

SMCOE Green Career Awareness

AGRISCIENCE

Solutionary Phase	Problem Cycle 1
Lesson # and title	Lesson 8: Animal management practices that are negatively impacting soil health
Duration	45 minutes

Lesson Overview
In this lesson, students will continue to expand on their knowledge of the different factors that can harm or improve soil health. Students will focus on how livestock has an impact on soil health and how ranchers can properly manage their herds to improve soil health. This lesson will lead into human impact and how it has an effect on soil health.
Learning Objectives
<ul style="list-style-type: none"> • Evaluate advantages and disadvantages to raising livestock in the agriculture industry • Investigate how to utilize livestock animals to improve soil health • Research different livestock management methods of different ranchers in the United States
Content Standard(s)
Agriculture CTE: G6.4 Research how soil biology affects the environment and natural resources. G7.0 Integrate effective tillage and soil conservation management practices. G7.1 Plan how to effectively manage and conserve soil through conventional, minimum, conservation, and no-tillage irrigation and through drainage and tillage practices.
College and Career Connection(s)

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This lesson highlights agricultural trades involved with animal management such as farmers and ranchers who grow and cultivate animals for human consumption.

Equipment, Instructional Resources, and Materials

- Student laptops (1/group of 4)
- [Lecture Slides](#)
- Paper/pen for students
- Whiteboard + markers
- Printer paper + writing materials (colored pencils, markers, etc.)
- [Ranching cattle](#) (8 min)
- [Soil Carbon Cowboys](#) - Rotational grazing + Rancher posters (12 min)

Suggested Student Grouping

Individual
Small groups of 3-4

Vocabulary

- Agriculture - The practice of growing plants for food, clothing, animal feed, and other resources humans need or desire. It also includes raising domesticated animals (livestock).
- Atmosphere - A thick layer of air that surrounds the Earth, supports life on Earth, and protects living things from the sun's harmful radiation.
- Biodiversity - Biological diversity is the variety of life in an area. Examples include the variety of individuals in a species, the variety of species in an ecosystem, and the variety of biomes or species on earth.
- Carbon - An element that is in all living things (e.g., humans, animals, and plants) and many nonliving things (i.e., rocks, soil, water, and our air/atmosphere). Atmospheric carbon is often attached to oxygen in the form of carbon dioxide.
- Carbon footprint - The amount of carbon dioxide and other greenhouse gases that a person or group of people puts into the atmosphere from their use of fossil fuels.
- Carbon sequestration - The process of capturing and storing carbon dioxide and other forms of carbon from the atmosphere. The natural process of sequestration stores carbon in soil and bodies of water. The human-designed processes using technology to capture and store carbon.

- Carbon release - The process of carbon being released from the soil. This happens naturally as soil organisms breathe (respire), and can be sped up through human activities such as tilling or plowing.
- Climate change - The global long-term change in temperature and weather patterns due to increases in atmospheric carbon dioxide, mostly due to use of fossil fuels.
- Conventional/degenerative agriculture - Industrial practices of farming which include large single-crop farms, intensive tiling and irrigation, and the use of synthetic fertilizers, pesticides, and herbicides. This way of farming is very productive, but requires high amounts of energy, adds toxins to the soil, and increases carbon release from the soil rather than carbon sequestration (capture).
- Decomposer - Any organism that breaks down dead or decaying organic matter such as dead animals, fallen trees, or leaf litter.
- Ecosystem - A place where all the living things (plants, animals, microorganisms) interact with each other and with nonliving parts of their environment (water, sun, temperature, rocks and soil).
- Erosion - When rocks, soil, or other landforms are gradually worn down by ice, water, or wind.
- Fertilizers - Any substance, natural or man-made, added to soil to increase the level of nutrients it contains and speed up plant growth.
- Greenhouse effect - The natural process of the Earth's atmosphere trapping heat from the sun. Human use of fossil fuels has increased the amount of carbon in the atmosphere, leading to more of the sun's heat being trapped (global warming).
- Herbicides - Chemicals used to kill unwanted plants. Also known as weedkillers
- Microorganism - A living thing such as bacteria or fungi that is too small to be seen without the use of a microscope or other magnification.
- Macro-organism - A living thing that can be seen by the naked eye.
- Monoculture - The practice of growing or producing only one crop, species, or animal in the same place at the same time.
- Pesticides - Chemicals used to kill unwanted organisms such as insects, rodents, plants, or fungi.
- Photosynthesis - The process by which plants use the sun's energy to create carbon-based sugars from carbon dioxide and water.
- Polyculture - The practice of growing or producing multiple crops, species, or animals in the same place at the same time.
- Regenerative agriculture - Farming and grazing practices that focus on restoring soil health and biodiversity, and sequestering (capturing) carbon in the soil.
- Soil - The material on the surface of the Earth in which plants grow. It is a mixture of eroded rocks, minerals, and organic matter. It holds water and air, provides nutrients and structural support to plants, and supports a diverse ecosystem of living micro- and macro-organisms.

The Lesson

Preparation

1. Warm-up - Have students start the lesson through a think/pair/share activity. Instruct the students to answer the following:
 - a. Create a list of advantages and disadvantages of using livestock in agriculture.
2. Have students share their ideas aloud with the class (answers on slide 3). Take the opportunity to expand/clarify any of the students' responses
3. Go through the lecture slides 4-5
4. Use the hyperlink in slide 6 of the lecture, this will redirect you to a youtube video from Kiss the Ground to look at the impacts of livestock on soil health
 - a. Have students watch the video - A Regenerative Secret. Have students list as many advantages to regenerative agriculture/improving soil health as they can find in the video.
 - b. When finished, have the students count how many each have and share aloud with the class. Write the students' responses/examples on the board for everybody to see. (finished list of advantages are located on slide 7)
 - c. The students with the most correct advantages win a candy prize!
5. Review graphic organizers on slide 8
6. Use the hyperlink in slide 9 of the lecture, this will redirect you to a youtube video from Carbon Cowboys to look at ranchers who use livestock to improve soil health
 - a. Have students answer the following questions while watching the Soil Carbon Cowboys video
 - i. What animal did the Carbon Cowboys try to mimic when they managed their cattle? Why?
 - ii. What happened to the grass on the ranches that were using rotational grazing practices?
 - iii. The Carbon Cowboys were able to improve their soil health by adding what to their soils?
7. Carbon Cowboys Paddocks - Infographic (slide 10)
 - a. Place students in groups (3-4) and have them select a Soil Carbon Cowboy from the provided list on the website (9 in total). Show students where on the website and which videos they can choose from. Note - Students should NOT choose the "Soil Carbon Cowboys" video (otherwise they will watch the same video twice).
 - b. In their groups, students will watch their "cowboy video" and create an informational poster on their specific rancher and what they do. If time, groups will present their poster to the class.
 - c. The infographic should include:
 - i. Video Name (ex - Herd Impact)
 - ii. Name of Rancher
 - iii. Location of regenerative ranch
 - iv. 2-4 sentences explaining how this rancher SPECIFICALLY uses regenerative practices on their ranch
 - v. Relevant picture (printed or drawn)
8. Have students submit their Carbon Cowboys infographic as assessment

Lesson Procedure		
Link to Lesson Slide Deck: https://docs.google.com/presentation/d/1EpF2kNixC3r-K66W-hmWeaqPGnuhEHMZbDqjzoWq38c/edit?usp=sharing		
Activity/Task	Description	Time (min)
Warm-up	Have students start the lesson through a think/pair/share activity. Instruct the students to answer questions on slides.	5
Lecture	Read through lecture slides 4-5	5
Video - A Regenerative Secret	Use the hyperlink in slide 6 of the lecture, this will redirect you to a youtube video from Kiss the Ground (A Regenerative Secret) to look at the impacts of livestock on soil health	10-15
Video - Carbon Cowboys	Use the hyperlink in slide 9 of the lecture, this will redirect you to a youtube video from Carbon Cowboys to look at ranchers who use livestock to improve soil health	15-20
Carbon Cowboys Paddocks - Infographic	Place students in groups (3-4) and have them select a Soil Carbon Cowboy from the provided list on the website and create an infographic on their rancher methods	30

Assessment
Have students submit their Carbon Cowboys infographic as assessment → may need to be finished as homework