Forage

*Lesson Plan for Grade 5, Science*

*Prepared by the California Academy of Science*

*Modified by Mississippi State University, School of Human Sciences*

*for Mississippi Farm Bureau Federation - AITC*

# OVERVIEW & PURPOSE

Humans need food and water to survive. In this activity, students will learn what it takes to develop, grow and consume some of the foods and water we need.

# EDUCATIONAL STANDARDS

**Mississippi College-and-Career Readiness Standards:**

G.5.2 Describe physical features of the environment. 1. Differentiate between landforms and bodies of water. 2. Identify how physical features impact communities. 3. Describe a different way.

ELA-W.5.9 Draw evidence from literary or informational text to support analysis, reflection, and research.

**NALOs:**

T2.3-5 e Understand the concept of stewardship and identify ways farmer/ranchers care for soil, water, plants, and animals.

# OBJECTIVES

* Students will discuss food, water, and space needs of common livestock animals
* Students will calculate how many animals can live on their imaginary 100 acre ranch
* Students will describe how land use and food consumption can be sustainable

# MATERIALS NEEDED

* How Much food, water, and space? Chart (1)
* Livestock Grazing worksheet (1copy per student)
* Colored pencils (3 colors per student)

Essential Files:

* [How Much food, water, and space? Chart (1)](https://www.calacademy.org/educators/lesson-plans/sustainable-grazing)
* [Livestock Grazing worksheet (1copy per student)](https://www.calacademy.org/educators/lesson-plans/sustainable-grazing)

# Lesson Set Up:

1. Read through the teacher background information provided.
2. Print copies of “How much food, water, and space” chart (1 per student).
3. Print copies of the “Livestock Grazing” worksheets (3 pages) (1 per student)

# VOCABULARY

**arid rangeland:** ecosystems that experience very little rainfall, have very shallow soil, and are typically covered with only grasses and shrubs that can use water and nutrients very efficiently. Droughts are common in these areas.

**climate change:** a regional change in temperature and long term weather patterns

**desertification:** process by which once fertile land becomes barren and unproductive.

**livestock:** animals, such as cows and goats, raised by humans for food.

**sustainable:** meeting current human needs without endangering our descendants. There is a broad, scientific consensus that our current environmental demands are unsustainable, causing climate change, degradation of natural habitats, loss of species, and shortages of essential resources.

**temperate rangeland:** ecosystems with very deep and nutrient-rich soils and sufficient moisture to support many types of plants.

**rotational grazing:** periodically moving livestock to fresh rangelands to allow pastures to re-grow

# Ag Facts:

* If forage is properly cut, harvested and stored, horses can eat many varieties of forage. Unless the horse has a specific allergy or health condition, many different forage choices will suffice.
* Alfalfa is actually lower in sugar and starch than many types of grass hay, as sugar is not the primary energy storage unit of legumes. The sugar content of hay is determined by many factors including variety of forage, growing conditions, and harvesting conditions. Cool-season grasses store carbohydrates as sugar and are naturally high in sugar.

# Background information for teachers:

Forages are the foundation of livestock production in Mississippi’s agriculture. In gross value, hay is considered the state’s fifth largest crop. This acreage represents 6.8% of the open farmland in the state. Over 80 and 70% of marketed beef and dairy products respectively are derived directly from forages. It is estimated that 1.4 million acres of pasture and 620,000 acres of hay and silage are harvested annually in Mississippi. Some of the most common forages utilized in Mississippi include bermudagrass, bahiagrass, tall fescue, annual ryegrass, oats, wheat, white clover and annual clovers (arrowleaf, ball, berseem, crimson).

# LEARNING PROCEDURES

Interest Approach:

1. Ask students what they know about animals that humans use for food. Which animals are used and what do these animals need to survive and grow? Discuss how all of these animals are grazers and traditionally eat only plant material (primarily grass).
2. Discuss how domesticated livestock have been raised in different places all over the world for thousands of years. Because plant growth rates depend on natural conditions such as climate, different ecosystems vary in how much plant material they can produce. Consequently, very productive ecosystems can support more animals than less productive ones and livestock types vary based on the biome in which it is located.

Procedures

1. Tell the students that their long lost Great Aunt has unfortunately passed away but has left them each with 100 acres of prime grazing land in northern California and they need to come up with a Ranch Management Plan for the newly acquired area.
2. Distribute “How much food, water, and space” charts to each student. Briefly discuss the information listed, answer any questions and explain to students that they will be using the data provided on the chart to answer questions and solve some problems.
3. Pass out the “Livestock Grazing in Northern California” worksheets and show them how to create symbols for their chosen animals and mark them on their sheet. Give them time to draw out their plan.
4. Discuss as a class why students made the choices that they did. How many used all or most of their land? Which animals did they choose and why? Ask students what they think might happen to land that is used over and over by livestock without a break.
5. Introduce overgrazing, desertification and sustainability as it relates to a livestock ranch. Have students develop a new sustainable ranching plan for Northern California.
6. Based on their new knowledge and success with sustainable ranching in northern California they have been called upon to consult with ranchers in Kenya, Africa and in the Amazon Rainforests of Colombia. Introduce the difference between the two biomes: temperate pasture (like those found in Northern California) and arid rangeland (like those found in Kenya, Africa and Southern California). Discuss how temperate pastures have deep, nutrient-rich soils, and plentiful moisture. In contrast, arid rangelands get very little rain and tend to have much shallower soil that supports only limited water-efficient plants and shrubs.
7. **CASE STUDY:** Camels- the Alternative Livestock In Kenya goats, sheep and camels are common livestock since they are hearty and able to survive droughts. Camels, while still rare, are being bred very successfully as livestock due to their drought tolerance, lean meat and lean milk. The Food and Agricultural Organization of the United Nations estimates that the industry will grow to $10 billion worldwide within the next 10 years. Camels may especially become more prevalent as climate change causes deserts to grow. Aside from being a hearty creature, camel milk is also high in vitamins C & B, iron and insulin. It is non-allergenic and has 10 times the antibacterial and antiviral properties as cow’s milk. Because camel milk is much more similar to human milk people find it easier to digest. It has been used to treat Crohn’s Disease, diabetes and some forms of cancer. The dromedary camel (camelus dromedarius) has been domesticated by humans for the past 3000-4000 years. They are most successful in warm and arid conditions. They are recognizable by their long-curved necks and single hump, which is made of fat and fibrous tissue. This fat reserve allows them to survive periods without eating. Aside from this, they also have some other adaptations ideal for life in deserts. For instance, they possess a double row of eyelashes to protect their eyes from sand. Furthermore, they can conserve water by shifting their body temperature by about 8 degrees Celsius during a day. This allows them to avoid sweating. They also can survive losing up to 30% of their body’s water (most other mammals would die after losing 15%), and can drink up to 10 liters of water a minute (Naumann, 1999).
8. In small groups have the students develop a plan for arid rangelands with recommendations on which animals to use.

**Concept Elaboration and Evaluation**

* Discuss how the ranching plans were adapted for the two different environments.
* How do different biomes affect food production in different areas?
* The average American eats 200 pounds of meat per year. How many Americans could your sustainable California land feed? Usually only half of an animal’s weight is edible (bones, fur and fat generally are not).

# Additional Learning Procedures

To help students review and elaborate more about forage, try using the [“I used to think.. Now I think…”](https://drive.google.com/file/d/1_S6kBYyjIoIx69Wqy1MEGaOnhDwH6KQj/view?usp=drive_link) method to allow students to think deeper and make new connections.

Additional Texts to Include:

[Fearless Foraging in the Rocky in the Rocky Mountains -Audiobook](https://www.audible.com/pd/Fearless-Foraging-in-the-Rocky-Mountains-Audiobook/B0BX4SH5MF?source_code=GPAGBSH0508140001&ipRedirectOverride=true&gclid=CjwKCAjwjOunBhB4EiwA94JWsC7ctGAHlEx3BPv_d43diMOYFakf74-KWtgjy6ZkEDezyP98La0J4hoCg2YQAvD_BwE&gclsrc=aw.ds)

[Foraging and Feasting](https://mountainroseherbs.com/foraging-feasting?sku=20-00061-27&utm_campaign=&utm_term=&utm_source=adwords&utm_medium=ppc&hsa_ver=3&hsa_acc=5389326775&hsa_mt=&hsa_src=x&hsa_cam=18463803571&hsa_grp=&hsa_tgt=&hsa_kw=&hsa_ad=&hsa_net=adwords&gad=1&gclid=CjwKCAjwjOunBhB4EiwA94JWsPhEbBy6Okw26w51ooHkKyd34-7i1JBUOXu-kh6Giku_-k73VdupnBoC_3YQAvD_BwE)

  
   
 Source: <https://www.calacademy.org/educators/lesson-plans/sustainable-grazing>

*For more information and additional lessons visit*

*https://msfb.org/ag-in-the-classroom/lesson-plans/.*