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| **Course** | Agricultural Science II |
| **Unit** | Introduction to Grassland Management |
| **Subunit** | Grasslands and Grassland Plants |
| **Lesson** | Grassland Composition |
| **Estimated Time** | Two 50-minute blocks |

**Student Outcome**

Appraise the current conditions of the grassland.

**Learning Objectives**

1. Describe why it is important to determine grassland composition.
2. Describe how grassland composition is determined.
3. Identify what makes a grassland viable for livestock and wildlife.
4. Identify what factors affect forage quality.

**Grade Level Expectations**

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| SC/EC/1/A/09-11/a | SC/EC/1/A/09-11/b | SC/EC/1/C/09-11/a |
| SC/EC/1/C/09-11/b | SC/EC/1/D/09-11/a | SC/EC/1/D/09-11/b |
| SC/EC/3/B/09-11/a | | |

**Resources, Supplies & Equipment, and Supplemental Information**

**Resources**

1. Activity Sheets
   - AS 1 – Grassland Composition Survey (Instructor)
   - AS 1 – Grassland Composition Survey (Student)
2. *Introduction to Grassland Management* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
3. *Introduction to Grassland Management Curriculum Enhancement,* "Unit I – Grasslands and Grassland Plants." University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

**Supplies & Equipment**

- ❑ See AS 1 for materials and equipment needed to complete the Activity Sheet.

**Supplemental Information**

1. Print
   - ❑ *Crop and Grassland Plant Identification Manual* (Catalog #10-1203-S). University of Missouri-Columbia: Instructional Materials Laboratory, 1997.

**Interest Approach**

Take a field trip to a nearby grassland area, preferably one used for livestock. Identify the factors that make the area good or bad for its current use. Discuss how all of these factors work together to make the grassland viable.

**Communicate the Learning Objectives**

1. Describe why it is important to determine grassland composition.
2. Describe how grassland composition is determined.
3. Identify what makes a grassland viable for livestock and wildlife.
4. Identify what factors affect forage quality.

| Instructor Directions | Content Outline |
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| **Objective 1**<br><br>*The quality of a grassland depends on the types of plants it contains. For example, a grassland with a lot of weeds and woody plant saplings would not be of as high quality as one with a mixture of cool-season grasses and legumes. Discuss the importance of determining grassland composition.* | **Describe why it is important to determine grassland composition.**<br><br>1. Livestock<br>a. Helps when estimating production potential<br>b. Used to determine the length of the grazing season<br>c. Used to adjust plant composition to reach optimum economic yields<br>2. Wildlife<br>a. Helps when estimating its potential for wildlife management<br>b. Used to adjust plant composition to achieve successful wildlife management |
| **Objective 2**<br><br>*Ask students how they would determine the composition of a grassland. Have students complete AS 1.*<br><br>AS 1 – Grassland Composition Survey | **Describe how grassland composition is determined.**<br><br>1. Visual appraisal of a given area of land<br>2. By appraising the grassland using a stick to determine the percentages of different plants in the grassland |
| **Objective 3**<br><br>*Ask students if they think the basic needs of all animals are the same. Once they realize that animal needs are similar, list some of those needs on the board.* | **Identify what makes a grassland viable for livestock and wildlife.**<br><br>1. Food<br>a. Livestock: need quality forages, including native warm-season grasses, cool-season grasses, and legumes |

| Instructor Directions | Content Outline |
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| *Discuss with students the factors that make a grassland viable for both livestock and wildlife.* | b. Wildlife: need a greater mixture of plants, since different animals may feed on leaves, stems, twigs, bark, roots, fruits, seeds, insects, or small mammals supported by these plants<br>2. Shelter<br>a. Livestock: use terrain and large plants like trees to reduce the effects of sun, heat, wind, and cold<br>b. Wildlife: use brush piles, nearby woods, and tall grasslike plants for nesting and protection from predators<br>3. Water<br>a. Livestock: require a surface source of water, such as a freeze-proof water tank located below a pond or at a water hydrant<br>b. Wildlife: can drink from streams or ponds or obtain moisture from berries, plants, or dew, depending on the species |
| **Objective 4**<br><br>*Forage quality affects livestock feeding on the forage, the hay or silage produced from it, and the wildlife living off the land. Forage quality refers to the nutritive value of the forage needed to produce a desired level of animal performance. Ask students to list factors that affect forage quality.* | **Identify what factors affect forage quality.**<br><br>1. Laboratory analysis<br>a. Moisture: water present in the forage<br>b. Crude protein (CP): includes both true protein and nonprotein nitrogen; indicates the ability of the forage to meet an animal's requirements for protein<br>c. Acid detergent fiber (ADF): percentage of indigestible plant material; as ADF increases, digestibility and energy decrease<br>d. Neutral detergent fiber (NDF): percentage of structural or cell wall material; low NDF correlates to increased feed intake<br>e. Total digestible nutrients (TDN): percentage of digestible material; higher ADF corresponds to lower TDN<br>f. Net energy for lactation ($NE_l$): measurement indicating the energy available in a forage to meet the requirements of lactating cows<br>g. Net energy for maintenance ($NE_m$): measurement indicating the energy available in a forage to meet the requirements for maintenance in meat-producing livestock |

| Instructor Directions | Content Outline |
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| | h. Net energy for gain ($NE_g$): measurement indicating the amount of energy available in a forage to produce growth or gain<br>2. Field assessment<br>a. Stage of growth: Nutritive value decreases as plants mature because the plants have more indigestible material due to higher fiber content.<br>b. Type of forage: Plant species differ in digestibility and energy content.<br>c. Growing conditions: Quality is affected by the environment, including the temperature, amount of sunlight, and amount of rainfall.<br>d. Presence of noxious weeds: Weeds affect intake because they are less palatable and also less nutritious. |
| **Application**<br><br>AS 1 – Grassland Composition Survey | Answers to AS 1<br>Answers will vary. |
| **Closure/Summary** | Grassland composition refers to the quality and variety of plants that grow in the grassland; it can be determined by making an appraisal of the land. A knowledge of grassland composition can be used to benefit both livestock and wildlife. A viable grassland should include quality food, shelter, and water. Forage quality depends on many factors, with stage of growth being the most important. |
| **Evaluation: Quiz** | 1. c<br>2. a<br>3. b<br>4. c<br>5. a<br>6. d<br>7. Quality food, shelter, water<br>8. Answers may include any four of the following: moisture, crude protein, acid detergent fiber, neutral detergent fiber, total digestible nutrients, net energy for lactation, net energy for maintenance, or net energy for gain.<br>9. A producer can determine grassland composition by making a visual appraisal of a given area of land or |

| Instructor Directions | Content Outline |
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| | by using a stick to determine the percentages of different plants in the grassland. |