EXPLORE

TEXAS 4-H RANGE EVALUATION | EXPLORING TEXAS 4-H RANGE JUDGING

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LESSON 1

Overview and Purpose of the Texas 4-H Range Judging Contest

OBJECTIVES

The 4-H member will:

- Understand the basic concept of a range judging contest.
- Know what materials are needed for the contest.

EXPLORE THE CONTENT

The range judging contest offers an opportunity for 4-H members to learn rangeland ecology, practical application, and decision-making skills essential to range management. Range management includes planning and directing the grazing of range forage for optimal sustained, efficient livestock production associated with the wise use and development of the range resources. These resources include vegetation, soil, water, and wildlife. Along with these range resources, proper stocking rates must be utilized. Productive livestock at the proper stocking rate on healthy rangeland is most profitable for the stockman. Range evaluation prepares management skills and knowledge and emphasizes the proper management of valuable natural resources. Throughout preparation and participation in contests, participants will become familiar with grasses, forbs, woody plants, different ecological sites, and the effects of grazing animals. Participants will also learn the differences in plant types, how grazing affects plant growth, what plants grow in certain ecological sites, the different vegetative states of plants, and the management practices to improve range sites. Not only are these skills and information valuable throughout a member's 4-H career, but they can also be carried into school, higher education, and their future career.

Age Divisions and Teams

There are three age divisions for this contest: Junior, Intermediate, and Senior. Those in the Junior age group are 4-H members that are 8 to 10 years old on or before September 1st of that year. Competitors in the Intermediate age group are 11 to 13 years old, and Seniors are 14 to 18. While you may practice as a team, the contestants compete individually, making sure what they turn in is their own work.

Sections and Materials Needed

There are three parts to this contest: plant identification, range evaluation, and range health. Participants will need pencils, a clipboard, and a calculator. Attire should be appropriate for rangeland conditions.

Reflect

- What are the three parts of this contest?
- What are the required materials for each contestant to have prior to the start of the contest?

Apply

- How do you think the knowledge and skills learned will help you in the future?
- Build teams that are close in age to begin practicing and traveling to contests.
- Reach out to your Extension agent or agriculture teacher for guidance.

LESSON 2

SECTION 1:

Plant Identification

Materials Needed:
Plants, plant presses, or PowerPoint with plant pictures

OBJECTIVES

The 4-H member will:

- Learn the characteristics of each plant on the list.
- Learn how to accurately identify each plant on the list.

EXPLORE THE CONTENT

Knowledge of range plants is the foundation of range management. The kind and amount of vegetation on a particular range site determine the most appropriate use. Not only is it necessary to know how to identify plants, but it is also important to know the characteristics of each plant as well.

Plant identification is the first section of the contest. In this section, 20 to 40 live plants from the 4-H Master Plant List are flagged or staked with a corresponding number. Transplants, potted plants, and duplicates are allowed. The contestant must identify the plant by writing its common name and checking off its plant characteristics on the scorecard.

Plant characteristics include the life cycle (annual or perennial), season of growth (cool or warm), origin (native or introduced), and economic value for wildlife and grazing animals. Another characteristic that must be checked off is whether or not the plant is poisonous. All of the above characteristics are included in the 4-H Master Plant List. Contestants are typically allowed 45 seconds to identify each plant, but this can be modified if the plants are spaced further apart or the competitors are young or inexperienced.

Plants can be grouped and classified in many different ways. A few that are helpful for the contest are grasses, forbs, and woody plants. **Grasses** are distinguished as having jointed stems that are hollow or pithy between the joints or nodes. They are characterized by fine, narrow leaves with parallel veins and a fibrous root system. **Forbs** are broadleaf plants with taproots and solid, non-jointed stems. The leaves have net-like or branching veins. **Woody plants**, most commonly known as shrubs and trees, have solid stems and leaves that are often broad and net veined. Shrubs have woody stems that branch near the base, typically have a mature height of 16 feet, and have long, course roots. Trees have a definitive trunk that branches well above ground level and are typically taller than 16 feet at maturity.

As previously mentioned, it is necessary to know the characteristics of range plants and how to identify them. Characteristics that are necessary for the contest are plant longevity, season of growth, origin, and economic value.

The **life cycle**, or life span of the plant, is classified as either annual or perennial. *Annuals* are herbaceous plants (grasses and forbs) that complete their life cycle in one growing season and must start new growth each year from seed. *Perennials*, however, grow for three or more seasons and may be grasses, forbs, or woody plants. Perennial grasses and forbs, or perennial herbaceous plants, produce new growth each year from ground level at the crown of the plant. In contrast, woody plants initiate new growth each growing season from aerial parts, or terminal buds, of the plant. The **season of growth** is the season of the year that the plants are best adapted to and most active in. Cool-season plants are best suited to cool, moist conditions.

Thus, the primary growth period for these plants is during the cool weather of spring, with seed set in late spring or early summer. Cool-season growth may also occur in the fall and early winter if soil moisture is adequate. Warm-season plants grow the most from late spring to mid-summer, as they are well adapted to the high temperatures and light intensity.

Seed development for these plants is mid-summer to early fall. The **origin** of the plants is categorized as either native or introduced. *Native* plants are those that are part of the original flora of the area. *Introduced* plants are those that are brought in from outside North America as forage crops.

The **economic value** of the plants, also referred to as animal preference, is ranked as good, fair, or poor. The preferred plants, or *good*, are those that are consumed by the animals in greater quantities. *Fair* plant species are not as preferred by animals as the "good" plant species are but are consumed in proportion to their availability in the plant community. *Poor* plant species are those that are not readily consumed by animals and are generally chosen at a lower rate than what is available. **Poisonous** plants are those that have a toxic substance at a certain stage of growth that will cause sickness or even death to foraging animals.

Reflect

- Remember that plants are going to be in varying stages of growth, so it is imperative that you study all stages to be able to accurately identify the plants.
- How important is it to study all plants to know their characteristics and how to accurately identify them?
- Who can help you fine-tune your judging skills?

Apply

- Travel to and participate in as many contests, practice contests, and clinics as your schedule will allow in order to perfect your skills.
  - Participate in simple activities, such as the speed plant identification exercise, to help with quick decision making.
- Ask your Extension agent or agriculture teacher for guidance.
- How might you use the knowledge and skills learned from this portion of the contest in the future?

ACTIVITY

Speed Plant Identification

Speed plant identification is a fun and interactive activity to help improve plant identification and quick decision-making skills. This activity provides embedded education and immediate results, along with some friendly, fast-paced competition with the team!

Objectives

- Teach plant identification techniques.
- Promote quick decision making.
- Increase plant characteristics and knowledge.
- Create a fun and competitive environment.
- Compete with instant results.

Rules

- Plants or pictures of plants are presented one at a time.
- Participants are given 25 seconds per plant.
- Participants must correctly identify the plant on their own sheet of paper.
- On the back of the same sheet of paper, the contestants will write the characteristics of the plant.
- Participants are given 20 seconds per plant.
- Repeat as many times as necessary.
- One point is awarded for every correct plant identification and characteristic. The highest score wins.

Materials Needed

- Paper
- Pencils
- Clipboard
- Plant specimen or pictures

LESSON 3

SECTION 2:

Range Evaluation

OBJECTIVES

The 4-H member will:

- Understand the components of the ecological site assessment.
- Understand the various grazing management decisions.
- Understand the various improvement management decisions.
- Know how to calculate similarity index and stocking rate.

EXPLORE THE CONTENT

Rangelands are the primary land type in the world and account for about 50 percent of all land area. Majority of the remaining land area is classified as forest or woodland, desert, and farmland. Rangeland is a specific kind of land where the native vegetation is predominantly grasses, grass-like plants, forbs, and/or woody plants suitable for browsing or grazing by large herbivores. Rangeland, when properly managed, can be used on a sustainable basis for livestock production while also providing high-quality air and water, wood products, wildlife habitat, recreation, and native plants. Since most rangeland is not suitable for farming due to the roughness and steepness of terrain, shallow and rocky soil, adverse climatic conditions, and/or poor accessibility, rangeland should remain as natural vegetation, providing many products of value on a sustained, self-renewing basis.

Range plants occur in various communities in response to the physical characteristics of the environment. These physical characteristics include climate, soil, and topography. Within particular climatic and topographical settings, the development of soil and plant communities is highly interrelated over time. Soil characteristics influence the vegetation type and amount, and the vegetation influences soil development by adding organic matter and reducing erosion. Overall, the composition and productivity of the plant community change as the soil characteristics change.

Primary succession starts with soil parent material and low plant forms that successively change over time to better-developed soil and higher plant life forms. The final stage in succession, or *climax*, is achieved when the soil and plant community are somewhat in balance with the climate or topography. Major changes in the soil or plant communities do not occur without significant shifts in the climate or topography. The climax plant community, or the potential natural community, represents the group of plants best adapted to the physical characteristics of the site. This plant community makes the best use of the available soil nutrients, soil moisture, and energy from the sun. Dominant plant species in the climax stage of succession are sensitive to grazing pressure and will decrease in population under disturbance. *Disturbance*, such as destructive grazing of the climax plant community, results in degradation of the site and movement of the site to a lower successional status. This process is called retrogression. Secondary succession occurs following retrogression and involves successive changes as the plant community develops back towards climax. The main concern is with vegetational changes, as disturbances generally do not significantly affect the soil. It should be noted that fire is commonly viewed as part of the environment under which natural grazing lands developed. Therefore, fire should be considered a part of climax conditions, especially on climax grasslands.

In this section of the contest, an area is staked and roped off. This area may represent an entire ranch, one or more pastures, or a small part of a pasture. There are seven sections on the scorecard for the participant to complete: degree of utilization, kind of site, successional stage, similarity index, vegetative state, recommended stocking rate, and management decisions. The contest coordinators will provide the contestants with conditions to consider when evaluating the selected plot. These considerations are the grazing and improvement decisions on the scorecard. Along with the scorecard for this section, the contestants will be handed the Ecological Site Description and Plant Production Worksheet.

Ecological Site Assessment

Degree of Utilization

Three degrees of utilization are considered during evaluation. The degree of utilization will be determined from two plants of a key plant species. One of the plants will be clipped to simulate the degree of utilization by grazing livestock and/or wildlife, while the second plant is left unaltered.

These plants will be staked and tagged outside of the roped-off plot, as shown circled in the picture below. After examining the two utilization plants, the contestant will decide which of the three degrees of utilization best applies to the plot and will mark that selection on their scorecard. The three degrees of utilization are:

1. **Unused or light**, where less than 25 percent of total plant production is utilized;
2. **Moderate**, where 26 to 60 percent of total plant production is utilized; and
3. **Heavy**, where more than 61 percent of total plant production is utilized.

Kind of Site

An ecological site is characterized by a soil or a group of soils that are capable of producing the same kinds and amounts of native forage. An ecological site will determine the forage production and, thus, the potential stocking rate for the specified rangeland. For the purpose of this contest, the soil depth determines the ecological site classification. Alternatively, when making a practical range survey, other site factors are considered.

These factors include parent material, topography, and drainage. Soil depth is characterized by the amount of soil in which plant roots will penetrate above the parent material or bedrock. The depth of the soil determines soil moisture and nutrient capacity. Soil depth will also affect or limit root growth and can greatly influence the kinds and amounts of forage produced. There are four general ecological site classifications used in range evaluation: bottomland, deep upland, shallow upland, and very shallow upland.

Bottomland is characterized by high-production soils that are nearly level and are greater than 20 inches deep. This type of ecological site receives frequent overflow of floodwater from a draw, stream, creek, or river. Driftwood, gravel, and sand deposits may be evident in this site. Similar to bottomland sites, **deep upland** ecological sites are characterized by high-production soils that are nearly level and greater than 20 inches deep.

These high-producing soils are typically found in divide or valley areas. In contrast to bottomland sites, these sites are not subject to frequent overflow. **Shallow upland** ecological sites are characterized by medium-production soils that range from 10 to 20 inches deep due to the possibility of deep pockets of soil. These sites are nearly level or rolling. **Very shallow upland** ecological sites are characterized by low-producing soils that are less than 10 inches deep but may have deeper pockets. These sites are nearly level or rolling and could have small, unattached rocks on the surface.

Very Shallow Upland

Shallow Upland

Deep Upland

At the contest, there will be a hole dug near the roped-off site for the competitors to use to determine the kind of ecological site the plot represents. An example is shown below. If plant roots are visible through the soil profile exposed by the pit, assume that the soil depth is the same as that of the pit.

Bottomland

Successional Stage and Similarity Index

In this section of the contest, several plants will be flagged or staked for identification within the roped-off plot. Pounds of production, Ecological Site Description, a list of plants that occur in the plant community, and their allowable production in pounds are provided to the contestants. The similarity index (SI) is used to determine the successional stage of the plant community. The equation for similarity index is **SI = allowable pounds of production ÷ total production per acre for the reference plant community (RPC) × 100**. An example of this would be 900 pounds of forage ÷ 2,000 pounds of total production per acre of the RPC × 100 = 45. Once the percentage is determined, the competitor must select the correct successional stage. There are four successional stages:

1. **Potential natural:** SI = 76 to 100 percent,
2. **Late:** SI = 51 to 75 percent,
3. **Mid:** SI = 26 to 50 percent, and
4. **Early:** SI = 0 to 25 percent.

Vegetative State

Rangelands consist of many different kinds of plants and plant communities that have very different characteristics. These differences in vegetation are correlated with differences in soils, soil moisture conditions, topography, and climate. Vegetation changes with the amount and distribution of rainfall. Soils on a steep slope also produce a different plant community than soils on a deep upland site because of differences in soil types and moisture availability. Therefore, across a broad expanse of rangeland, there are several subunits that have specific physical characteristics that differentiate one from the other. These subunits, or *range sites*, are the basic vegetation units used in range management.

A range site is the product of all environmental factors responsible for its development. Range sites are the basic working units used in the management of rangelands.

While different plant communities may exist in an individual site, these communities have varying vegetative states. These states of vegetation can change due to the management practices used by the stockman. For the purpose of this contest, four vegetative states are used:

1. **Open grassland:** RPC less than 10 percent woody vegetation,
2. **Grassland with shrub encroachment:** RPC 10 to 30 percent woody vegetation,
3. **Shrubland:** RPC shrub dominated with greater than 50 percent shrubs, and
4. **Woodland:** RPC tree dominated with greater than 80 percent tree cover.

This portion of the contest uses the same roped-off area as the previous assessments. In one of the corners of the plot, an 8-foot reference pole is used to help determine woody plant height. Trees are defined as being 16 feet or taller—anything shorter than that is classified as a shrub.

Open Grassland

Grassland with Shrub Encroachment

Shrubland

Woodland

Stocking Rate

Using the plants staked for the similarity index and successional stage, the participants will determine the recommended stocking rate. Only the plants that are considered "desirable," as indicated in the Ecological Site Description provided, are used in this calculation. Desirable pounds of plant production are totaled for the site and divided by four, representing the 25 percent harvest efficiency to determine useable forage. Then the annual, air-dried forage allowance per animal unit (10,000 pounds/Animal Unit Year [AUY]) is divided by the pounds of useable forage, resulting in acres/AUY. The equation for stocking rate is:

- Step 1: **Desirable forage (lbs/ac) ÷ 4 = useable forage (lbs/ac)**
- Step 2: **10,000 lbs/AUY demand ÷ useable forage (lbs/ac) = ac/AUY.**

The following is an example of calculating stocking rate. In this scenario, there are 750 pounds per acre of little bluestem that is desirable, 450 pounds per acre of silver bluestem that is undesirable, 500 pounds per acre of sideoats gramma that is desirable, 400 pounds per acre of plains lovegrass that is desirable, 350 pounds per acre of buffalograss that is desirable, and 250 pounds per acre of upright prairie coneflower that is undesirable.

- Step 1: 2,000 lbs/ac desirable forage ÷ 4 = *500 lbs/ac desirable useable forage*
- Step 2: 10,000 lbs/AUY demand ÷ *500 lbs/ac* = **20 ac/AUY.**

Management Decisions

This section is made up of two main parts: Grazing Decisions and Improvement Decisions. From there, these two parts have multiple considerations of their own.

Grazing Decisions

The first consideration of grazing decisions is livestock grazing. *Livestock grazing* can be recommended as one of four different practices. The first of these is to continue the current grazing system. If the range successional stage is potential natural or late succession and the degree of use is moderate, this means that the current management practice is considered satisfactory. If the current grazing system is using some kind of deferment, the participant should check the box to continue the current grazing system. For a range management practice to be considered satisfactory, some kind of deferment is usually necessary for plant vigor to remain high. The scenario information provided at the contest will indicate if the land manager is currently following a systematic deferred-rotation grazing system, uses decision deferment, or grazes until a certain utilization of a key management species is obtained. Monitoring the grazing of key species can help to determine the degree of utilization of the range, thus influencing the grazing management strategy chosen.

The second recommendation is to initiate a *planned deferred-rotational stocking system*. If a grazing management system is not already in place, the rangeland should be placed into some kind of planned deferred-rotational stocking program. There are many planned deferred-rotational stocking programs, but for the purpose of this contest, do not worry about the specifics. The rate of range improvement and livestock and wildlife performance will vary within the chosen system. As previously mentioned, the scenario information provided should give the contestant a clue to selecting this recommendation. The third recommendation is to *introduce livestock* into the rangeland to help manage the wildlife habitat. In some cases, the vegetational disturbance caused by livestock is desirable for certain wildlife species. For example, white-tailed deer can benefit from forb production generated within areas where livestock grazing has opened the soil to sunlight. In addition to this, the bobwhite quail need areas with frequent, basketball-sized clumps of tall grasses for nesting and cover, as well as open areas for travel and foraging for insects and seeds. The fourth and final recommendation is to have *no livestock* at all. If the site scenario indicates that the landowner only wants to manage for wildlife, the contestant should select this decision.

The second grazing management decision is to *defer grazing during the growing season* for increased vigor and seed production of desirable plants. This decision is desirable for overgrazed and low-successional pastures because it gives key species a chance to grow and produce seeds and accumulate plant litter and mulch on the soil. This decision will also help determine if artificial seeding is necessary. Deferred grazing will provide an opportunity for seeded stands to establish before grazing livestock are introduced to the area. The contestant should select this decision if utilization is heavy or if continuous grazing is the current system in place.

The third grazing decision is to *defer grazing before noxious plant control*. The method used to control and manage noxious plants, such as poisonous brush and herbaceous weeds, depends on if there are any key forage plants present or not. In areas with dense noxious plant coverage, forage plants are often overgrazed and hard to identify. Plants that are deferred usually make a more rapid recovery following noxious plant control. If 10 percent of the vegetation is key forage species that are well distributed, chemical control may be more feasible than mechanical control, as reseeding may not be necessary. If less than 10 percent of the vegetation is key forage species, mechanical control may be the best method for brush control and to help prepare a seedbed for reseeding. The contestant should select this decision if prescribed burning will be applied.

The fourth grazing decision is to *defer grazing after noxious plant control for the re-establishment of desirable forage plants*. Noxious plants use 4 to 11 times more water than key forage species to produce 1 pound of plant material. When noxious plants are controlled, defer grazing to aid in re-establishing desirable forage plants and to obtain the greatest range improvement, forage production, and grazing capacity possible. By moderately grazing the treated area during the winter after treatment, vigorous grasses will emerge and help control noxious plant seedlings. The contestant should check this box if improvement decision numbers 1, 2, 3, and/or 4 are also checked.

The fifth grazing decision is to *distribute salt for more uniform grazing*. Oftentimes, a watering place is not ideally located, and the construction of a new one is not feasible. By using salt and mineral blocks to help with grazing distribution, some of the under-utilized areas can be used. Cattle will easily find the salt and mineral blocks in the pasture. On ranges with forages that have a high sodium content, add cottonseed meal to the salt block and/or use low-salt feed supplements. Salt and mineral blocks do not need to be placed near water in order for the animals to utilize them. Place the blocks in the under-utilized areas about half a mile from a water source on knolls, benches, openings in timber and/or brush, or on gentle slopes. Granulated salt is often a better option than blocks because the animal can directly ingest it rather than just licking it. The exception to this is if you are using the "cell" pasture arrangement grazing method, in which case, the water and salt and mineral blocks can be placed in the cell center.

The sixth grazing decision is to *initiate flexible stocking*. This management practice is designed to limit forage use by rotating the livestock out of an area once 50 percent (weight) of the desirable plant's yearly growth is consumed. By implementing flexible stocking, range health can be maintained or even improved. If animals are purchased, sell extra stock when moderate use of vegetation is obtained. If it is a dry year and forage is short, sell the year's calf crop earlier than usual. Implementing these practices will help to keep good plant cover and sufficient forage during winter to maintain the foundation herd. By combining flexible stocking and a systematic deferred-rotational grazing system, range health will continue to improve while being grazed and will maintain the ranching operation on an economically sound basis. Flexible stocking should be used regardless of the grazing system in place. If the scenario presented at the contest states that flexible stocking is not being used, the contestant should consider checking this box.

The seventh grazing decision is to *change to other kinds or combinations of domestic animals*. This includes cattle, sheep, and goats. At the basis of range management, the grazing animal should fit the forage that is being produced. Cattle eat mostly grasses, sheep eat mostly grasses and a high percentage of forbs, and goats eat about half grass and half browse with some forbs. Wildlife such as deer will eat mostly browse and forbs and very little grass. You can have just one species of livestock, or you can have a mixture of species, which is commonly referred to as a mixed grazing system.

The provided scenario, with respect to the current grazing species, management goals, and vegetation in the plot, should determine whether this box should be checked. The eighth and final grazing decision is to *reduce the stocking rate*. This decision should be checked if the utilization is heavy or if the scenario shows a higher stocking rate than the calculated stocking rate. Remember that a stocking rate of 10 ac/AUY is greater than 20 ac/AUY.

Improvement Decisions

The first improvement decision the contestant is given to consider is to *seed adaptive species*. This decision is recommended when less than 10 percent of the forage production is from plants on the Ecological Site Description. These plants should be well distributed over the plot. Artificial seeding and deferred grazing should be practiced when native grasses are destroyed by mechanical methods. Annual weed growth should be controlled with chemicals to ensure grass seedling establishment.

The second improvement decision is to *control or manage herbaceous weeds*. This decision should be utilized when weeds are abundant enough to reduce forage production. Concentrations of three or more weeds per square foot would also dictate the need for control. Weeds to consider are on the Master Plant List and/or the Ecological Site Description. Annual weeds can be controlled by grazing with sheep and goats, chemical application, or mechanically by mowing. Mowing is not the most practical method in rough Texas rangelands but may be suitable for some native grassland pastures. Chemical weed control can be both beneficial and economical. Grazing with sheep and goats to manage weeds is considered biological control. This method involves grazing the area at a heavy stocking rate until the young annual weeds have been utilized, then rotating the animals to another pasture. If sheep, goats, and deer are currently grazing the site and the annual weeds are palatable and nutritious, this decision should not be checked.

The third decision is to *control poisonous plants*. Generally, if there is a plant in the plot that is listed on the Ecological Site Description or Master Plant List as poisonous, this box should be checked. There are many exceptions to this, but most are not included here. Certainly, species such as Western bitterweed, woolly loco, and threadleaf groundsel should be controlled. However, live oak, which is only poisonous under very limited conditions, is usually a desirable browse for goats or is utilized as cover and food for many wildlife species. Therefore, live oak should not be controlled. This is where the contest scenario should be referenced for insight into whether or not to select this decision.

The fourth improvement decision is *woody plant, cacti, and/or yucca management*. If plants are valuable as browse, honey plants, cover, or nesting, control might not be appropriate depending on management goals. This decision has six specific practices, the first of which is aerial or ground broadcast herbicide spray. This practice is a possible choice when plant density is 400 or more per acre. The second practice is broadcast mechanical treatment. This practice is a possible choice when plant density is 400 or more per acre. Mechanical individual plant treatment is the third practice option. This practice is a possible choice when plant density is less than 400 per acre. Stem-spray individual plant treatment is the fourth practice option. This practice is a possible option when plant density is less than 400 per acre and when there are three or fewer stems per plant. Leaf-spray individual plant treatment, including prickly pear pad spray, is the fifth practice. This practice is a possible option when plant density is less than 400 per acre, there are more than three stems per plant, and the plants are no more than 6 feet tall. The sixth and final practice is prescribed burning. This practice is excellent for the management of Ashe juniper under 4 feet tall and reduces the number of prickly pear pads if it does not kill the entire stand. It is not a desirable practice with resprouting species such as mesquite. Depending on the scenario given, this practice can be used for the suppression of resprouting woody species, vegetational management, and wildfire suppression.

The fifth improvement decision is *water development*. In many areas, fencing to better distribute livestock and unify grazing is not economically feasible, but redistributing water facilities instead can help improve range use. Generally, livestock watering facilities should be spaced about a mile apart. However, in some cases, watering facilities can be as close as a half mile or as far as 2 miles apart. Another option that is available is to water one or more pastures from a central location by constructing pipelines. The watering facility can be an earthen tank, windmill and tank, springs, or streams with permanent water. If current watering facilities are inadequate to encourage good grazing distribution, this decision should be checked. The scenario provided should give contestants clues to aid in deciding whether or not to select this decision.

The sixth and final improvement decision is fencing to implement management decisions. The scenario provided at the contest should give keys to help determine if this option should be chosen.

Part 2a: Ecological Site Description and Plant Production Worksheet

In the second part of the contest, there is the Ecological Site Description and Plant Production Worksheet that the contestant will fill out and hand in. The staked and roped-off area used in Part 2 of the contest will be used for this as well. As mentioned in the section above, plants are flagged and numbered for use in determining successional stages and similarity index. Those same plants will be identified by the contestant for use on the worksheet. Prior to the contest, the contest committee should have the plant species names filled in on the worksheet. The contestant will then fill in the corresponding plant number found on the flag or stake next to the plant. Along with having the species names, the committee is responsible for providing whether the species is desirable or undesirable, RPC production in pounds per acre for each plant number, the ranch situation or scenario, and if there are any possible noxious and/or invasive plants. The contestant will take the production pounds per acre for each plant number as listed and enter them into the corresponding cells in the worksheet. From there, the participant will total the pounds per acre for the RPC, allowable production, and desirable annual production. The contestant will then use these numbers to calculate the similarity index and recommended stocking rate. The participant will then take the numbers from the similarity index and the recommended stocking rate equations and transfer them to Part 2 of the scoresheet.

Reflect

- What are the eight grazing management decisions?
- What are the formulas for similarity index and stocking rate?
- What are the four components of the Ecological Site Assessment?
- What are the six improvement management decisions?

Apply

- How do you think that the knowledge and skills learned will help you in the future?
- Travel to and participate in contests and practice contests, clinics, and other events to strengthen your skills and prepare you for success.
- Ask your county Extension agent or agriculture teacher for guidance.

LESSON 4

SECTION 3:

Rangeland Health

OBJECTIVES

The 4-H member will:

- Understand and identify the seven indicators.
- Know how a plot can qualify for each health category.
- Understand the 10 evaluation statements.

EXPLORE THE CONTENT

Range condition assessment is based on the ecological concept of plant succession. Range condition is often said to be an ecological rating of the plant community on a particular site at a particular time. The purpose of range condition determination is to compare the current plant community status to the climax plant community in terms of the kinds and amounts of plants present. Range condition is generally considered to be high if the plant community on a particular range site is dominated by vigorous, productive, and palatable plants. Under low range condition, the plant community would be composed of mostly weedy, unproductive, and unpalatable plants.

In Section 3 of the range judging contest, four square plots will be staked off and numbered. A reference plot, or acceptable bare ground, will be staked and labeled as well. For each plot, there are seven indicators of range health problems. The contestant will evaluate each plot separately, then check all the indicators that they observed in each plot to determine its overall health. There are three range health categories the contestant will select from for each plot. The contestant will make their selection based on the number of problem indicators that they observed for each plot.

The **range health problem indicators** are pedestalled plants, noxious plants, excessive bare ground, litter dams, rills/gullies, erosion shelves, and soil capping. To aid in determining excessive bare ground, the reference plot should be utilized. The reference plot will have the acceptable amount of bare ground for the site. This indicator is determined by examining the amount of bare mineral soil exposed and areas where plants, rocks, and plant litter are not considered. The contestant should check this box if any plot has a greater amount of bare ground than the reference plot. The noxious plant indicator should be checked when noxious plants are present in a plot. At the contest, a list of noxious plants will be provided. Noxious plants include native or introduced plant species capable of invading and encroaching on a site, even under good management. For examples of the other range health indicators, please reference the picture guide at the end of this section.

Once the contestant has evaluated the four plots for the seven range health problem indicators and made their selections, they will need to determine the overall range health category for each of the four plots. The three range health categories are healthy, at-risk, and unhealthy. For a plot to be considered *healthy*, no problem indicators should be selected. *At-risk* plots will have one to two indicators selected, and an *unhealthy* plot will have three or more selected.

Plot Evaluation Statements

This is the second part of Section 3. For this part of the contest, the participant will determine which plot each of the 10 statements best represent. Occasionally, there are instances where the differences between two plots may be too difficult to determine, so multiple answers could be accepted. In addition to this, there could be situations where none of the plots fit the statement—in this case, a zero would be the appropriate response.

The first plot evaluation statement is, *"Which plot has the greatest number of plant species allowed on the Ecological Site Description?"*

The contestant should select the plot with the greatest number of species that are listed on the Ecological Site Description. If two plots have the same number of species, the plot with mature, healthy plants should be selected over a plot with seedlings. This is because the mature, healthy plot will have better forage production and conservation of soil and water.

The second statement is, *"Which plot has the most ground cover of plant species allowed on the Ecological Site Description?"*

Ground cover is defined as the amount of live and dead desirable plants that cover the plot's soil surface. Ground cover is beneficial because it protects the soil from erosion. Invasive species are seldom good ground

cover because most are either annuals or perennials, which will leave the soil exposed during certain seasons and compete with or prevent desirable plants from growing. The plot with the most desirable ground cover should be selected.

The third evaluation statement is, *"Which plot has the most pounds of current year's growth from plants allowed on the Ecological Site Description?"*

The plot with the most current forage production or standing crop from desirable plants should be selected. In the event that the new year's growth has not begun, the previous year's growth should be used.

The fourth evaluation statement is, *"Which plot has the most ground cover of cool-season plant species on the Master Plant List?"*

The contestant should select the plot with the most ground cover of cool-season plants. Having winter forage on rangelands helps maintain good, year-round grazing.

The fifth statement is, *"Which plot has the most ground cover of forb and herbaceous legume species allowed on the Ecological Site Description?"*

Many legumes are palatable and provide considerable forage throughout the year. The participant should select the plot that has the most ground cover of allowable forbs and legumes.

The sixth evaluation statement is, *"Which plot has the most ground cover of poisonous plants on the Master Plant List?"*

The plot with the greatest ground cover of plants that are designated as poisonous on the Master Plant List should be selected.

The seventh statement is, *"Which plot has the most pounds of forage from desirable browse allowed on the Ecological Site Description?"*

The plot with the most forage provided by allowable woody plant species listed on the Ecological Site Description and within reach of wildlife and livestock should be selected by the contestant.

The eighth statement is, *"Which plot has the most rock cover?"*

Rock can help protect soil from erosion by slowing rainfall movement. It can also help reduce raindrop impact, which causes soil capping. While there are benefits to some rock cover, rocky soils are shallow and less productive. The plot with the most rock cover should be selected.

The ninth statement is, *"Which plot has the most bare ground?"*

The plot with the most exposed mineral soil not covered by rock, plant litter, or live plants should be selected.

The tenth and final statement is, *"Which plot has the most plant litter?"*

Plant litter is defined as any dead plant material on the soil surface. Litter acts as a soil conditioner and prevents puddling from rainwater, reduces fluctuations in soil temperature, and can reduce soil water loss by evaporation. During the summer months, litter breaks the contact of direct sun rays on the soil. During the winter months, it holds the heat in the soil. Usually, moderately used rangelands will have enough plant litter to allow rapid intake of water by the soil. The plot with the most plant litter should be selected.

Soil Capping

Excessive Bare Ground

Litter Dam

Rill/Gully

Pedestalled Plant

Erosion Shelf

Reflect

- What are the three range health categories and their qualifications?
- What are the seven range health indicators?
- What is the reference plot, and when should it be used?

Apply

- How do you think the knowledge and skills learned from this project will benefit you in the future?
- Contact your county Extension agent or agriculture teacher for assistance.

ACTIVITY

Plant Pressing

One of the most extensive and important renewable resources in Texas is native vegetation. These plants provide food for livestock and wildlife, cover for wildlife, conserve soil and water, and produce timber products. Many plants are valuable as ornamentals, while others are toxic to livestock and wildlife. The vast number and variety of plants in Texas make it essential that individuals know the names of the plants and how to identify them. This is why it is important to know how to collect, press, mount, and store plants for future reference.

Collecting Plants

When collecting plants for pressing, aim to select a complete and representative plant. This includes roots, leaves, stems, flowers, and seeds for grasses and legumes. For trees and woody specimens, a twig with 10 to 20 leaves, bark, flowers, fruit, and seeds should be collected. Do not collect diseased or abnormal samples.

Before Pressing

1. Remove all soil from the roots.
2. Bend, fold, break, or cut the plant to fit the sheet of herbarium paper.
3. Be sure to include all identifying plant parts on the sheet, including the name of the plant.

How to Press Plants

It is important to press each specimen after collection. A helpful tip is to keep the plants between the pages of a magazine, notebook, or book while collecting. Place plants on a single sheet of newspaper that is the same size as the press. Only the amount of plant material that will properly dry should be used. Place only one plant on each sheet of newspaper. Dryers such as felt, blotter paper, or cardboard should go between each specimen. The dryers should be changed every day for 5 to 10 days to ensure proper drying, color preservation, and that the plant is fully pressed. Handle the specimen with extreme caution until they are dry enough to retain their shape. The press may be held together with two canvas, web, or leather belts. A bag filled with gravel placed on the press will add the weight needed to better press the specimen. When the plants are dry, keep them on the newspaper or proceed to mount them on the herbarium paper.

How to Mount Plants

Standard herbarium paper is a moderately heavy paper that comes in 8.5-inch by 11-inch and 11.5-inch by 16-inch sizes. At the simplest, transparent tape can be used to affix the specimen to the paper. However, depending on the type of specimen, hot glue or spray adhesive work well for a more permanent solution. Again, the specimen may be cut or bent so that it properly fits on the sheet of paper.

How to Store Plants After Pressing

After pressing and/or mounting the specimen, cover the plants with cellophane or place them in large, transparent sheet covers for protection when being stored or transported. Occasional treatment with mothballs is recommended to kill or repel insects from your specimens.

How to Make a Plant Press

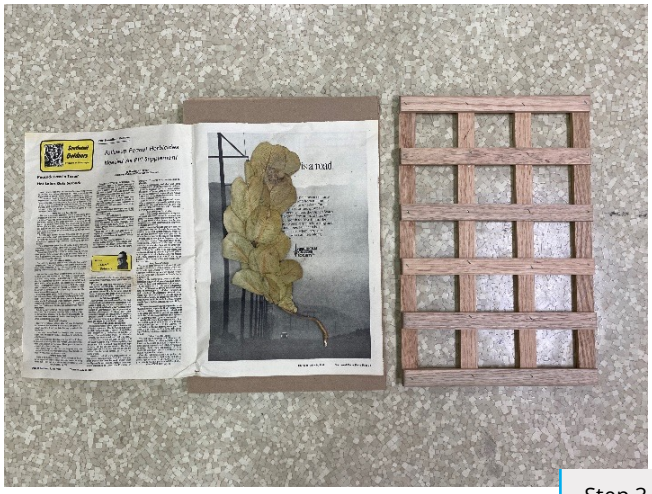
A press can be made from eight to twelve 1- to 2-inch strips of plywood. First, make two frames about 12 by 17 inches in size using 1-inch by 4-inch lumber. Then, place the strips running both ways at about 1 to 2 inches apart on the inside of each frame. The strips may be nailed, screwed, or stapled together. Having a slatted press allows for maximum ventilation and airflow.

Step 1

Step 4

Step 2

Step 5



Step 3

Step 6

4-H EXPLORE PROJECT BOOK EVALUATION

RANGE JUDGING

1. Please read the statement in the left column in the table below. For each item listed, mark the number in the middle column for your level of understanding BEFORE starting the project, then mark the number in the right column for your level of understanding AFTER the project.

LEVEL OF UNDERSTANDING: 1 = POOR, 2 = AVERAGE, 3 = GOOD, 4 = EXCELLENT	BEFORE				AFTER			
As a result of participating in the Range Judging lessons and activities:	1	2	3	4	1	2	3	4
I understand the different parts of the contest.								
I understand how to properly identify plants.								
I understand how to make quick decisions.								
I understand how to calculate stocking rate and similarity index.								
I understand how I should present myself at contests.								
I understand resiliency and working toward a goal, even when it may be difficult.								

2. For each statement below, fill in the box that best describes you:

INTENTIONS TO ADOPT:	YES	NO	UNSURE
As a result of participating in the Range Judging lessons and activities:			
I can identify plants, their characteristics, and their economic value.			
I will practice my skills with my team.			
I will work toward becoming a better competitor.			
I plan to speak with my Extension agent or agriculture teacher about practice opportunities.			
I can work cooperatively in a team using the appropriate decision-making method.			
I can recognize change in my life and identify strategies to manage it.			

3. For each statement below, fill in the box that best describes your level of agreement with the following statements.

BEHAVIOR CHANGES:	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE
As a result of participating in the Range Judging lessons and activities:				
I am more confident in working independently.				
I am more willing to listen to others.				
I am more comfortable speaking with others.				
I am more confident in my leadership skills.				

4. What is the most significant thing that you have learned from this Explore Book?

5. Do you think what you have learned will help you in the contest and the future?

LESSON 5

CONTEST PLANNING, SETUP, AND SUPPLEMENTAL MATERIALS

Careful planning and organization before the contest are essential for its success. The contest committee should have representatives from agricultural agencies within the county and/or surrounding counties if available. Designate a coordinator in planning and running the contest. The duties of the contest committee are to:

- Publicize the event ahead of time.
- Select a suitable site for the contest.
- Select plants from the Master Plant List for identification.
- Stake and rope off the area for Part 2.
  - Dig a hole for site determination outside of the area.
  - Designate two plants for utilization outside of the area.
  - Stake plants for identification to be used in similarity index and successional stage determination.
  - Place a reference pole for woody plant height.
- Stake and number four plots and one reference plot for Part 3.
  - These plots should be on the same ecological site.
- Determine correct answers for all parts and make keys.
- Station an instructor at each part to assist contestants.
- Grade scoresheets and determine the winner.
  - In the event of a tie, the judges' decisions will be final.
- Select appropriate awards and recognition.
- Have sufficient copies of contest forms.
- Arrange for a PA/speaker system if groups are large or spread out.
- Locate a parking area away from the contest area.
- Have water available.

Copies of Parts 1, 2, and 3, as well as the Master Plant List and the Partial Credit Worksheet, are below.

Range and Pasture Grass Identification Contest Info

Descriptions of Range and Pasture Plants

Plant ID Contest Scorecard

Master Plant List

Range Evaluation Contest Manual

Range Evaluation Part I – Plant Identification

Range Evaluation Part II – Ecological Assessment

Range Evaluation Part III – Rangeland Health

Ecological Site Description and Plant Production Worksheet

Similarity Index and Recommended Stocking Rate Calculation Partial Credit