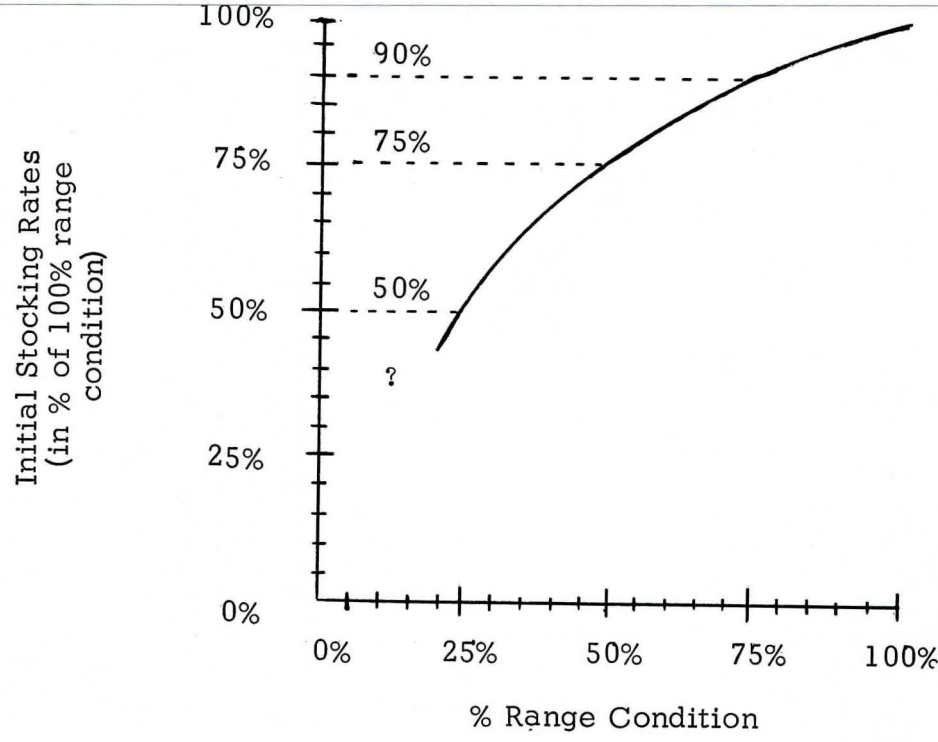
Next, refer to the graph in Section B. Place a straightedge perpendicular to the bottom scale and intersecting it at 75% range condition. Mark the point where the straightedge intersects the curved line. Then lay the ruler horizontally and passing through the point marked on the curved line. Note it intersects the left hand scale at 90%. The suggested initial stocking rate is then .72 AUM's per acre (.8 x 90%) or .7 AUM's per acre when rounded off to the nearest 5/100th.

Table 3. Suggested initial stocking rates (in AUM's per acre annually) 1/

A. 100% range condition (top excellent) 2/

	Precipitation zones in Nebraska				
	14-16"	17-19"	20-24"	25-29"	30-34"
	AUM/a.	AUM/a.	AUM/a.	AUM/a.	AUM/a.
Wet land	2.4	2.4	2.4	2.4	2.4
Subirrigated	1.6	1.6	1.6	1.6	1.6
Saline subirrigated and overflow	.8	.8	1.0	1.2	1.2
Sands, sandy, silty, clayey	.4	.6	.8	1.0	1.2
Choppy sands and limy upland	.4	.6	.7	.9	1.1
Shallow and thin loess	.3	.5	.6	.8	1.0

B. Relation of range condition and estimated initial stocking rates 3/



1/ All stocking rates based on summer grazing. Rates may be increased somewhat if grazing is limited to non-growing season.

2/ As modified from SCS Technicians Guide.

3/ Stocking rate relationships in graph are based on estimated full grazing capacity and do not include a planned degree of undergrazing. Stocking at rates computed from this table should allow range in good and fair condition to improve in condition if range improvement practices such as good distribution of grazing, deferred grazing, avoiding harmful overgrazing in drought years, and weed control are followed. Undergrazing at lower range condition is considered an impractical method of improving range condition.

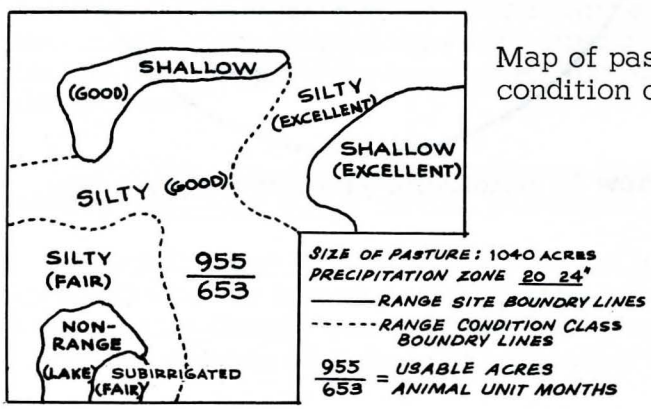
Table 4. Example of figuring animals per pasture

Name of pasture East Canyon

Year 1967 Precipitation zone 20 - 24"

Name of site	Range Condition	No. of acres		Initial Stocking rate, AUM's/acre	Number of AUM's
		Total	Usable		
silty	85%	300	290	.75	217
	70%	380	380	.7	266
	45%	110	110	.55	61
subirrigated	40%	25	25	1.05	26
shallow	95%	100	80	.6	48
	65%	80	70	.5	35
non-range	-	45	0	-	0
Total	xxxxx	1040	955	xxxxxx	653

653 AUM's / 5-month grazing season = 131 animal units for the grazing season



Map of pasture showing range sites and range condition classes.

Figuring Animals per Pasture

After determining the suggested initial stocking rates, the next thing to determine is the number of usable acres in the pasture. Do this by subtracting 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 wetland and subirrigated sites. Refer to example in Table 4 and accompanying map.

You are now ready to determine the number of animal unit months the pasture will provide. Do this by multiplying the usable acres by 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.

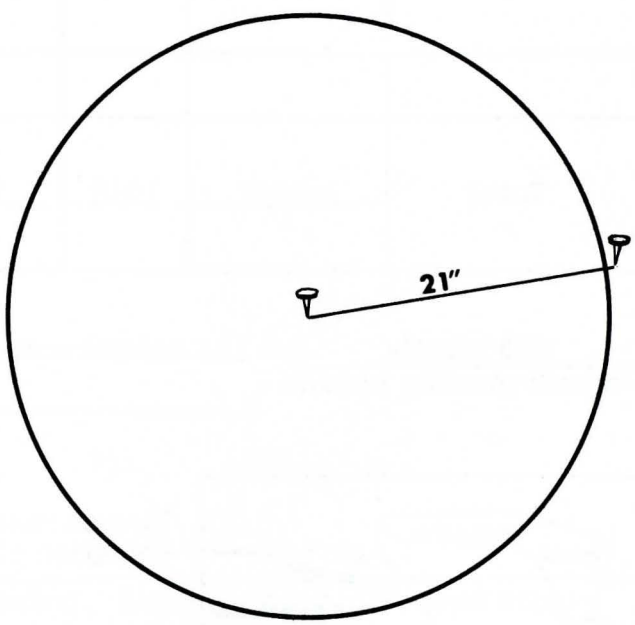
In the example a pasture with 653 AUM's of grazing capacity is to be used for a five-month grazing season. Six hundred and fifty-three divided by five equals 131. One hundred and thirty-one animal units can be grazed for five months in the pasture.

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. 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. 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).

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.



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 half and leaving 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 25 pounds (air-dry) of grass each day, an AUM would be equivalent to about 750 pounds of forage. Our estimate of stocking rate for this range site would then be .4 AUM's per acre (300 divided by 750).

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 will 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.

CHAPTER 12. 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 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 a 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. However, once stocking rates have been adjusted to grazing capacity, good grazing practices or cultural treatments rather than undergrazing should be used to improve range condition.

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

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.

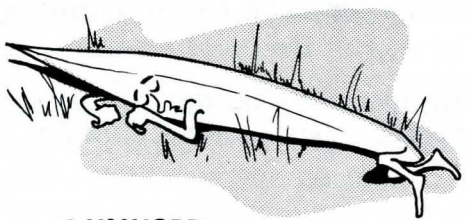
A flexible system of stocking is necessary to meet variations in forage production resulting from droughts, late spring seasons and insect damage. One method is to operate a cow herd of a size the range can carry in low forage years. Use excess forage in average and good years to keep calves until they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

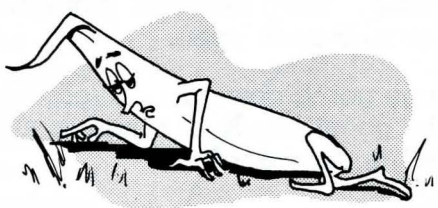
Degree of use check. A running check should be made by the rancher on his range as the grazing season progresses. This is to determine how closely the primary or key forage plants have been grazed during the current grazing season. The range manager will base his management on these key plants. These 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 below:



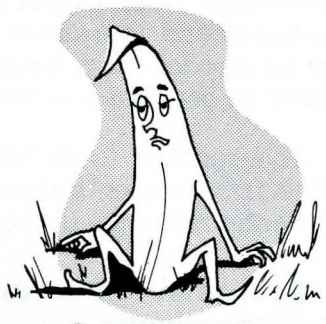
1. UNUSED

NO LIVESTOCK USE



2. SLIGHT

1-20% USE OF PRIMARY FORAGE PLANTS. PRACTICALLY UNDISTURBED.

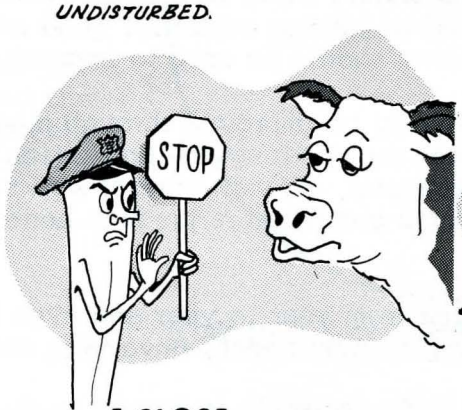


3. MODERATE

21-40% USE OF PRIMARY FORAGE PLANTS. MOST OF RANGE BEING GRAZED. LITTLE OR NO USE OF POOR PLANTS.

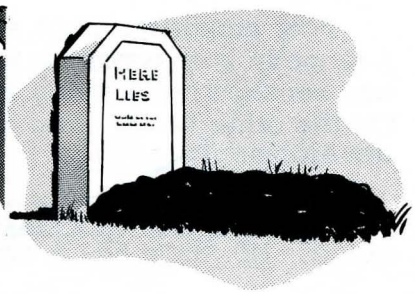
4. FULL

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.

CHAPTER 13. Grazing Management

When to Graze

In Nebraska ranges may be grazed any month of the year but they should not be grazed every month of the year.

The range forage plant is most nutritious in spring and early summer. At this time livestock will make greatest gains. This is also the time in which the plant has the lowest stored food reserves. What are some of the problems in management a rancher must meet if he is to keep his range in top shape?

Plants are living organisms. They are the only living organism that can convert inorganic materials into organic materials that can be used as food by animals. So the plant must not only manufacture all the feed eaten by cattle but must also feed itself.

From the figure on Page 36 it can be seen that the plant lives through the dormant season on its stored food reserves. At the end of this time there must be enough food stored to permit the plant to resume or start growth in the spring. As the plant grows in leaf area the rate of photosynthesis exceeds the rate of energy use and there is a beginning of food storage.

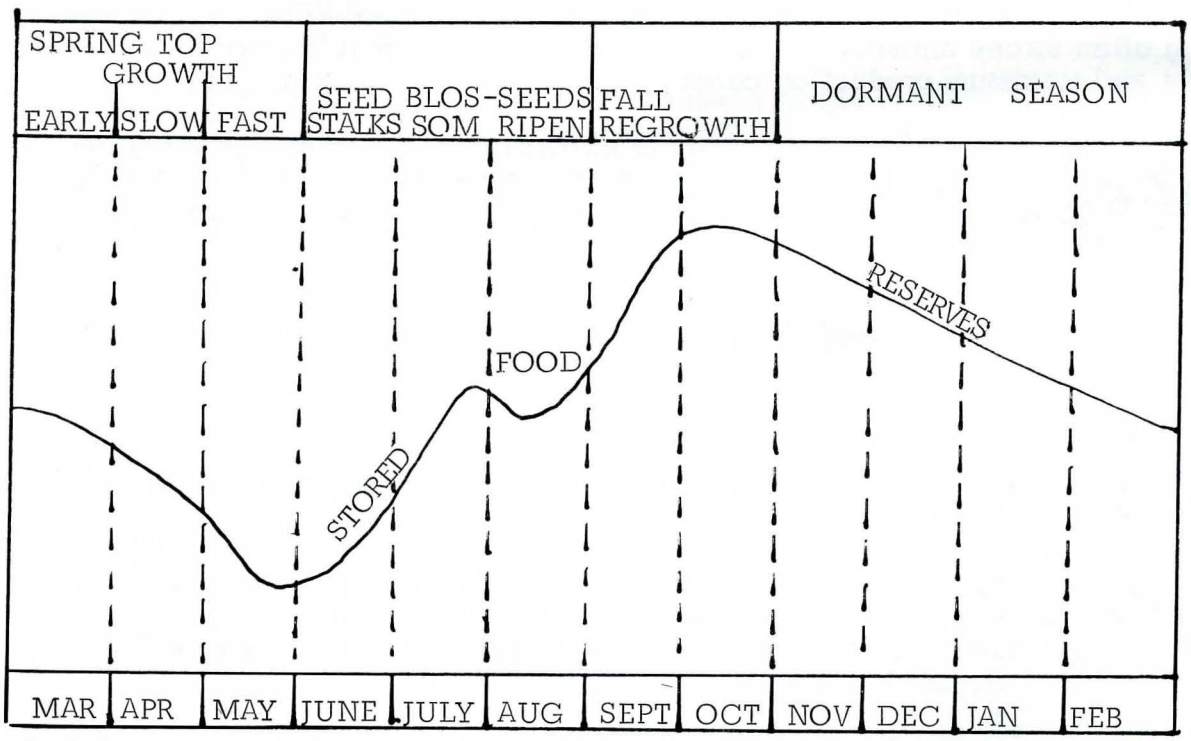
If a plant is continuously grazed or grazed too short early in the spring and summer, the stored reserves are further depleted as the plant begins regrowth. When this occurs the plant is weakened and livestock production goes down. If overgrazing continues in future years, the plant will die and its place will be taken by less productive plants.

Although some Nebraska ranges are continuously grazed, most ranchers practice some type of use-rest program. In many instances this involves rotating winter and summer use. Best production, however, is accomplished by following a carefully planned deferred or deferred-rotation grazing program.

Research on Oklahoma sandhill range 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.

On some livestock farms, native grazing lands are grazed only in the summer and cattle are wintered on crop aftermath and harvested roughages through the winter. Under this system of production, range should not be grazed until sufficient 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.

The annual growth and food storage cycle of cool-season grasses.



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.

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

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 range land, 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. A deferred-rotation system may be set up 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:

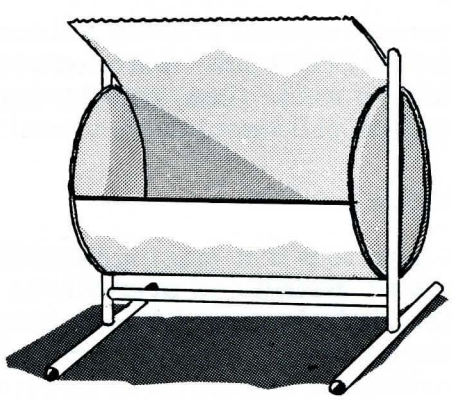
1. Developing new stockwater facilities in undergrazed areas.
2. Cross fencing large pastures.
3. Fencing along range site lines and around seeded range.
4. Rotation grazing.
5. Feeding winter supplements in underused areas.
6. Placing salt away from water.
7. Mowing old grass in underused areas.
8.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

Salting Practices

Livestock need salt all year. Feeding a salt supplement to grazing livestock is a standard range practice. Grazing animals need more salt than they can get from plants. Proper distribution of salt is one of the cheapest and most convenient methods of getting uniform use of forage in a pasture.

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. 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.



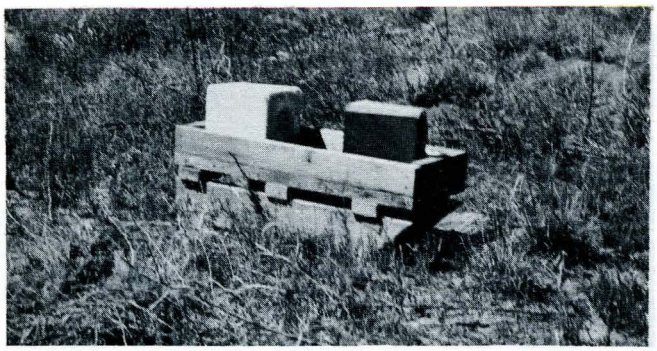
Here are some suggestions for salting:

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.



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

CHAPTER 14. 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.

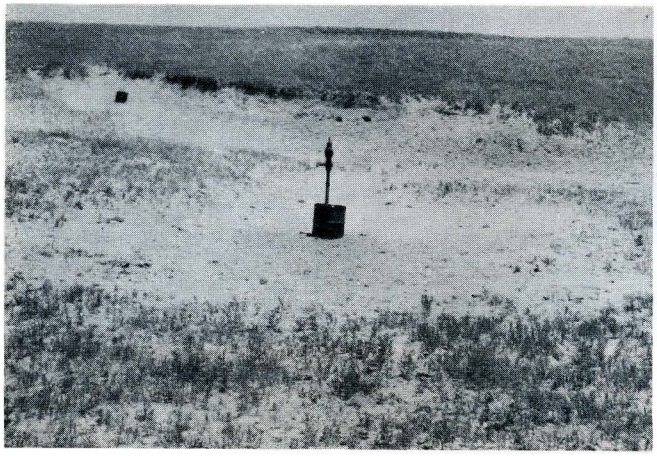
Wells and Windmills. The most common type of water development in Nebraska consists of wells and windmills. The well has many advantages as a source of livestock water. Some of them are:

1. They can be drilled near the forage supply.

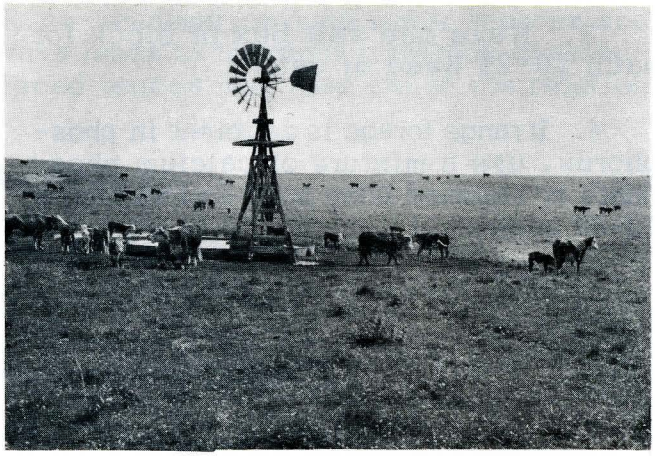
2. They furnish a more dependable water supply in dry seasons and in winter.

3. They are a safe place for livestock to get water in winter.

Wells should be in areas where there is enough forage. They should not be on soils subject to erosion. Where erosion can be kept to a minimum, windmills may be put along fence lines. This is a good practice when the pasture size is small or when water development is needed in remote areas of two adjacent pastures.



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



Proper location of the windmill and tank together with correct stocking (no more than 50 animal units per watering place) and deferred-rotation grazing reduces erosion hazards.

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.

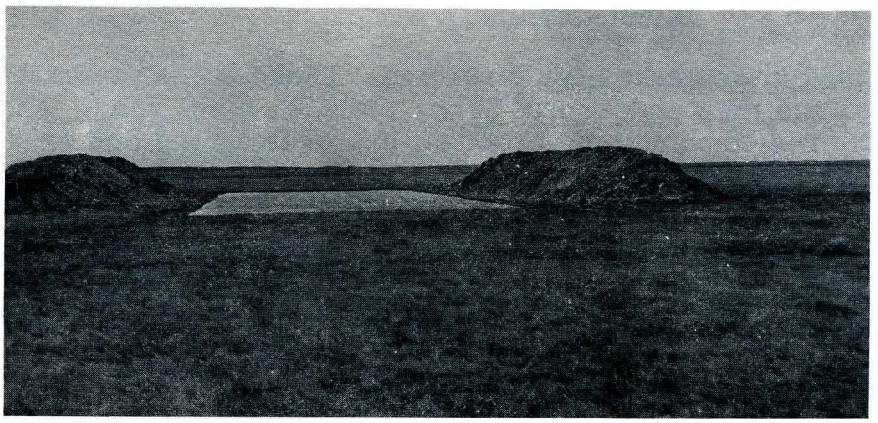
Other types of man-made stockwater developments include dugouts, catchment basins and sand tanks. For further information on stockwater needs and developments, obtain a copy of E.C. 63-156, "Water for Range Livestock".

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.



A stockwater dugout constructed with dragline on native range.

3. Fences make deferred grazing possible or divide winter from summer range.

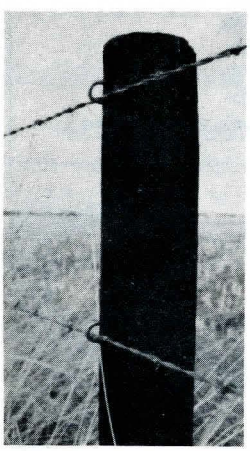
4. Fences make it possible to eliminate grazing or trampling on critical areas, such as blowouts and reseeded areas.

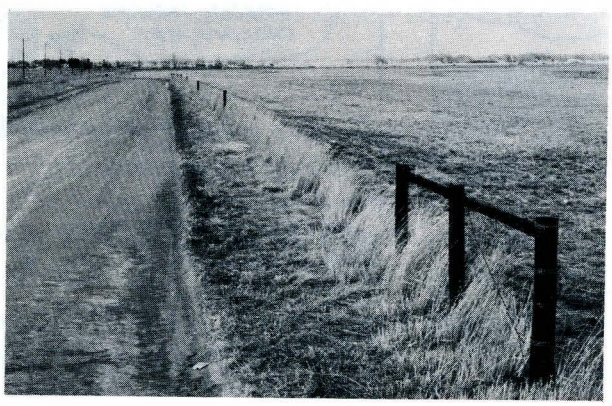
5. Fences make it possible to separate different classes of stock for better management and provide breeding pastures.

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 has 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 the pictures below.





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

CHAPTER 15. Range Seeding

Thousands of acres of range land in Nebraska need reseeding. These areas represent land that was at one time farmed and then abandoned. They include, also, range land that has been severely 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 successful grass seeding. Plans for the seeding should include:

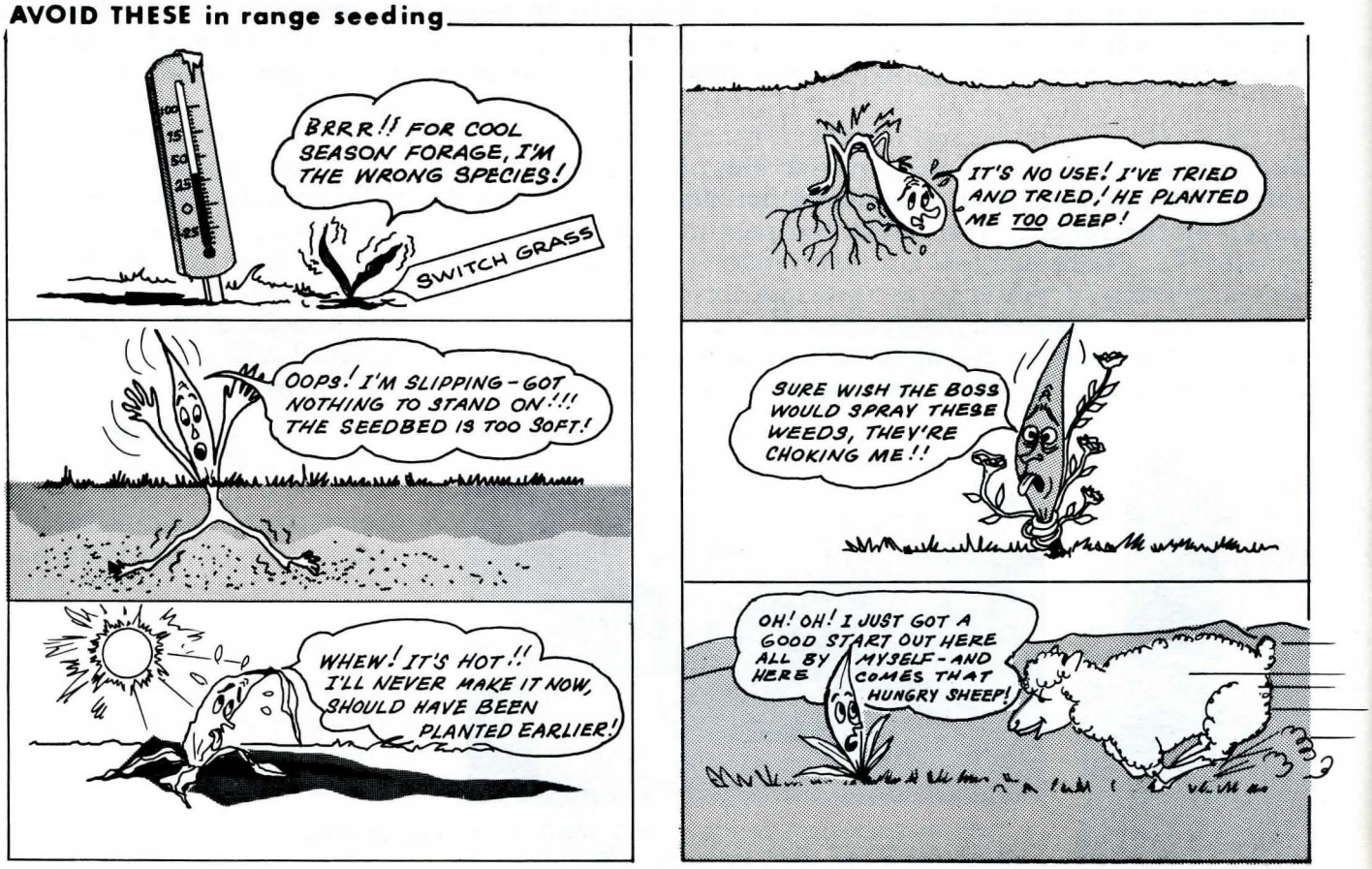
1. Selection of the grass or mixture of grasses that will fulfill the purpose for which the seeding is to be made.

2. Preparation of a suitable seedbed.

3. Following the best seeding practices known.

4. Careful management after the seeding is made.

AVOID THESE in range seeding



Selecting the Grass or Grass Mixture

Selection of the correct grass or mixture of grasses depends upon several things. The first is the purpose for which the seeding is to be made. Select cool-season grasses to provide grazing in late April and early May. They will extend the period in which green grass is available to your livestock in the fall. Warm-season grasses are used to provide high quality forage in midsummer. They should be used in all seedings of abandoned farm land that is to be reseeded and included in a native pasture after establishment.

Another 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 many range areas of Nebraska. Sand lovegrass is best used in mixtures on the coarse-textured soils of the state. Table 5 shows the region to which many grasses are best suited in a reseeding program.

Whenever possible always buy certified seed of improved and recommended varieties of grass. This assures an adapted seed that will get the job done.

Buy, sell and plant grass on a pure-live-seed basis. The pure-live-seed content of grass seed is determined by multiplying the germination percentage times purity percentage. For information on the pure-live-seed method of determining seeding rates, the reader is urged to get a copy of EC 61-35 from his county Extension office.

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 are most successful when a seedbed with a mulch cover is provided. 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 provided 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 fall, 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 requires the use of a grass drill with depth bands. This assures 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.

The range interseeder is used in situations where tillage operations for seedbed preparation would result in severe erosion hazards. This machine seeds grass in the bottom of a shallow lister furrow without disturbing the vegetation between furrows. The range interseeder is best adapted for reseeding abandoned farm land on sands or sandy range sites.

Table 5. Grasses and legumes commonly used for range and pasture seeding and recommended planting rates.

Grasses and Legumes	Eastern			Central			Western			PLS lb. required per acre[1]
	Hard Land	Sandy	Wet	Hard Land	Sandy	Wet	Hard Land	Sandy	Wet	
Smooth bromegrass, Lincoln	*	*	*	*		*			*	6.5
Orchardgrass	*	*	*			*			*	2.0
Intermediate wheatgrass, Nebr. 50	*	*		*	*	*	*	*	*	10.0
Tall wheatgrass, Nebr. 98526	*		*	*		*			*	11.0
Crested wheatgrass, Nordan				*	*		*	*		5.0
Russian wildrye, Vinall				*			*			5.0
Blue grama	*	*		*	*		*	*		1.5
Sideoats grama										
Butte				*	*		*			4.5
Trailway	*	*								4.5
Big bluestem										
Pawnee	*	*	*	*		*				6.0
Kaw	*	*	*	*		*				6.0
Champ				*	*		*	*	*	8.0
Little bluestem, Blaze	*	*	*	*	*		*	*	*	3.5
Indiangrass										
Holt				*	*	*	*	*	*	5.0
Nebr. 54	*	*	*							5.0
Switchgrass										
Nebr. 28				*	*	*	*	*	*	3.0
Pathfinder	*	*	*							3.0
Sand lovegrass, Nebr. 27		*			*			*		
Western wheatgrass	*	*		*	*	*	*	*	*	8.0
Canada wildrye		*		*	*		*	*		7.5
Reed canarygrass, Ioreed	*		*			*			*	2.0
Alfalfa	*	*		*	*	*		*	*	4.0
Birdsfoot trefoil	*	*	*			*			*	2.5

1/ A planting rate of 20 pure live seeds per square foot is considered adequate under good conditions of seedbed preparation and weather. Somewhat higher rates are suggested where obtaining a full, usable stand in a minimum time justifies the added cost.

Time of seeding is important. Plant cool-season grasses in late summer for fall establishment, if soil moisture conditions are favorable. They may be planted in early spring. In central and western Nebraska, wheatgrasses may be planted 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 midspring from early April to early May. Plant slow germinating warm-season grasses such as bluestems, switchgrass and Indiangrass at the earlier date.

Management

Close attention must be paid to the management of range after seeding. Seedlings should not be grazed until they are completely established. This may require from one to three years. More time is needed for 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 to use for control of grassy weeds in new grass seeding. If foxtail, barley, bristlegrasses or sandburs are a problem, the only solution is clipping.

When clipping for weed control, care should be used so that the new seedlings are not clipped too closely. Clippings should be done at heights of 4 to 5 inches.

CHAPTER 16. 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 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 skunkbrush 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 for a copy of "Chemicals That Control Weeds," A Nebraska Extension circular.

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 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 Meadows

The yield and quality of hay produced on many subirrigated meadows can be improved through the use of commercial fertilizers. The introduction of adapted legumes to the stand increases the efficiency of the fertilizer.

Use of fertilizer for improving meadow production includes:

1. A reliable soil test and a trial application.

2. Application of 40 to 80 pounds of P_2O_5 (17.5 to 35 pounds of elemental phosphorus) per acre every four years.

3. If legumes are not present in the stand, interseed them in the early spring. The legumes may be seeded with any seeder or drill equipped to handle small seed. This is often done with attachments to fertilizer spreaders at the time phosphorus is applied. Some ranchers seed clovers by feeding mature clover-grass hay on meadows where they wish to establish new stands.

Table 6 will help you select the proper legume and seeding practice for your meadows.

Grazing cattle on subirrigated but not wetland meadows is a sound practice under proper management. It is recommended that a subirrigated meadow be grazed one year and cut for hay two consecutive years. Gains of cows and calves grazing meadows have

Table 6. Guide to selection of legumes and seeding practices for meadows.

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

proven equally satisfactory to those from grazing upland sandhill ranges during the summer. Some ranchers report 25 to 35 lb. greater summer gains with yearlings grazed on subirrigated meadows than those grazed on sandhill uplands.

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. A common rate of application is 30 to 40 pounds of nitrogen per acre as soon as the frost is out of the ground in 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.

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 range lands. 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.

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