AGRICULTURE ACROSS DISCIPLINES
EDUCATOR’S GUIDE
GRADES K-5
Updated August 2017
Using the past and present, Museum of the Rockies inspires life-long learning in science, history, culture, and art; advances knowledge through collections, research and discovery; and presents engaging, vibrant exhibits and programming. MOR brings the world to Montana and Montana to the world.

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Dear Educators,

Welcome to the Museum of the Rockies’ “Agriculture Across Disciplines” Educator’s Guide! This Educator’s Guide was created in partnership with Montana State University’s Division of Agricultural Education supported by Montana State University’s Center for Faculty Excellence, with funding from the Office of the Provost, through the Instructional Innovation Grants Program.

In the fall of 2016, Dr. Shannon Arnold and her AGED 482: “Non-formal Teaching Methods” students collaborated with Museum educators to research the connections between agriculture and Museum of the Rockies exhibits. With this new information, Montana State University undergraduate students then created educational outreach materials these lessons for elementary teachers on MOR field trips for rural Montana students. This new guide strives to share relevant lessons and activities that connect Montana’s rich agricultural history and science with MSU research in paleontology, astronomy, history and Yellowstone science.

Each lesson in this guide is supported by free, additional educational materials, available to all Montana teachers. To borrow these resources from Museum of the Rockies, please email MORoutreach@montana.edu or call 406-994-6591.

Enjoy “Agriculture Across Disciplines” written by Montana State University students in partnership with the Museum of the Rockies!

Sincerely,

Education Department
Museum of the Rockies

Division of Agricultural Education
Department of Agriculture
Montana State University
Table of Contents

Lessons

1. Dinosaurs and Livestock: Growth and Reproduction _____________ 3
2. Ice Cream on the Frontier ________________________________ 6
3. Montana Homesteading _______________________________ 12
4. Let’s Plant a Seed _________________________________ 19
5. Hunting and Gathering ______________________________ 27
6. Animals in Yellowstone ______________________________ 30
7. Leaves and Things ________________________________ 35
8. MOR Kits ________________________________________ 38
Dinosaurs and Livestock: Growth and Reproduction

Lesson Duration 1 Hour

Audience Elementary Students

Background Growth and reproduction are important aspects to understand about any organism or ecological system. There is a lot of diversity in these systems, present in both prehistoric and modern times. Some of these systems can be seen or compared to growth and reproduction commonly found in an agricultural system. This is a valuable lens through which students can observe and learn about how the growth and reproduction of dinosaurs is similar to animals in modern agricultural systems.

Objectives • In a one hour lesson, students will be able to explain how dinosaurs reproduced and grew.
• Students will be able to draw basic connections between dinosaur growth and reproduction, and that of modern livestock.

Learning Outcomes • Students will be able to understand basic growth and reproduction cycles and relate them to one another by the end of the lesson.
• Students will be able to apply this knowledge and better understand what the world was like when the dinosaurs existed in Montana.

Materials • 20 egg toys
• 6-8 pictures of live birth livestock offspring
• String
• 10 sets of matching cards
• Images of Tyrannosaurus rex and Maiasaura skeletons

Common Core Standards Life Science:
• Students will use crosscutting concepts, science and engineering practices, and technology while investigating the characteristics, structures, and functions of living things; the processes and diversity of life; and how living organisms interact with each other and their environments.
• Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
• Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
Dinosaurs and Livestock: Growth and Reproduction (Cont.)

Instructional Procedures

Introduction to lesson:

- Have students pick an animal and briefly write some facts that they know about how it is born, and how it develops throughout its life. Encourage a few students to share their results.
- Explain that many dinosaurs laid eggs and cared for their young, similar to what birds do now. Compare this with live birth, and explain that animals that give live birth can generally only rear one offspring per year, whereas dinosaurs and birds could lay several eggs at a time.

Activity: Comparing predators and prey

Part 1: Predators and eggs

- Split the students into two groups. Egg protectors (75% of the class) will have two eggs each, and must remain stationary in their “nest.” They must keep their arms at their sides while protecting their nest. Predators (25% of the class) may only take one egg per nest. They may only touch the eggs, not the protectors.
- Ask students to discuss the challenges and advantages of being a protector versus a predator.

Part 2: Predators and livestock

- Split the students into two groups. The livestock group (75% of the class) will have a picture of their offspring on a string. They may move around the room, pulling their picture behind them. Predators (25% of the class) can eat the offspring by stepping on the picture.
- Ask students to discuss the differences between this activity and Part 1 (predators and eggs). Was it easier or more difficult to catch the livestock?
- Make a list of a few dinosaurs that would have defended eggs, and the predators that may have attacked them. Then make a list of modern livestock and the predators that sometimes attack them. Compare and contrast the similarities and differences.
Dinosaurs and Livestock: Growth and Reproduction (Cont.)

Instructional Procedures  Activity: Thinking about growth and development

• Have students pair up and get a set of animal matching cards
• Lay out cards on table face up.
• Match the babies with their mothers.
• Ask students what types of similarities there are between the babies and mothers.
• Look at both a *Tyrannosaurus rex* skeleton and a *Maiasaura* skeleton, and ask them to guess how the skeleton of a baby might be similar or different, based on the similarities between the livestock mothers and babies.
• Discuss some basic facts about dinosaur development, and ask students to compare these to what they know about how modern livestock and farm animals develop.
• Dinosaur eggs came in a variety of shapes and sizes. Some shapes were better than others at putting up with the pressure of nesting.
• Most eggs were buried or laid in a pit.
• Many dinosaurs “incubated” their eggs, burying them under soil or vegetation to keep them warm, or sitting on them for a long time.
• Dinosaurs developed their basic skeletal and muscular structure within the egg, then continued to develop once they were hatched.
• We do not know exactly for how long dinosaurs cared for their young after they were born, but we do know that birds and crocodiles both protect and care for their young on a basic level.

Evaluation

• Discuss differences between domesticated livestock growth and development and dinosaur growth and development. As a class, create a Venn Diagram on the board, or on a large piece of paper.
Ice Cream on the Frontier

Lesson Duration 15 Minutes

Audience 3rd through 5th graders

Background Montana was settled by a significant number of homesteaders in the second half of the 19th century. The Homestead Act of 1862 enabled U.S. citizens, or intended citizens, to acquire 160 acres of land in the Western United States, provided they could cultivate and improve it for five years. Homesteaders endured difficult conditions while trying to raise livestock and crops on the frontier, but the promise of cheap land encouraged many families and individuals to attempt homesteading.

For the most part, homesteaders were responsible for providing their own food. Dairy products were acquired from livestock, and settlers had to make their own cheese, butter, cream, and milk. Before refrigeration, homesteaders relied upon cutting and storing ice to keep food cool. During the winter, surface ice was collected from lakes and deep, slow moving rivers and stored in ice houses.

The Tinsley House at Museum of the Rockies has a large garden and kitchen, and visitors can observe what type of foods were grown on the frontier, in addition to learning about canning, preservation, and cooking. This lesson will teach students a simple method for making ice cream, similar to the method used by settlers. It will also ask them to consider the difficulty of acquiring and producing certain ingredients on the frontier.

Objectives

• Students will learn the steps for making ice cream from scratch, and how ingredients were obtained by homesteaders.
• Students will recognize that homesteaders made and acquired their own basic meat and dairy products, rather than being able to go buy them in grocery stores.

Learning Outcomes

• By the end of the lesson, students will learn how to make their own ice cream and can describe the kinds of ingredients needed.
• Students will be able to explain the concept of how homesteaders needed to hand-make basic products versus being able to go to the grocery store to buy them.
Ice Cream on the Frontier (Cont.)

Materials
- 1 gallon 2% milk
- Small bag of sugar
- Vanilla extract
- 1 cup – measuring cup
- Teaspoon
- Tablespoon
- Large bag of ice
- Rock salt
- Quart size Ziploc bags
- Gallon size freezer Ziploc bags
- Bath towel
- Dixie cups
- Plastic spoons
- Ice cream worksheet
- Markers & pencils

Common Core Standards
- Construct a cause and effect argument communicating some animals, including humans, form groups and communities that help members survive.
- Communicate ideas about the impact of humans on the land, water, air or other livingthings in the local environment.

Instructional Procedures

Introduction to lesson
- As a class, make a list of the foods that homesteaders would have needed on a daily basis (milk, butter, meat, vegetables, bread, etc.). Ask students to consider where each of these foods may have come from.
- Discuss how the the land around a homestead may have been impacted by the production of each of these foods.
  **Example:** Growing wheat for grain production would have entailed plowing, planting, and harvesting sections of the prairie.
- Ask how many students like ice cream and where they like to get their ice cream.
- Ask how many students have made their own ice cream and how homesteaders could have possibly made their ice cream. Make a list of what goes into ice cream.
- Have students write a sentence or two about how the land would have been impacted by producing the ingredients specific to ice cream.
Teaching methods and student activities: (10 minutes)

- If this lesson will be taught to several classes throughout one day, you can have at least one bag of ice cream already prepared just in case you run out of time to show how to make it. This way there will be enough for everyone to get a taste.
- **Discussion:** How would the homesteaders begin their ice cream making process?
  - Milk from cows
  - Explain that although we use different materials to day, the process and ingredients are very similar.
  - Talk briefly about what a homestead-era ice cream maker would have looked like:
    - Ice cream machines appeared in the middle of the 19th century. These machines were a wooden barrel with a metal cylinder in the middle, into which you would put the ingredients. The ice and salt went outside of the cylinder. By turning the metal crank, you could churn the ingredients in the cylinder until they turned into ice cream!
    - If a family didn’t have an ice cream machine, they could put the ingredients in a pot, and set the pot in a bucket of ice and salt.

Activity:

- Use the ice cream recipe included in this kit.
- Start with quart size Ziploc bag.
- Ask each student to help measure the right amount of each ingredient into the bag.
- Seal the bag tightly, trying to get as much air out as possible.
- Put quart size bag within a gallon size freezer Ziploc bag
- Have students fill the gallon bag halfway with ice.
- Sprinkle rock salt over the ice.
- Place quart size bag in the ice and seal both bags, getting as much air out as possible.
- Fold the bag within a towel to keep from students’ hands getting too cold while shaking.
- Have students take turns shaking and massaging the bag.
- Meanwhile, ask the students what they think is happening to the milk mixture as it’s surrounded by the salt and ice (liquid to solid).
- Once the ice cream is solid, divide it amongst the number of students into Dixie cups and give them spoons to try their ice cream.
Instructional Procedures (cont.)

Closure: 2 minutes

- Compare the process of homemade ice cream to the convenience of going to the store to get ice cream.
- As a class, make a list of other favorite foods that could be made with the ingredients available on a homestead.
- Ask students to think of a few ways that homesteaders may have helped one another when it came to sharing resources. Throughout the lesson, the class will be engaged in learning about each step within the ice cream making process. Asking the students where each ingredient came from helps build their critical thinking skills. The class will be able to reinforce their knowledge by drawing or writing each step on the ice cream worksheet. At the end of the lesson, students will be able to taste the treat that they helped create. This process will give students an idea of how labor-intensive some products or treats could be.
- Have students complete the ice cream worksheet.

Evaluation

- Throughout the lesson, the class will be engaged in learning about each step within the ice cream making process. Asking the students where each ingredient came from helps build their critical thinking skills. The class will be able to reinforce their knowledge by drawing or writing each step on the ice cream worksheet. At the end of the lesson, students will be able to taste the treat that they helped create. This process will give students an idea of how labor-intensive some products or treats could be.
- Have students complete the ice cream worksheet.
Name: _______________________________

Ice Cream on the Frontier

What ingredients did we use? _____________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

How do you think the homesteaders got those ingredients? ______________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

What were some of the steps we took to make ice cream? ______________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Ice Cream on the Frontier (Cont.)

Ice Cream Recipe

1/2 cup milk  
1/2 teaspoon vanilla  
1 tablespoon sugar  
4 cups crushed ice  
4 tablespoons rock salt  
1 quart size Ziploc bags  
1 gallon size Ziploc freezer bag  
A hand towel or gloves

Directions: Put the milk, sugar, and vanilla in one of the smaller Ziploc bags and seal it tightly. Try to eliminate as much air as possible from inside the bag. Place the ice and salt in the larger Ziploc bag, and place the smaller bag inside of it. Seal the larger bag once you have removed as much air as possible. Using gloves or a towel (to avoid cold hands), have each student shake and massage the bag for several minutes. It is important that the smaller Ziploc bag remain surrounded by ice.
Montana Homesteading

Lesson Duration 1 hour

Audience 3rd through 5th graders

Background Montana was settled by a significant number of homesteaders in the second half of the 19th century. The Homestead Act of 1862 enabled U.S. citizens, or intended citizens, to acquire 160 acres of land in the Western United States, provided they could cultivate and improve it for five years. Homesteaders endured difficult conditions while trying to raise livestock and crops on the frontier, but the promise of cheap land encouraged many families and individuals to attempt homesteading.

Livestock was a central component of success for a homesteader, and shaped the lifestyle of settlers on the frontier.

Objective • Students will learn about the reasons for which homesteaders wanted to move to the western frontier.
• Students will learn about the importance raising and selling livestock and how it shaped the lifestyles of homesteaders.
• Students will learn about the different tools used by cowboys and homesteaders.

Learning Outcomes • Students will be able to explain the different reasons that homesteaders came to the western frontier.
• Students will be able to identify some of the different tools used by cowboys and homesteaders to make their everyday lives a little bit easier.
• By the end of the lesson, students will understand the importance of raising and selling livestock, and how this shaped the lifestyles of homesteaders.

Materials • Pencils and paper
• Photocopies of the narrative
• Trunk objects
• Cattle Kids
• Riding on the Range
• Woolies and Whinnies: The Sheep and Cattle Industry in Montana (pamphlet)
Montana Homesteading (Cont.)

Common Core Standards

• Construct a cause and effect argument communicating that some animals, including humans, form groups and communities that help members survive
• Communicate ideas about the impact of humans on the land, water, air or other living things in the local environment

Instructional Procedures

Introduction to lesson

• Ask students to close their eyes and visualize what their house is like, and what type of clothing they are wearing. Ask students to think about what these things might have been like when settlers were first moving out to Montana. There were not any clothing stores or stores that sold the building materials for homes. After a few minutes, begin to discuss different objects that students thought of, and share with the class.
• Print off, distribute, and read the narrative attached to this lesson plan, in order to give students some background about life on the frontier. Ask for a student volunteer to read each section.

Student activities: 40-45 minutes

Activity: Examining Different Perspectives

First People
• Where did these people come from? Discuss with students.
• What did these people do to survive? Cultivators, hunters, and gatherers

The Euro-Americans
• Who were the Euro-Americans? Discuss the different types of Americans that began to move out west — explorers, scientists, fur trappers, traders, miners, and settlers
• What did these settlers want from the West? Gold, resources, and land
• Divide the class into two groups. One group will be examining settlement from the perspective of First Peoples, and the other group will be examining settlement from the perspective of Euro-Americans
• Have each group discuss the causes and effects of settlement from their assigned perspective, and record their ideas on a piece of paper
• As a class, share the different perspectives and have a short discussion about the causes and effects of settlement.
Activity: Early Cattle and Sheep Ranching
Give a short overview of the history of early cattle and sheep ranching:

Cattle
• Where did cattle ranching start in Montana? Discuss where the different major valleys are throughout the state (Beaverhead, Bitterroot, and Deer Lodge valleys)
• Helped serve the traveling mining communities by supplying meat for them to eat.
• This resulted in the ranchers needing to build larger herds to meet their demand for meat.

Sheep
• Where did sheep ranching start in Montana? Discuss how sheep ranching took place throughout the state.
• As more mining communities were built, those settlers enjoyed eating lamb and using sheep wool for clothing.
• Ask the students what types of challenges ranchers had to face while raising their cattle and sheep herds.
• The weather was harsh, especially in the winter.
• The supply of water was scarce in dryer weather, and harder to find.
• The supply of food could get low, and the ranchers needed to keep moving their herds.

Activity: Kids, Cowboys and Homesteaders
• Read the story on pp. 28 of Woolies and Whinnies: The Sheep and Cattle Industry in Montana.
• Read the book Cattle Kids.
• Have students draw pictures of what they think a year on the Western Range looked like.
• Discuss the differences and similarities between this book and the homesteading story from Woolies and Whinnies.
• Split the class into several small groups, and assign each group an activity from Riding on a Range. This part of the lesson can be adapted to each particular class, and to the resources available.
• The instructor can decide to what extent they would like to discuss how the objects or tools provided in the trunk were used by cowboys and/or homesteaders.
Montana Homesteading (Cont.)

Instructional Procedure (cont.)

• Have students close their eyes again and ask them to visualize what their lives might be like if they were a homesteader or a cowboy. Ask what kind of clothes they might be wearing and what their homes might look like. After a couple of minutes, have the class discuss what they thought of and how different their lives would have been. Ask them if this changed from what they said at the beginning of the class.

Closure: 2 minutes

• Throughout the lesson, the students will be engaged in learning about the past. By using the trunk and its contents, students will be able to use all their senses and visualize how homesteaders might have lived. At the end of the lesson, students will be able to discuss more about how their visualizations have changed after learning more about the homesteaders. Students will be able to see the large differences between how they visualized their lives today versus how their lives would have been back then.
Historical Narrative
(from pp. 22 of Woolies and Whinnies: The Sheep and Cattle Industry in Montana)

The First People
For Montana’s First Peoples, this land was a paradise. Food, water, clothing, shelter and the inspiration of a beautiful place surrounded them each day. They traveled frequently, following herds of buffalo, elk, deer and other animals that provided meat to eat. They ate roots, berries and some plants. All the foods they found and harvested were nutritious and plentiful. Montana’s First Peoples did not need to plant seeds or grow crops; they did not raise cows or sheep. It was not necessary for their lifestyle.

The Newcomers
Euro-Americans came west looking for furs and then for gold. They traveled across lands belonging to Montana’s First Peoples. With the white settlers came their ideas of government, architecture, wealth, clothing and food. Because there were no stores at first, the newcomers raised their own food. They tried to plant seeds, grow crops and raise animals to eat. They paid large sums of money to purchase supplies and fresh meat from local providers.

Early Ranchers
The earliest ranchers in Montana lived in the western part of the state in protected and lush valleys like the Bitterroot, the Beaverhead and the Deer Lodge valleys. Two stories about early ranchers demonstrate the experience of many who began ranching operations in Montana. A man named Johnny Grant traded one of his strong and healthy oxen for two worn-out and sickly ones from a wagon train moving west. He returned to his ranch with the two tired oxen to feed, water and rest them. Soon, his herd grew to thousands of head. Sheepherders also enjoyed the early years in Montana. Henry Sieben began his sheep business as early as 1872 in the Helena valley, where miners paid high prices for the pleasure of eating lamb. The sheep’s wool also made fine coats and blankets.
Historical Narrative
(from pp. 22 of Woolies and Whinnies: The Sheep and Cattle Industry in Montana)

The Cowboy
Cowboys worked hard and were paid about $1 a day. During roundups, cowboys traveled great distances from the ranch looking for wandering cattle. Over a period of weeks, these young men branded and notched the ears of the young cows, and moved the cows to train cars waiting to transport the beef to market. Cowboys often slept on the ground or in tents, and they ate meals provided by the camp cook. Sheepherders had similar lives. They did not need to ride horses all day, but they had to protect the sheep from predators like wolves or bobcats and even large birds. Sheepherders depended upon good dogs that could chase and corral wandering sheep and alert the sheepherder to danger. Sheepherders had specially designed, horse-pulled wagons. Each sheep wagon was a “home away from home,” complete with a bunk, stove, cupboards and supplies. Sheepherders could spend several weeks or months in comfort in their wagon, following the grazing sheep.

Dangers on the Range
Rattlesnakes, gopher holes, alkali water, and bad weather caused problems for all ranchers. Sometimes there was little water to drink, or little grass to feed the cattle. Perhaps you have heard the story about the “Hard Winter of 1886 and 1887,” when cattlemen lost between 50% to 90% of their herds due to freezing snow and wind. To document the harsh conditions, Charlie Russell painted a picture, called “Waiting for a Chinook,” depicting a starving cow and a hungry wolf, standing in the cold and snow. After 1887 the open range was phased out, and many ranchers began to fence their property. These ranchers grew hay, timothy or other grasses. They improved the breeds of cattle. The cowboy changed from herd driver to fence builder.

The Modern Era
Ranchers today have learned to diversify their ranches. Many do not raise just cattle or sheep, but also grow grasses to feed their livestock. Their ranches are fenced, and water is provided by irrigation or deep wells. Cattle are shipped most often by truck. Roundups still happen. Today’s cowboys and herders move cattle within the boundaries of the ranches, rather than for hundreds of miles across the state.
Montana Homesteading (Cont.)

Potential Discussion Questions for Kit Objects

What brought homesteaders and cowboys out to Montana?
How did they catch the cows?
What differences do you notice between cows and horses?

Rope/Lasso
Branding Iron
Horseshoes
Model Horse
Model Cow

Was the weather that the new Montanans faced hot, cold, or both?
What kind of clothing protected them from the warm and the cold?
What kind of clothing kept them safe when they were out with cows and horses?

Chaps
Shirt
Boots
Spurs
Cowboy hat

Where did the cowboys live?
Did they have houses?
What kind of food did they eat?
How did they navigate from place to place?

Wagon
Tin Plate
Coffee
Silverware Spice Cans
Candlestick holder

Where did the homesteaders live?
Did they have houses?
What did they do in their free time?

Hand Beaters/Old Fashioned Mixer
Milk Jars
Tablecloth
Pocket watch
Night Gown
Book
Fur Coat
Let’s Plant a Seed

Lesson Duration 30-45 minutes

Audience 3rd through 5th graders

Background Montana was settled by a significant number of homesteaders in the second half of the 19th century. The Homestead Act of 1862 enabled U.S. citizens, or intended citizens, to acquire 160 acres of land in the Western United States, provided they could cultivate and improve it for five years. Homesteaders endured difficult conditions while trying to raise livestock and crops on the frontier, but the promise of cheap land encouraged many families and individuals to attempt homesteading.

For the most part, homesteaders were responsible for providing their own food. This meant that seeds and plants had to be carefully cultivated in crops and gardens. Once the food had grown, lots of it had to be preserved so that it could be eaten throughout the winter.

The Living History Farm at Museum of the Rockies has a large garden every summer, and visitors can observe what type of foods were grown on the frontier, in addition to learning about canning, preservation, and cooking.

Objective • Students will learn the steps for properly planting a seed, and how to keep their seed growing.
• Students will recognize seven common plants found in our area, and which animals may eat them.
• Students will learn about the basic parts of a plant and how they contribute to the plant’s growth.

Learning Outcomes • By the end of the lesson, students will learn how to plant a seed and describe the steps that were followed.
• Students will be able to explain how seven common plants found within our area are eaten and what eats them.
• Students will be able to identify the basic parts of the plant and explain how it helps the plant grow.
Let’s Plant a Seed (Cont.)

Materials
- Whiteboard and dry erase markers (if available)
- Dixie cups
- Soil
- Waterer
- Scissors
- Water
- Large aluminum trays to hold cups
- Markers and pencils
- Seeds (herbs, tomato, mint, sunflower)
- Plastic spoons or large kitchen spoons
- Large roll of paper to write steps on
- Planting steps worksheet
- The Homesteading Handbook

Common Core Standards
- Make observations of plants and animals to compare and contrast the diversity of life in different habitats.
- Plan and conduct a cause and effect investigation to determine whether plants need sunlight and water to grow.

Instructional Procedures

Introduction to lesson

- Ask students to raise their hands if they have ever planted a garden at home. Ask students what kind of vegetables/plants they had in their garden. Begin to discuss how we will be planting our own seeds, and what we will be planting. 
- Ask students to think about how homesteaders would have planted their own food. They needed to be careful about what they planted, since animals liked to eat their food as well.
- Use the book The Homesteading Handbook to discuss how homesteaders grew and preserved their food, and raised animals. Have students draw a picture of what they think homesteading looked like in the past.
  * pp. 2-6 (“Basic Plant Requirements” and “Selecting a Site”)
  * pp. 68 (“How Canning Preserves Foods”)
  * pp. 122 (“Edible Wild Plants and Mushrooms”)
  * Make sure to emphasize that students should not try to find edible plants on their own!
  * pp. 191 (“Root Cellars”)
Student activities:

Activity: Plants in the Ecosystem

- Use the flashcards included in the kit for this activity.
- Ask students where they might find these different plants. Make the point that these plants grow better in different environments and are found in different places, resulting in different animals wanting to eat them.
- Show pictures of plants and ask the class which animal might eat each plant.
  - Grasses – cattle
  - Tulips/Geraniums – deer
  - Strawberry – deer/bears
  - Sunflowers – slugs/insects
  - Dandelions – elk
  - Corn – humans
- After discussing answers, show the class the animal on the back of the paper.

Activity: Plant Parts

- Instructors can follow this link to bring up an interactive game and case scenario for the students. Be sure to click on the bottom picture of the magnifying glass (“mysteries”) and the link called “What are the parts of the plant?”.
- [http://extension.illinois.edu/gpe/case1/index.html](http://extension.illinois.edu/gpe/case1/index.html)
  - Roots – take in water and nutrients, anchor plant, and spread out in the soil
  - Stem – transports water through the plant, helps keep the plant structured
  - Leaves – create food for the plant, contain chlorophyll – green inside of the leaf
  - Flower – produce seeds to create new plants
  - Fruit – carries and protects the seeds
  - Seed – helps disperse the plant into different locations
Let’s Plant a Seed (Cont.)

Instructional Procedure (cont.)

Activity: Planting a Seed

- This activity can be done individually (with each student planting their own seed) or as a class.
- Discuss: what do we need to plant a seed?
- Pot, water, soil, seed.
- Begin to write steps of planting our seed on the whiteboard.
- Put newspaper on the floor.
- Label the cup with the name of the plant.
- Put holes in the bottom of the cup to let water through when we water our seed.
- Put soil in the cup.
- Make a hole in the soil within the cup.
- Put our seed in the hole that we made in the soil.
- Cover the hole with some more soil.
- Put the cup in the tray and water our seed.
- Put our plant in a warm, sunny spot.
- To help our seed continue to grow, we need to make sure to water our plant every day.
- Students are given a worksheet on which to draw out each step that we learned about.

Evaluation
- Throughout the lesson, the class will be engaged in learning about each step within the planting process. Discussing how each step is carried out, and the importance of the order, will build their critical thinking skills. The class will be able to reinforce their knowledge by drawing each step on the planting steps worksheet. At the end of the lesson, students will be encouraged to go outside and see if they can find the common plants that we talked about and how they play a part in our environment.
- Discuss that homesteaders who moved to the frontier needed to grow their own food. They could not run to the grocery store. Emphasize the importance of knowing the steps for planting, and explain that keeping the plants in a garden or field alive would have been very important for success and survival.
- Have students draw a design for their own homestead garden and ask them to write a few sentences about why they chose to plant those particular things.
- Send students home with the planting steps worksheet and their own plants (if they planted individual seeds).
How to Plant a Seed

1) What does your seed need to grow?

_____________________________________________________________________

_____________________________________________________________________

2) Put a label on your cup or in the spot you have picked in your garden, so that you know what kind of seed is planted there.

3) Put some holes in the bottom of your cup.

4) Put soil in your cup and dig a hole in it. Follow the instructions on your seed packet, because some seeds need to be planted more deeply in the soil than others do. If you are planting in a garden, dig a hole in the garden soil.

5) Cover the seed with soil, and water it.

6) Put your cup in a warm, sunny spot. Make sure to water the seed every day!

7) Watch your plant grow. Once it is a few inches high, you can plant it outside.
Plants in the Ecosystem Flash Cards

Cut flashcards out along the dotted lines to be used in the “Plants in the Ecosystem” activity.

- Black Bear
- Cow
- Deer
- Racoon
Plants in the Ecosystem Flash Cards

Cut flashcards out along the dotted lines to be used in the “Plants in the Ecosystem” activity.

Dandelion

Sunflower

Tulip

Grass
Plants in the Ecosystem Flash Cards

Cut flashcards out along the dotted lines to be used in the “Plants in the Ecosystem” activity.

Lady Bug

Strawberry

Corn

Elk
Hunting and Gathering

Lesson Duration
30 minutes

Audience
Elementary Students

Background
During the 19th century, one significant difference in lifestyle between American Indian tribes in Montana and the new settlers and homesteaders was how food was procured and acquired. The process of hunting and gathering and the method of sustained agriculture found various levels of success on the frontier. This lesson enables students to consider the pros and cons of each method, and to understand the historical significance of these different approaches to survival. Students will also consider why agriculture remained the method of choice for most settlers, since it allowed for the establishment of permanent, stationary communities and homes similar to those on the East Coast. The lesson will encourage students to consider the importance of bison to many Montana Indian tribes, and how a decreased bison population affected these communities.

Objective
• Students will be able to communicate how hunting and gathering differs from agriculture, and how these different methods shaped lifestyle. This will be assessed by a concluding discussion.
• Students will understand basic concepts regarding the importance of bison to Montana Indian tribes
• Students will be able to communicate why a group might choose agriculture or hunting/gathering as a method for acquiring food.

Learning Outcomes
• Students that successfully learn the objective will be able to understand why agriculture is so important to our society today, in terms of how it helps provide food.
• Students will understand why bison were and are important to Montana Indian tribes

Materials
• Story cubes
• Plant and egg toys for scavenger hunt
• Large sheet of paper
• Markers
Hunting and Gathering (Cont.)

Common Core Standards  

Life Science:

- Students will use crosscutting concepts, science and engineering practices, and technology while investigating the characteristics, structures, and functions of living things; the processes and diversity of life; and how living organisms interact with each other and their environments.
- Make observations of plants and animals to compare and contrast the diversity of life in different habitats.

Instructional Procedures  

Introduction to lesson:

- Split the class into two groups, and explain that one group is going to create a story about agriculture/farming, and that the other group will create a story about hunting/gathering.
- Each student picks a picture from the story cubes. The first student begins a story based on their picture, the second student continues it with their picture, and so on.
- Once they have shared their stories, have the class brainstorm about the significant differences in each story, and make a list of the pros and cons of each method (hunting vs. farming).

Activity:

- Explain to students that the hunting group is now going to try out agriculture, and that the farming group is going to try hunting.
- Hunters will look around the classroom for food items that were placed around the room prior to the lesson (eggs and plants).
- Farmers will create a plan for their garden and crops on a large sheet of paper.
- Once students are finished, have a group discussion about the pros and cons of each experience. As a class, brainstorm what some of the challenges may have been for groups that were hunters and gatherers, or for groups who were farmers.
Hunting and Gathering (Cont.)

Instructional Procedures (cont.)

Activity:

• Look at some images of how certain parts of a bison were used by Montana Indian tribes. Emphasize that bison were not only used for food, which meant that the time spent hunting them was well worth the products.

• Have a brief discussion about how tribes may have been impacted when the number of bison on the plains decreased rapidly during the late 19th century.

• There used to be over 20 million bison in the United States. Now there are approximately 500,000.

Evaluation

• Why do you think settlers chose to use agriculture as a food source? Why do you think it was developed in the first place?

• How might the lifestyle of a hunter/gatherer be different than your own?

• Which lifestyle caused people to move around more? Do you think this relates to why agriculture was developed in certain cultures?
Animals in Yellowstone

Lesson Duration 1 hour

Audience Elementary Students

Background Yellowstone is a National Park that is partially located in Montana. It is a beautiful place full of breathtaking landscapes, hot springs and animals, and is an important part of Montana’s history and culture. The Children’s Discovery Center at Museum of the Rockies provides an engaging opportunity for young visitors to learn about the ecosystems, geology and history of Yellowstone. This lesson, which is about what the animals of Yellowstone eat, will fit well with the theme of the room. Yellowstone is a very important part of Montana and the culture. There are many special and unique animals that live there. The students should be able to understand and respect the life cycle of those animals, to recognize that animals work hard to survive, and to identify that animals eat different things. This will help children understand how a variety of species live and eat.

Objective
- The students will be able to describe the difference between herbivores, carnivores and omnivores.
- The students will be able to describe the different habitats in Yellowstone.
- The students’ knowledge of animal eating habits will increase.

Learning Outcomes
- The students will learn how animals interact with each other in the wild.
- Students will be able to explain the differences between omnivores, carnivores and herbivores.
- Each student will be able to list a few examples of animals and what they eat.
- Students will be able to understand that animals live in different areas and habitats of Yellowstone.

Materials
- Power Point Slides and projector
- Paper and markers/crayons
- Yellowstone Animals Matching Flashcards
- Resources to make classroom “Habitats”
- Snacks: vegetables, lettuce, cereals (grains), meat pieces, etc. and hold snacks
Animals in Yellowstone (Cont.)

Common Core Standards

*Life Science:*
- Students will use cross-cutting concepts, science and engineering practices, and technology while investigating the characteristics, structures, and functions of living things; the processes and diversity of life; and how living organisms interact with each other and their environments.
- Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

Instructional Procedures

*Introduction to lesson:*

- Begin by asking students some questions about Yellowstone. Give each student a “fact card,” and have them take turns reading their card to the class.
  - Who has been to Yellowstone?
  - What did you see? What did you hear? What did you smell? What did you touch?
- If possible, watch one of the short Yellowstone videos from the Yellowstone National Park Service website:
  [https://www.nps.gov/yell/index.htm](https://www.nps.gov/yell/index.htm)
- If possible, play several different one minute videos from the Minute Out in It Video Series to show a variety of events and phenomena in Yellowstone.
  [https://www.nps.gov/yell/learn/photosmultimedia/minute.htm](https://www.nps.gov/yell/learn/photosmultimedia/minute.htm)
- Ask students the following questions about Yellowstone:
  - What kinds of animals live in the park?
  - What kind of plants grow in the park?
  - What do you think the animals eat? Do all animals eat the same things?
  - Can you name some Yellowstone habitats? A habitat is the home or environment of a plant or animal.
  - Have students pick a Yellowstone habitat (rivers, mountains, forests, grasslands, wetlands, freshwater) and draw a picture of what they think it would look like.
## Instructional Procedures

### Activity: What do Yellowstone animals eat?

- Using the matching game worksheet, have the class try to match certain animals to what they eat.
- Present the PowerPoint, which has definitions of herbivore, carnivore, etc. along with the picture examples. Discuss other examples of animals in each category by asking the students to name other animals they can think of.
- After the PowerPoint, have the students do the matching game again to see if they have improved!

### Activity: Yellowstone habitats

- Prior to class, set up four different habitats around the room, using the World Wildlife Federation website as a reference: [http://www.worldwildlife.org/habitats](http://www.worldwildlife.org/habitats). These habitats should relate to Yellowstone Park, so they could be rivers, mountains, forests, grasslands, wetlands, freshwater, etc. Define each habitat by writing a list of features that it might have.
- Tell the students to pretend to be a wolf, bear, bison, pronghorn, elk, deer, eagle, fish, etc. and ask them what habitat they would they go to if they were that animal. Have them proceed to that specific area in the room.
- While in the habitat, have them discuss what they would eat, challenges faced in the habitat, threats to the habitat, the importance of the habitat, other animals that might live in the habitat, etc. These answers are all on the WWF website under each specific habitat.
- Go around the room and ask them to share their ideas and answers with the rest of the class.
- If there is time, allow students to play habitat games on the Wild Kratts website: [http://pbskids.org/wildkratts/habitats/](http://pbskids.org/wildkratts/habitats/). This is a great external resource.
Instructional Procedures

Activity: Carnivores and herbivores

• Have snacks available that represent all eating types. These can be vegetables, lettuce, cereals (grains), meat pieces, beef jerky, etc., or a mix.
• Put the snacks in ziploc bags and have students choose them randomly. Once each student gets a snack, have them describe what kind of eater they are.
• While the students are eating their snacks, they should pick what kind of animal they are (based on their snack), and draw that animal’s habitat.
Animals in Yellowstone (Cont.)

- Yellowstone became a National Park in 1872
- Yellowstone National Park is bigger than the states of Delaware and Rhode Island.
- Yellowstone is home to many habitats and ecosystems.
- Yellowstone is the world’s first National Park!
- Yellowstone is an active volcano Yellowstone is over 2 million acres large
- Yellowstone is host to 67 animal species, 285 species of birds, and 16 species of fish!
- Yellowstone has over 500 active geysers
Leaves and Things

Lesson Duration 1 hour

Audience 1st through 2nd graders

Background This lesson will incorporate agriculture into the Children’s Discovery Center by introducing the different types of foliage within the Yellowstone ecosystem. The Children’s Discovery Center at the Museum of the Rockies is filled with images of various types of vegetation that can be classified into different categories. By recognizing the different types of leaves and plants in Yellowstone, this lesson can help broaden students’ knowledge about the ecology of Yellowstone.

Objective
• Students will be able to categorize the different types of plants within the Yellowstone ecosystem.
• Students will connect different plants with different ecosystems present in Yellowstone.

Learning Outcomes
• Students will be able to tell the difference between shrubs, trees, and grasses based on simple identification characteristics.
• After observing the different plant types, the students will be able to properly match the type of plant to the ecosystem with which it fits.
• Students will understand the importance of plants to all Yellowstone ecosystems.

Materials
• Power Point Slides and projector
• Various real plants (branches and flowers)
• Paper and markers/crayons
• Book: What I Saw In Yellowstone

Common Core Standards
• Students will use cross-cutting concepts, science and engineering practices, and technology while investigating the characteristics, structures, and functions of living things; the processes and diversity of life; and how living organisms interact with each other and their environments.
• Make observations of plants and animals to compare and contrast the diversity of life in different habitats.
Leaves and Things (Cont.)

Instructional Procedures

Introduction to lesson:

• A collection of pictures of different grasses, branches, and boughs of other shrubbery from Yellowstone should be dispersed on a table in a room, mixed together in random order. The teacher will have examples of each foliage type.
• The teacher will raise up a branch. Students must then look through the pile and find the matching plant.
• Once the picture has been found, the teacher will pose certain questions pertaining to the foliage:
  • What does it feel like?
  • Is it from a tree or bush, or is it a grass?
  • Where in Yellowstone might this grow?

Presentation (20 minutes)

• Transition into the PowerPoint slides
• Explain to students that plants are a very important part of Yellowstone. Ask them if they know why.

Slide 1: Intro

• Introduction to Yellowstone and why it is so special and important to us.

Slide 2: What is an Ecosystem?

• Ecosystems provide different habitats and foods for the different animals that we get to see in Yellowstone
• Quickly list the ecosystems that we will be discussing in the presentation: Prairie, Alpine, Lakes and Rivers, and Forest

Slide 3: Prairies

• Important for grazing animals, because they are going to eat the grasses.
• Can you think of a grazing animal in Yellowstone?
• It can become very hot and dry in Yellowstone, which makes the grass brown and crunchy.
• Sagebrush grows well in Yellowstone because of the hot, dry conditions in the summer, as well as the cold months of winter.
Leaves and Things (Cont.)

Instructional Procedures

Slide 4: Alpine

- There is not as much life on the top of a mountain.
- Pikas are small little creatures that can survive on the minimal food on top of mountains.
- Small grasses and flowers grow during the short summer months.
- Why doesn’t much grow up here?

Slide 5: Lakes and Rivers

- This is the main source of water for Yellowstone’s plants and wildlife.
- Near the streams and rivers you will find many trees and bushes.
- What made this tree fall over? (hint: it wasn’t caused by a human).
- Some trees, like willows and cottonwoods, need a lot of water, so you will find them near rivers and streams.

Slide 6: Forest

- Huge part of Yellowstone’s ecosystems
- Large pines and aspen groves thrive on the rolling hills in Yellowstone
- Often during the hot summer, forest fires will start
- How do they catch fire?
- Can you think of anything else besides trees that grows in the forest? (berries, flowers, grass)

Slide 7: End of presentation

Read the book “What I Saw in Yellowstone” and have the students identify the different habitats and their characteristics.

Activity: Design an ecosystem!

Allow students to use a variety of mediums (marker, watercolor, collage, etc.) to create an ecosystem on a large piece of heavy duty paper. Each ecosystem should be labeled with the following information:

- Temperature and climate
- Types of animals that live there
- Types of foods that grow there
Agriculture Across Disciplines
Outreach Kit Contents

Each lesson in this guide is supported by free, additional educational materials, available to all Montana teachers. To borrow these resources from Museum of the Rockies, please email MORoutreach@montana.edu or call 406-994-6591.

Lesson 1: Dinosaurs and Livestock
- Dinosaur Figurines
- 20 Egg toys
- Laminated Matching Cards and Pinning Pictures

Lesson 2: Ice Cream on the Frontier
- None

Lesson 3: Montana Homesteading
- Book: Cattle Kids
- Book: Riding on the Range
- Pamphlet: Woolies and Whinnies: The Sheep and Cattle Industry in Montana
- Objects:
  - Rope/Lasso
  - Branding Iron
  - Horseshoes
  - Model Horse
  - Model Cow
  - Chaps
  - Shirt
  - Boots
  - Spurs
  - Cowboy hat
  - Wagon
  - Tin Plate
  - Coffee
  - Silverware
  - Spice Cans Candlestick holder
  - Hand Beaters / Old Fashioned Mixer
  - Milk Jars
  - Tablecloth
  - Pocket watch
  - Night Gown
  - Book
  - Fur (Coat)
Lesson 4: Let’s Plant a Seed
  • Book: The Homesteading Handbook

Lesson 5: Hunting and Gathering
  • Story cubes
  • Plant and egg toys

Lesson 6: Animals in Yellowstone
  • Power Point Slides and projector
  • Paper and markers/crayons
  • Yellowstone Animals Matching Flashcards
  • Resources to make classroom “Habitats”
  • Snacks: vegetables, lettuce, cereals (grains), meat pieces, etc. and hold snacks

Lesson 7: Leaves and Things
  • Book: What I Saw In Yellowstone