



The Hungry Games

Heritage Breed Livestock & Rotational Grazing

Overview

The purpose of this activity is to show the public why the Accokeek Foundation does rotational grazing. Attendees will participate in a tour of the farm and livestock with an interactive activity and demonstration.

Lesson Planner

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| Time Required | 20-45 minute tour of the farm and livestock, ~3-5 minutes for each game round |
| Key Concepts/terms | Heritage breed, preservation, biodiversity, nutrient (carbon) cycle, adaptation, trait, rotational grazing |
| Setting | Open space (preferably a pasture) for three 20' x 20' areas |

Learning Objectives

After completing the farm tour and activity, participants will be able to...

- explain what a heritage breed animal is and how it preserves biodiversity
- model the transfer of nutrients throughout a farm ecosystem
- Identify three heritage breed species and their unique characteristics
- understand the role and use of animals on a farm

Materials Required

Hands-on objects to pass around during farm tour



- cow horn, wool sample, hog hair, tallow candle, drop spindle, chicken feather, map denoting where our heritage breeds came from

Game supplies

- 150 green bean bags (or cardboard pieces, tennis balls, osage oranges, etc) to represent grass
- 90 brown bean bags (or pinecones, dark colored stones, etc) to represent manure
- Step-in fence posts (rocks, cones, etc) and rope for three 20' x 20' areas
- Cow hats and straw hats (optional but fun!)
- Tote bags for cow stomachs
- Cow bell or timer
- Storage bins

Procedure

Create 3 separate “pastures” 20' x 20' each. Spread out of the green bean bags in each pasture. Evenly distribute all of the brown bean bags in the tote bags. Place bins outside of pastures as a bean bag receptacle when resetting between rotations.

Activity Instructions

1. Assign roles and responsibilities to each student. A small group (ideally 2 or 3) will be farmers and the majority (ideally 4 or more) will act as American Milking Devon cows.
 - a. Farmers: collectively decide when to rotate to the next pasture by ringing the cowbell.
 - b. Cows: “eat” the green bean bags by collecting them in their tote bag or stomachs and “poop” out the brown bean bags by dropping them on the ground.
2. Discuss the object of the game. Keeping the cows happy and healthy keeps the farmer and the soil happy and healthy as well. Cows need plenty of grass, plenty of room to roam, and stay physically healthy. This is not a race, it's about keeping a good balance of grass and manure. If the farmer allows the cows to eat and poop too much, the pasture does not grow back and the cows do not have a reliable food source. If the cows do not eat enough, the farmer will not yield enough milk or quality meat and will have to spend more money on additional feed.
3. Discuss the rules of the game and run simulation. As the cows pick up 3 grass bean bags, they will say “moo” and drop 1 manure bean bag. The farmers will ring the bell to signal a pasture



rotation when the ideal ratio is reached at 40% poop and 60% grass. The cows will move to repeat the round in the next pasture until all of the pastures are grazed.

4. At the end of each rotation, count the brown bean bags to see how each round turned out.
 - a. Track each round to see the improvement. You can even make it a group challenge!
 - b. To extend the length of the activity, each student can get a chance to play each role.
5. Collect all supplies and place in bins.

Discussion Questions

- How happy are the cows? How does the cow's health affect the farmer?
- What do you think would happen if a cow was confined to the same pasture for an extended period of time?
- How would farmers feed their cows if they do not have enough grass?
- How would a farmer keep their cows healthy if there is too much manure in the pasture? Where would all of that manure go when it rains?
- What was the most challenging part of being a farmer? What advice would you give for future farmers?

Background Information

Heritage Breeds and Biodiversity at the Accokeek Foundation

While many people have become aware of endangered species in the wild, such as sea turtles or spotted owls, very few realize that domesticated livestock species are also threatened. The Accokeek Foundation is countering this narrowing of the agricultural genetic base through its Heritage Breed Livestock Conservation program. We demonstrate to 25,000 visitors each year – from the Washington, D.C. area and around the world – the importance of agrobiodiversity.

It is easy to appreciate the beauty of farm animals without realizing their important role in farming systems. Over the centuries, domesticated animals have lived at what is now Piscataway Park and have contributed to the shaping of this land as we see it today. As part of our mission, we are preserving heritage breeds of domesticated animals. Many of these breeds are known for characteristics such as strong feet, good maternal instincts, the ability to survive on poor quality forages and in harsh conditions, and overall hardiness. All the breeds found at the Accokeek Foundation are listed as critically endangered on the Livestock Conservancy's conservation priorities list. For both livestock and poultry, this means there are fewer than 2000 animals of this breed worldwide; fewer than 200 registered in the U.S.



Much of the loss of genetic diversity in farm animals is related to their commercial use. Current industrial agriculture prefers breeds with high yields, with consistent quality meat. These high yield animals frequently require intensive management, supplemental feed, and extra veterinary care to reach their maximum level of productivity. The use of a select few breeds and individual bloodlines which perform well with this management style results in the loss of genetic biodiversity in breeding stocks, leaving animals increasingly vulnerable to pathogens and environmental changes. The effects of this selective agricultural breeding are startling.

- ✧ “Large white turkeys... account for over 90% of the commercial market.. but their selection for a tremendous width of breast and shorter legs has left them without the ability to mate naturally.”¹
- ✧ “More than 90% of the three billion eggs sold in the United States each year come from one kind of chicken. In fact, virtually all commercial egg-laying chickens in the United States come from just nine hatchery sources.”²
- ✧ Holstein cattle produce 95% of the milk consumed in the United States, yet they can only survive as healthy dairy animals for two years. Eighty-percent of Holstein cows are bred to 20 sires or their sons.³
- ✧ Three breeds of pigs make up 75% of the piglets born annually. Of the 15 breeds of swine raised in the United States fifty years ago, 8 are now extinct.⁴
- ✧ 60% of the lambs born each year come from four breeds of sheep.
- ✧ Keith Hammond, of the United Nations Food and Agriculture Organization, notes that “worldwide, at least 1500 of the roughly 5000 domesticated livestock breeds are now rare – represented by less than 20 breeding males on the planet, or 1000 breeding females” Five percent of highly endangered livestock breeds disappear annually, which averages more than one each week.⁵
- ✧ Experts predict a 45% loss in North American livestock species in the coming decades, and nearly half the known breeds of livestock in the United States and Canada are listed by the American Livestock Breeds Conservancy as declining or rare.

1. ALBC News, Jan/Feb 1998. 2. [Rainforest in Your Kitchen](#), Martin Teitel. 3. New England Heritage Breeds Conservancy. 4. Science News Online, 10/4/97. Science News Online, 10/4/97.

The Accokeek Foundation raises Black Turkeys, Milking Devon Cattle, Dominique Chickens, Hog Island Sheep, and Ossabaw Hogs. Each of these animal breeds carries traits which made them valuable in agriculture at one time. Their genetic heritage could also be used to diversify commercial livestock, should environmental or market circumstances demand it.

Black Turkeys

Turkeys were a valuable pest control tool for colonial farmers, particularly for tobacco farmers. “This function has been so thoroughly supplanted by chemical controls that the turkey’s contribution to one of the most important agricultural products of the region is now wholly forgotten (Christman and Hawes, 1999). Washington and Jefferson refer to the use of turkeys for pest control in their writings, as does James Fenimore Cooper. According to Christman and Hawes (1999) “the greatest problem facing the industry.. may be the narrow genetic foundation of industrial turkey.”



Milking Devon Cattle

The first North American Devon cattle arrived with the Pilgrims in 1623, and spread as far as Florida and Oregon by the 19th century. However, by 1900 they had been replaced by other breeds and were rarely found outside of New England. Devon cattle are multi-purpose animals, showing strong maternal instincts, providing quality meat and milk from foraging, and out-performing other breeds as draft animals. In the 1950s, many breeders began focusing their efforts on beef production, and by the 1970s fewer than 100 of the multi-purpose Milking Devons remained. Though they are still considered critically rare, the Milking Devon population has increased to 400 in the United States.

Dominique Chickens

Dominique chickens are known for their hardiness, ability to forage for food, and to lay eggs in marginal conditions. Originally brought to New England by early European settlers, by the middle of the 19th century, Dominiques were found throughout the Eastern United States. At one point during the 20th century, the population declined to the point that it existed only in exhibition form. Today, Dominique chickens are still considered critically rare according to the most recent survey conducted by the American Livestock Breeds Conservancy.

Hog Island Sheep

Two hundred years ago, a flock of sheep was established on Hog Island, a barrier island off the Eastern Shore of Virginia. Hog Island sheep evolved to become excellent foragers, showing excellent reproductive ability and hardiness in their harsh environment. They are one of few populations of feral sheep in the United States. In 1974, the Nature Conservancy purchased Hog Island and the sheep were moved to several private farms and museums in an effort to protect the island plant life. Several of the Accokeek Foundations' sheep have been registered as foundation stock for the breed.

Ossabaw Hog

Ossabaw hogs are descendants of Spanish pigs brought to North America over 400 years ago. They are a feral breed found on Ossabaw Island, off the coast of Georgia near Savannah. Ossabaw hogs are known for their tough, aggressive nature. As a result of adapting to food cycles on the island, the hogs developed the ability to store very large reserves of fat in order to survive at times when food was scarce. They have a mild form of diabetes associated with this trait. Though they are unlikely candidates for introduction into commercial markets, due to the high fat content of their meat, they are an excellent resource for medical researchers.

The Accokeek Foundation's Heritage Breeds Conservation Program contributes to the protection of endangered species and demonstrates their importance in sustainable agricultural systems. As the conventional wisdom surrounding food production and the environment changes, the genetic traits of these heritage animals may become extremely valuable. The loss of this genetic base could have unanticipated consequences that go beyond agricultural issues. Our Heritage Breeds Conservation Program is part of a regional network which includes similar programs at Mount Vernon, Gunston Hall, and Colonial Williamsburg, as well as small individual breeders. The Accokeek Foundation shows that biodiversity is vitally important – for environmental, economic, genetic, cultural and aesthetic reasons – through this unique program which preserves heritage breed animals.



Heritage Breeds, Rotational Grazing and Environmental Protection

At the Accokeek Foundation, we integrate animals into our natural resources management plan. In particular, the animals help us to maintain our open space and protect the environment in many ways.

- 1) Preventing erosion: A key aspect of our management plan is to feed animals a grass-based diet. Our perennial grass lands are not plowed each year, and their roots are active in the soil continuously. Therefore there is less erosion than when row crops, such as corn, are grown, removing permanent plant root structures and exposing soil to possible wind and water erosion. During the growing season, the grass can be harvested directly by grazing animals, or it can be cut as hay.
- 2) Saving fuel: Grazed grass is harvested directly by the animals, and of course, no fossil fuels are used in the process. This limits air pollution as well – one hour of lawn mowing produces the same amount of pollution as driving a car for 50 hours. Raising grain to feed the animals would require frequent use of a tractor, and purchasing large quantities of grain from elsewhere would require transportation to Accokeek. Our animals eat fresh, local grass in season!
- 3) Returning nutrients to the soil: We don't need to fertilize the areas used for grazing, since the animals fertilize the pasture as they move across the field. The problem of manure disposal is eliminated; instead, manure becomes a resource because it adds nutrients to the soil. It is not a source of pollution as it would be if the animals were held in confinement.
- 4) Protecting water resources: Animals are fenced out of the pond and away from river banks to prevent bank erosion and water pollution. Fresh water is provided by a constantly running spring trough fed by gravity.
- 5) Promoting biodiversity: Studies indicate that a richer variety of native plants is found on grazed land, when compared to land that was fertilized, burned, mowed, or left untouched. Many rare and endangered species are found at the Accokeek Foundation, and careful grazing management encourages these plants (and the animals that they attract) to flourish here.

The Accokeek Foundation's rotational grazing program began as a pilot project in 1999, and we continue to refine and expand it. We rotate our herd of Milking Devon cattle and our flock of Hog Island Sheep through a series of paddocks every few days, avoiding areas which are in need of longer periods of rest. In a continuous grazing system, animals remain in one area, which can lead to overgrazing and soil compaction. Rotational grazing prevents these problems, and has many benefits as well, including improved grass growth, even distribution of manure, fewer livestock parasite problems, increased diversity of wildlife habitat, improved soil quality and overall ecosystem health. Numerous studies indicate that grassfed meat has greater nutritional value than grainfed meat – an added benefit to health-conscious consumers.

The agricultural staff at the Accokeek Foundation cut and bale hay in several areas over the course of the summer. Most of the hay is stored for winter feed, but some is used during the warmer months, to allow pastures to rest if conditions require. This prevents overgrazing, and allows a longer grazing season



because plants can regrow at critical times. When grass is cut and baled for hay, we use less fossil fuels and fewer scarce resources than when we maintain a lawn, and we produce feed for the animals as well.

Researchers are finding that many heritage breeds possess traits which are well-suited to sustainable agriculture systems. Characteristics such as good foraging ability, strong maternal instincts, and overall hardiness, qualities which make them poor choices for tightly managed, industrial agricultural systems, make them attractive choices for diversified farms that integrate produce and livestock operations. The Hog Island sheep and Milking Devon cattle raised at the Accokeek Foundation are excellent examples of livestock breeds which could flourish in commercial rotational grazing systems.

Twelve Reasons to Protect Agrobiodiversity

(source: World Resources Institute - www.wri.org)

Agrobiodiversity has allowed humans to survive through 12,000 years of agriculture. It includes edible plants, livestock, soil organisms, ecosystems and habitats, and types of agricultural systems. The continued sustainability of agriculture depends on conservation of all kinds of resources.

Agrobiodiversity can:

1. Increase productivity, food security and economic returns
2. Reduce pressure of agriculture on fragile areas, forests and endangered species
3. Make farming systems more stable, robust and sustainable
4. Contribute to sound insect pest and disease management
5. Conserve soils and increases natural soil fertility and health
6. Contribute to sustainable increase in output from land
7. Diversify products and income opportunities
8. Reduce or spreads risks to individuals and nations
9. Help maximize effective use of resources and the environment
10. Reduce dependency on external inputs (fertilizers, herbicides, pesticides, etc.)
11. Improve human nutrition and provides sources of medicines and vitamins
12. Conserves ecosystem structure and stability of species diversity

Vocabulary

Heritage Breed

traditional livestock breeds that were raised by our forefathers. These are the breeds of a bygone era, before industrial agriculture became a mainstream practice. These breeds were carefully selected and bred over time to develop traits that made them well-adapted to the local environment and they thrived under farming practices and cultural conditions that are very different from those found in modern agriculture.

Preservation

the activity or process of keeping something valued alive, intact, or free from damage or decay



Biodiversity

biological diversity in an environment as indicated by numbers of different species of plants and animals

Nutrient/Carbon Cycle

the biogeochemical cycle by which carbon is exchanged among the biosphere, pedosphere, geosphere, hydrosphere, and atmosphere of the Earth. Along with the nitrogen cycle and the water cycle, the carbon cycle comprises a sequence of events that are key to make Earth capable of sustaining life. It describes the movement of carbon as it is recycled and reused throughout the biosphere, as well as long-term processes of carbon sequestration to and release from carbon sinks.

Adaptation

modification of an organism or its parts that makes it more fit for existence under the conditions of its environment : a heritable physical or behavioral trait that serves a specific function and improves an organism's fitness or survival

Trait

an inherited characteristic

Rotational Grazing

describes many systems of pasturing, whereby livestock are moved to portions of the pasture, called paddocks, while the other portions rest. Each paddock must provide all the needs of the livestock, such as food, water and sometimes shade and shelter. The approach often produces lower outputs than more intensive animal farming operations, but requires lower inputs, and therefore sometimes produces higher net farm income per animal.

References

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<http://www.milkingdevons.org/>

<https://nationalzoo.si.edu/animals/ossabaw-island-hog>

https://www.esrl.noaa.gov/gmd/education/carbon_toolkit/basics.html