

Course	Agricultural Science II
Unit	Introduction to Grassland Management
Subunit	Grassland Management Practices
Lesson	Grazing Management Systems
Estimated Time	Three 50-minute blocks
Student Outcome	

Determine the optimal grazing methods for a grassland.

Learning Objectives

1. Identify methods used in harvesting grasslands.
2. Identify advantages and disadvantages of continuous grazing.
3. Identify advantages and disadvantages of rotational grazing.
4. Identify advantages and disadvantages of management-intensive grazing.
5. Describe how the type of grazing system affects grazing efficiency.
6. Identify grazing intensity.
7. Identify what determines the livestock carrying capacity of a grassland.
8. Determine the stage of growth grassland should be grazed to optimize quality and quantity.
9. Describe how the type of grazing affects wildlife.
10. Describe how cool-season grasses, warm-season grasses, and legumes complement each other in a grazing system.
11. Identify how grazing systems benefit wildlife.

Grade Level Expectations

SC/EC/1/C/09-11/b

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. PowerPoint Slide
 - ☐ PPT 1 – Estimated Forage Dry Matter Yield, lbs./acre/in.
2. Activity Sheet
 - 📄 AS 1 – Developing a Rotational Grazing System (Instructor)
3. *Introduction to Grassland Management* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1997.
4. *Introduction to Grassland Management Curriculum Enhancement, "Unit III – Grassland Management Practices."* University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplemental Information

1. Internet Sites

- ❑ Grain Harvesting History. Shenandoah Valley Agricultural Research and Extension Center, Virginia Agricultural Experiment Station. Accessed February 15, 2008, from <http://www.vaes.vt.edu/steeles/mccormick/harvest.html>.
- ❑ Livestock: A Powerful Wildlife Management Tool. Integrated Rangeland Management Class, University of Idaho. Accessed February 15, 2008, from <http://www.cnr.uidaho.edu/range456/hot-topics/livestock-wildlife.htm>.

Interest Approach

With students working in small groups, have them list the different types of grazing systems and any advantages or disadvantages they can think of for each one. The students should consider such factors as seasonal growth, amount of labor involved, quality of plant growth, and amount of land needed in their evaluation of the different grazing systems. Then, talk about the pros and cons of the grazing systems in a class discussion.

Have a local cattle producer speak to the class about his or her operation. Discuss the cattle population, grazing capacity of the land, types of forage plants available for grazing, the grazing system used, and the pros and cons of that system.

Communicate the Learning Objectives



1. Identify methods used in harvesting grasslands.
2. Identify advantages and disadvantages of continuous grazing.
3. Identify advantages and disadvantages of rotational grazing.
4. Identify advantages and disadvantages of management-intensive grazing.
5. Describe how the type of grazing system affects grazing efficiency.
6. Identify grazing intensity.
7. Identify what determines the livestock carrying capacity of a grassland.
8. Determine the stage of growth grassland should be grazed to optimize quality and quantity.
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10. Describe how cool-season grasses, warm-season grasses, and legumes complement each other in a grazing system.
11. Identify how grazing systems benefit wildlife.

Instructor Directions	Content Outline
<p>Objective 1</p> <p><i>Ask the students to name two ways in which grasslands may be harvested. Channel their answers into a discussion of the various types of harvesting.</i></p>	<p>Identify methods used in harvesting grasslands.</p> <ol style="list-style-type: none">1. Grazing: by livestock and wildlife<ol style="list-style-type: none">a. Continuous<ul style="list-style-type: none">- Continuous grazing uses only one pasture to meet the needs of the livestock, which are allowed to graze freely on the plants available.- This type of grazing system allows animals to engage in selective grazing, since they have unrestricted access and can pick and choose plants to consume.b. Rotational<ul style="list-style-type: none">- Rotational grazing uses at least two grazing units, with animals alternating between the different pastures in a preplanned cycle.

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	<ul style="list-style-type: none"> - Strip grazing and management-intensive grazing are two types of rotational grazing. - This type of grazing system tends to prevent selective grazing, since animals are only provided with the amount of forage they require. <p>2. Mechanical harvesting: cutting forage for hay, silage, or greenchop</p>
<p>Objective 2</p> <p><i>Have students describe the advantages and disadvantages of continuous grazing.</i></p>	<p>Identify advantages and disadvantages of continuous grazing.</p> <ol style="list-style-type: none"> 1. Advantages <ol style="list-style-type: none"> a. Higher initial performance due to selective grazing b. Low maintenance 2. Disadvantages <ol style="list-style-type: none"> a. Grassland composition altered by selective grazing b. Poor forage utilization
<p>Objective 3</p> <p><i>Ask students to describe rotational grazing. Have them list advantages and disadvantages of this system.</i></p>	<p>Identify advantages and disadvantages of rotational grazing.</p> <ol style="list-style-type: none"> 1. Advantages <ol style="list-style-type: none"> a. Maintains desired grassland composition by decreasing selective grazing b. Provides rest periods allowing for plant regrowth c. Causes less damage from compaction and animal wastes d. Increases production per acre 2. Disadvantages <ol style="list-style-type: none"> a. Lower production per animal than selective grazing b. Requires more time and labor to manage the herd c. Requires extra fencing to separate pastures into paddocks, increasing costs to the producer
<p>Objective 4</p> <p><i>Have students describe management-intensive grazing. Ask students to list its advantages and disadvantages.</i></p>	<p>Identify advantages and disadvantages of management-intensive grazing.</p> <ol style="list-style-type: none"> 1. Advantages <ol style="list-style-type: none"> a. Maintains desired grassland composition b. Causes less damage through compaction and animal wastes c. Higher production per acre than rotational grazing systems

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	<ul style="list-style-type: none"> d. Provides for long regrowth periods e. Causes the operator to come in contact with the herd on a regular basis, allowing him or her to identify and correct potential problems <p>2. Disadvantages</p> <ul style="list-style-type: none"> a. Requires more time to plan and set up the system b. Requires extra fencing to separate the pastures into paddocks, increasing costs over continuous grazing c. Lower production per animal than selective grazing
<p>Objective 5</p> <p><i>Discuss grazing efficiency in the grazing systems.</i></p>	<p>Describe how the type of grazing system affects grazing efficiency.</p> <ul style="list-style-type: none"> 1. In continuous grazing systems, only 30-35% of the total forage produced is eaten by the livestock. 2. When management-intensive grazing is used, forage utilization can be as high as 65% of the forage produced. 3. To calculate the actual amount of forage dry matter needed in a pasture to feed a herd during a particular season, the seasonal dry matter intake requirements should be divided by the forage utilization rate.
<p>Objective 6</p> <p><i>Ask students to explain grazing intensity. Discuss the different grazing intensities.</i></p>	<p>Identify grazing intensity.</p> <ul style="list-style-type: none"> 1. Grazing intensity refers to the extent to which a plant or grassland is grazed. 2. The three levels of grazing intensity are heavy, moderate, and light grazing. <ul style="list-style-type: none"> a. Heavy grazing (overgrazing) <ul style="list-style-type: none"> - Exhausts the energy reserves of forages by removing growth too frequently, before it has a chance to replenish itself - Marked by the presence of less than 4 inches of growth in the fall in cool-season grasses and less than 8 inches in warm-season grasses b. Moderate grazing <ul style="list-style-type: none"> - Leaves enough vegetation to maintain the vigor of forage plants and protect soil - Indicated by 4-8 inches of growth at the end of the season for cool-season grasses and 8-10 inches of growth for warm-season grasses

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	<p>c. Light grazing (undergrazing)</p> <ul style="list-style-type: none"> - Not beneficial if it results in too much tall, dense forage in the fall, since excessive ground litter can interfere with next year's crop - Indicated by more than 10-12 inches left at the end of the growing season for cool-season grasses and more than 12-14 inches for warm-season grasses
<p>Objective 7</p> <p><i>The type of grazing system used will partly depend on the carrying capacity of the pasture, which is the ability of a forage to support a specific number of animals throughout a grazing season. Ask students how the livestock carrying capacity of a grassland is determined. Use PPt 1 as an illustration of dry matter yield.</i></p> <p><input type="checkbox"/> PPt 1 – Estimated Forage Dry Matter Yield, lbs./acre/in.</p>	<p>Identify what determines the livestock carrying capacity of a grassland.</p> <ol style="list-style-type: none"> 1. Carrying Capacity = $\frac{\text{Annual Forage Production} \times \text{Seasonal Utilization Rate}}{\text{Average Daily Intake} \times \text{Length of Grazing Season}}$ 2. Annual forage production: amount of forage dry matter produced per acre in a year 3. Seasonal utilization rate: percentage of the forage produced that will be consumed by the herd in one year 4. Average daily intake: percentage of the animal's body weight that is consumed in forages on a daily basis 5. Length of the grazing season: days of grazing per year
<p>Objective 8</p> <p><i>Forage quality and quantity at the time of harvest is very important to production. Ask the students what the stage of growth should be when forage is grazed.</i></p>	<p>Determine the stage of growth grassland should be grazed to optimize quality and quantity.</p> <p>Optimum forage harvesting would take place during the vegetative (leafy) stage, when forage growth is continuous and nutritional quality is high; the vegetative stage ends when plant reproduction begins.</p>
<p>Objective 9</p> <p><i>Wildlife is greatly affected by the type of grazing system utilized, since they are dependent on the grassland for food and shelter. Have students discuss the effect of various types of grazing on wildlife.</i></p>	<p>Describe how the type of grazing affects wildlife.</p> <ol style="list-style-type: none"> 1. Continuous grazing: This grazing system is not beneficial to wildlife, although special provisions such as brush piles and fence lines with tall vegetation may aid animals. 2. Rotational grazing: During rest periods, pastures provide habitat and food for wildlife. Rotational grazing systems also favor more diversity in

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	grassland composition, which improves the food and cover available to wildlife and tends to protect wildlife habitat in woody draws and along bodies of water.
<p>Objective 10</p> <p><i>Discuss how cool-season grasses, warm-season grasses, and legumes can work together in a grazing system.</i></p>	<p>Describe how cool-season grasses, warm-season grasses, and legumes complement each other in a grazing system.</p> <ol style="list-style-type: none"> 1. Ideally, one-third of the grazing system should consist of warm-season grasses. They begin the bulk of their growth in June and July, when cool-season grasses are finishing their spring growth. 2. Legumes can lengthen the grazing season of cool-season grasses because they will often grow longer in the summer. They also provide higher quality forage, fertilize the ground, and increase yields. 3. Cool-season grasses reach another peak in forage growth as warm-season grass production declines.
<p>Objective 11</p> <p><i>Discuss how a grazing system that consists of cool-season grasses, warm-season grasses, and legumes can benefit wildlife. Have students complete the activity outlined in the instructor's AS 1.</i></p> <p> AS 1 – Developing a Rotational Grazing System</p>	<p>Identify how grazing systems benefit wildlife.</p> <ol style="list-style-type: none"> 1. By the time warm-season grasses are ready to be harvested (hayed or grazed), most wildlife species are finished using them for reproduction. 2. At this time, cool-season grasses are being rested and can be used for cover or nesting.
<p>Application</p> <p> AS 1 – Developing a Rotational Grazing System</p>	<p>Answers to AS 1 Answers will vary.</p>
<p>Closure/Summary</p>	<p>Forages can be harvested either by grazing or mechanical harvesting. Continuous grazing is a low-maintenance system in which the herd remains in one pasture for the majority of the grazing season. Rotational grazing involves the intensive management of pastureland and animals, since the animals are moved between two or more pastures or paddocks based on forage quality, quantity, and utilization. A grazing system that combines cool-season grasses, warm-season grasses, and legumes benefits both livestock and wildlife.</p>

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<p>Evaluation: Quiz</p>	<p>Answers:</p> <ol style="list-style-type: none"> 1. d 2. a 3. e 4. c 5. d 6. a 7. d 8. b 9. a 10. By the time warm-season grasses are ready to be hayed or grazed, most wildlife species are finished using them for reproduction. At this time, cool-season grasses are being rested and can be used for cover or nesting. 11. The advantages of rotational grazing are that it maintains desired grassland composition, provides rest periods allowing for plant regrowth, causes less damage through compaction and animal wastes, and increases production per acre. The disadvantages are that it has lower production per animal than selective grazing, requires more time and labor to manage the herd, and requires extra fencing to create paddocks, which increases costs. 12. The rotational systems provide food and habitat for wildlife while the forages are being regrown during rest periods. Rotational grazing systems also tend to protect wildlife habitat in woody hollows and along bodies of water and favor more diversity in grassland composition, which improves the food and cover available to wildlife. 13. Ideally, one-third of the grazing system should consist of warm-season grasses. They begin the bulk of their growth in June and July, when cool-season grasses are finishing their spring growth. Legumes can lengthen the grazing season of cool-season grasses because they will often grow longer in the summer. They also provide higher quality forage, fertilize the ground, and increase yields. Cool-season grasses reach another peak in forage growth as warm-season grass production declines.