

Things you can Learn from a COW and a WORM

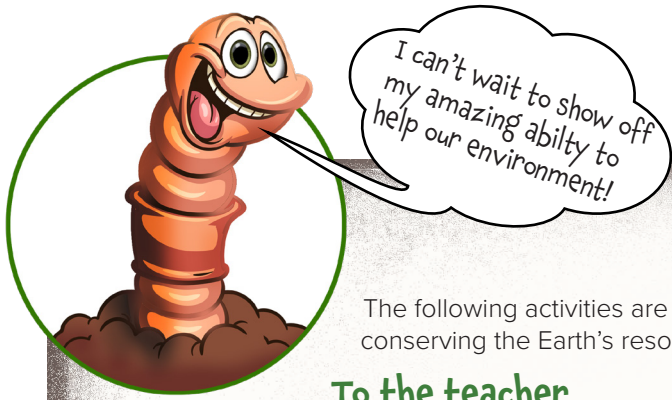


Just what is it we observe, of how these species do conserve; precious resources up above, and underneath the earth, we love.

Recycling things that we can't use, these worms and cattle, give us clues; so let's admire these earth dwellers, which live on land, and in its cellars!



Introduction



The following activities are designed to encourage students to emulate nature's models for conserving the Earth's resources.

To the teacher

Students learn how to better conserve precious resources by identifying natural animal abilities and behaviors and applying the concepts to their own lives.

Cattle and earthworms were chosen for this lesson because nature provided them with unique capabilities that allow them to use resources efficiently. Earthworms, for example, are crucial to the decomposition process, because they help to return to the soil those nutrients necessary for new plant growth.

As ruminants, cattle turn grass and other forages — containing cellulose, which is inedible by humans and many other animals — into high quality food for humans, making use of vast resources that would otherwise go underused. For food production they also efficiently utilize otherwise unusable byproducts from human food processing and play a key role as “energy converters and nutrient reservoirs” in food systems around the world.

The *Things We Can Learn from A Cow and a Worm* activity booklet highlights these two animals and encourages students to think critically about the interaction between each animal and its environment. The classroom activities challenge the students to consider good environmental stewardship in their daily lives. The following Lesson plan encapsulates a series of short activities that may be presented as a single extended lesson or as a series of short lessons within a unit on the environment or ecosystems.

Objectives



Students will examine natural models that support conservation of resources.

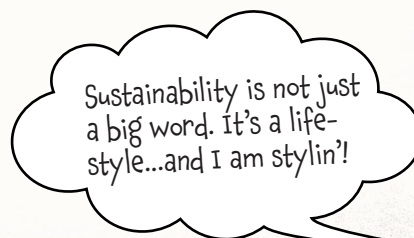


Students will extend conservation practices to their own lives.

Introducing the cover of the booklet.

Engage students in a discussion through this riddle: *What do cattle and earthworms have in common?*

Answer: they are both models for conservation. Display the cover and have the students discuss what cattle eat. Encourage them to use information from the poster as well as prior knowledge. Record their responses on the board.



Name _____

Ruminants recycle and conserve.

Cattle and other ruminants are nature's models for food and energy conservation. Ruminants have unique stomachs with four compartments that allow them to eat products that other animals find inedible.

Directions

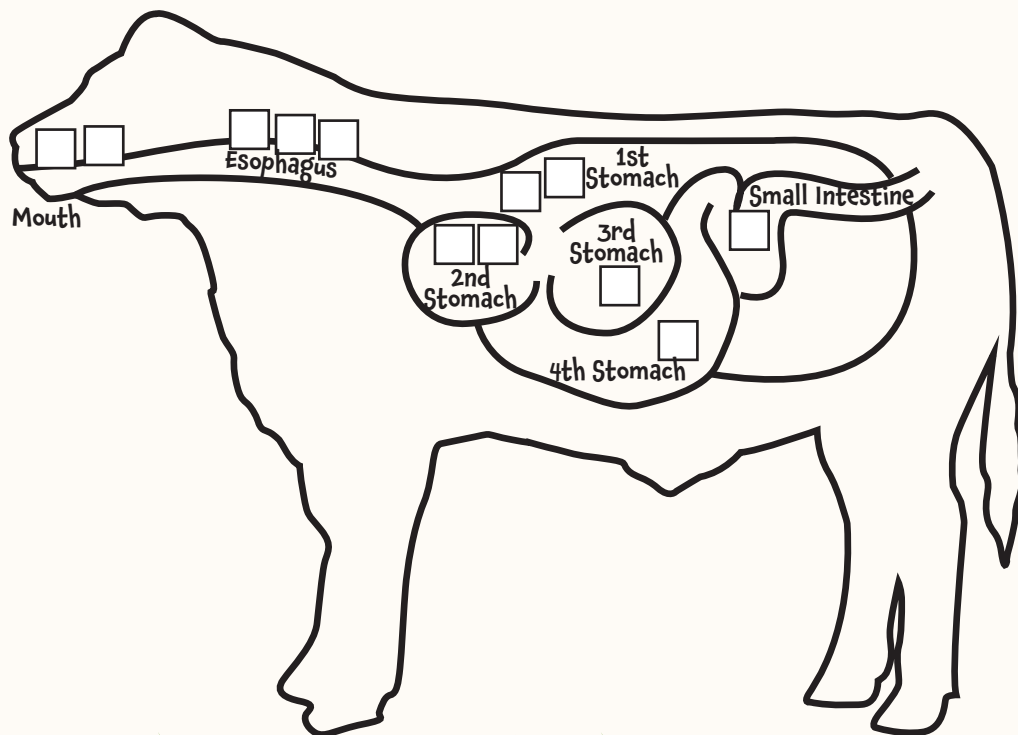
Read the information below and follow the path of food as it moves through the ruminant stomach by writing the step numbers in the boxes on the diagram below. Some of the numbers will be used more than once.

Ruminant stomach

1. Teeth tear and chew food in mouth.
2. Food travels down esophagus.
3. Cud (swallowed food) moves and softens in stomach compartments 1 and 2
4. Cud returns to mouth for more chewing by rear molars.
5. Cud passes through stomachs compartments 1, 2, 3 and 4. It is digested and nutrients are absorbed.
6. Waste materials passed through intestines and exit body as manure.

Find out

1. What other animals are ruminants?



Directions.

Examine the information on this page and underline or highlight information that is new to you.

The US has a total land area of 2.3 billion acres, roughly 1/3 (29%; 655 million acres) is considered grasslands pasture and rangelands used for grazing because it is too steep, too rugged, too dry (arid), or too wet for crop cultivation. Grass from these lands contains cellulose which is indigestible by humans. As ruminants, cattle can eat grasses and convert them to beef and dairy products that humans can eat.

Cattle producers are responsible for managing cattle and land in ways that will protect the environment. This is in the producer's best interests, since caring for the land will allow the land to care for the cattle on which they depend.

93% of a beef animal's lifetime diet consists largely of feed that is inedible to humans. Many beef cattle go from grazing lands to feedlots. There they are fed roughage and cattle feed (concentrates mostly grains only suitable for animal feed) for about 100 days. Feedlots help keep supplies of beef constant, making beef available year round and keeping prices stable.

Cattle producers also use their animals as upcyclers by feeding them foodprocessing byproducts that would otherwise be shipped to landfills. More than half of byproducts of fruit, vegetable, and grain processing goes into livestock feed.

Foods from cattle provide high quality protein, calcium, and vitamins such as iron, zinc, and B vitamins that humans need to maintain a healthy diet. Equally important are other products from cattle that humans use every day.

Processing Information

Explain in your own words how cattle are nature's model for environmental conservation.

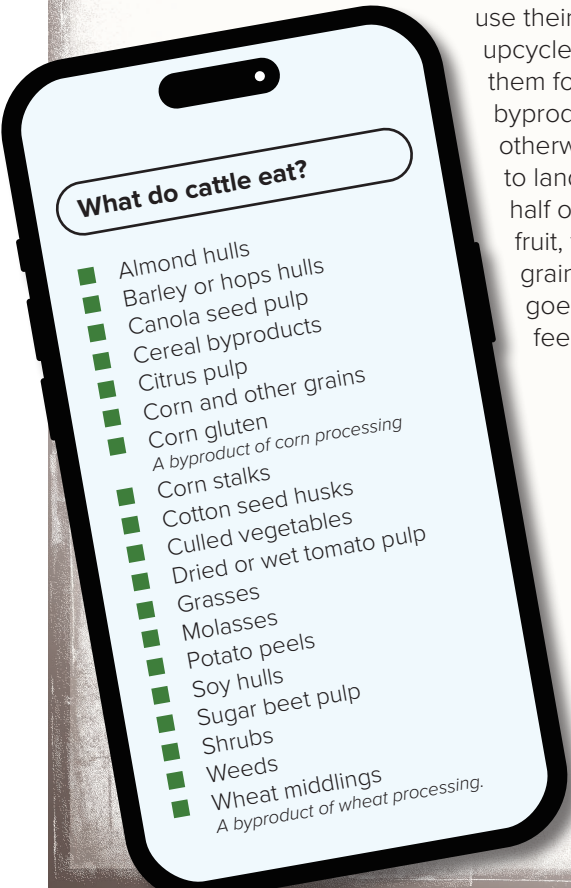
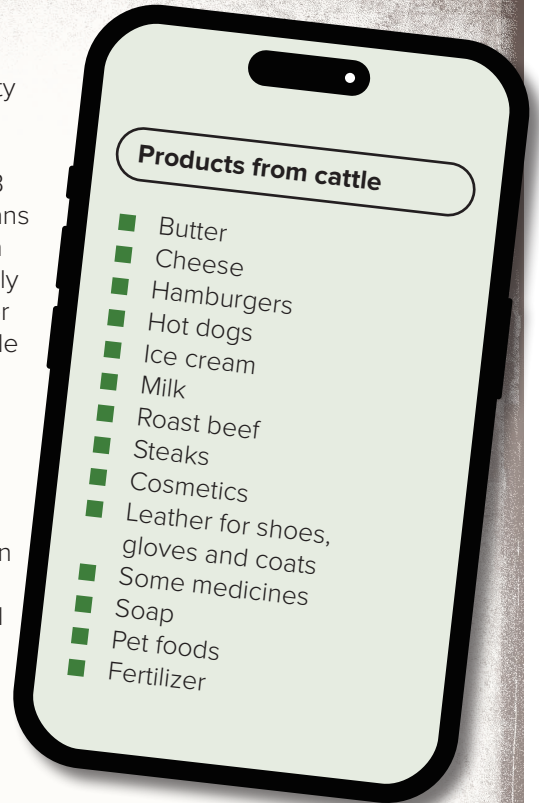
Application

List items you can conserve on the back of this sheet. Place a check next to those you currently conserve or recycle. Circle those items you plan to start conserving. Write an explanation next to the things you don't plan to reuse, recycle or reduce.

Find Out

1. What other ruminants are nature's model for conservation?

2. Explain why you listed the animals you did for number 1.



Activity Sheet **Three** Composting as Recycling

Directions

Read the information below and then fill in the section at the bottom of the page.

Composting is a fairly modern practice that speeds up and intensifies the very natural process of decomposition. Decomposition has been happening, unaided by people, since the world began. Through decomposition, things made of organic matter are broken down through a chemical process into simpler compounds and elements. Composting spurs some of nature's recyclers into action and hurries the decomposition process.

Microorganisms are too small for the human eye to see. Bacteria and fungi are microorganisms. They digest garbage like food scraps, industrial waste, leaves and grass clippings. They release 99% of all the carbon dioxide necessary for plant growth.

Macroorganisms also contribute to decomposition. Earthworms, mites, grubs, and insects are macroorganisms that dig, chew, digest, and mix materials. When they chew a leaf, for example, they increase the surface area so that bacteria and fungi can increase the decomposition process.

Earthworms eat almost anything soft enough to chew. They also eat bacteria, which is very nutritious — 60% protein and no fat! As organic matter passes through the earthworms body, it is ground up by tiny stones in the gizzard, and leaves the body as waste in the form of dark gold castings which contain partially digestive material that enriches the soil. Each day, an earthworm produces its weight in castings. That's a lot of recycling!

When microorganisms and macroorganisms decay their decomposing bodies add nitrogen and other elements to the soil. Decomposed refuse, or compost, enriches soil. It returns nutrients necessary for new plant growth to the soil. If it weren't for the work of microorganisms and macroorganisms, our earth would be one major garbage dump with no chance of survival. These tiny creatures model recycling by turning garbage into nutrients to enrich the soil.

Application

Composting isn't for everyone, but everyone can use less, or reduce their demand for resources. Make a list of practices you are willing to change to use less of the Earth's resources.

Find Out

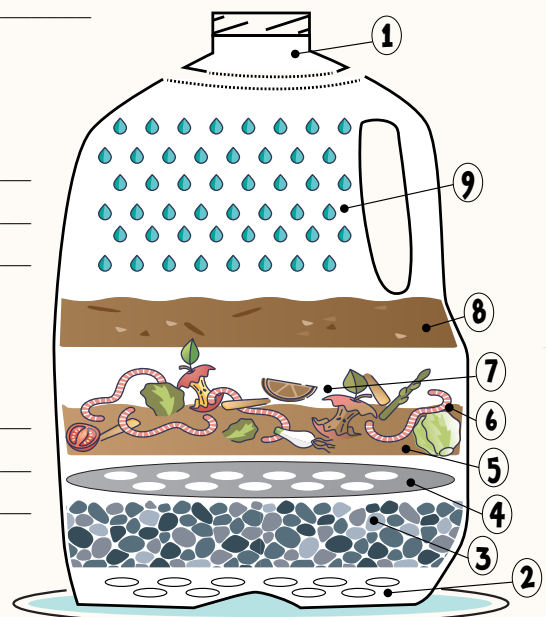
1. How can you tell a male earthworm from a female earthworm?

2. What conditions hasten decomposition?

3. What conditions hinder decomposition?

How to construct a mini compost bin

1. Cut the top from a clean, clear plastic gallon jug.
2. Poke holes for drainage in the bottom of the jug. Make sure you have a dish to put under the jug to collect excess water.
3. Add 1 inch of gravel for drainage.
4. Poke holes in a plastic lid or plate and place over gravel.
5. Create a bedding mixture of peat moss, grass clippings, vacuum cleaner bag debris, dryer lint, etc., and put on top of the lid.
6. Add a few earthworms.
7. Chop food scraps and sprinkle on top.
8. Cover with more bedding material.
9. Sprinkle with water. Don't soak!
10. Stir and observe daily. Record what you see in a daily log. Sprinkle with water as needed.



Directions

Write a short answer for each of the following:

1. How are cattle models of recycling and conservation?

2. Name an animal that is a ruminant.

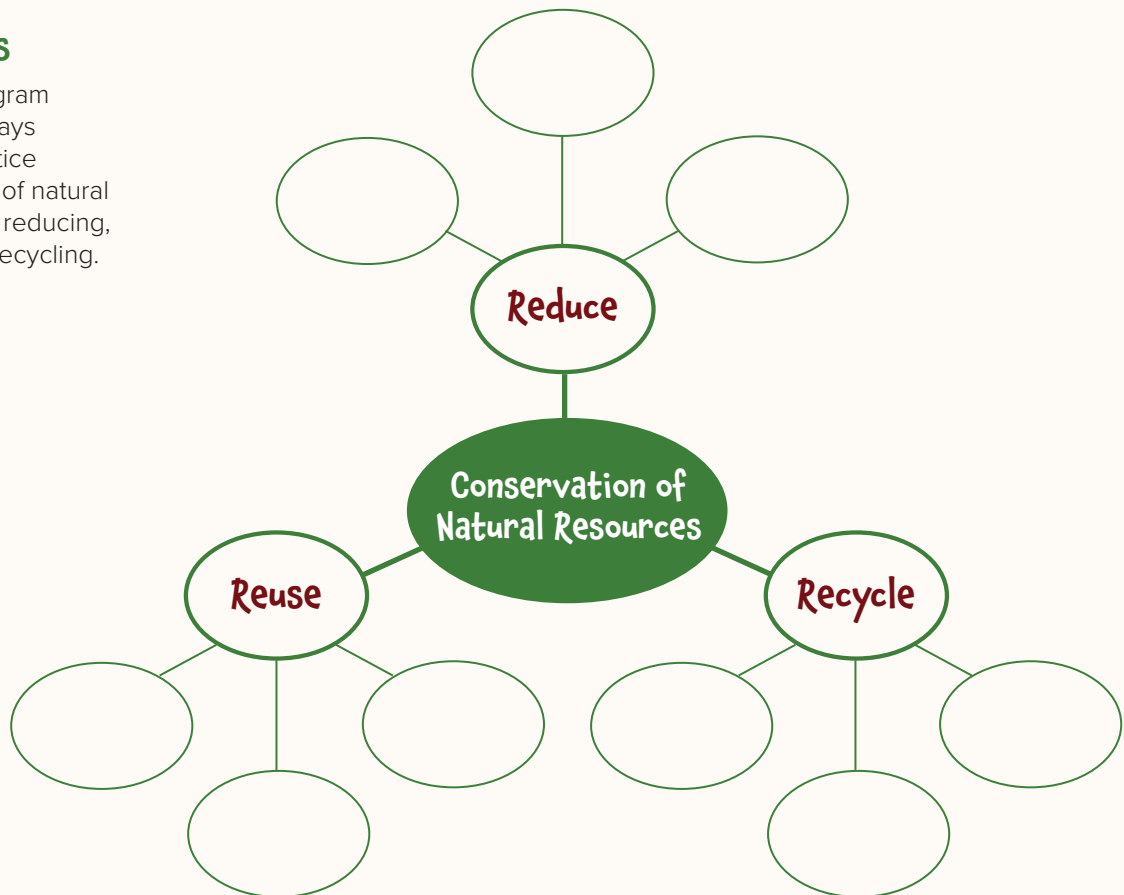
3. What is another name for a microorganism?

4. What animal is a macroorganism?

5. Explain how microorganisms and macroorganisms work together.

Directions

Fill in the diagram below with ways you can practice conservation of natural resources by reducing, reusing and recycling.



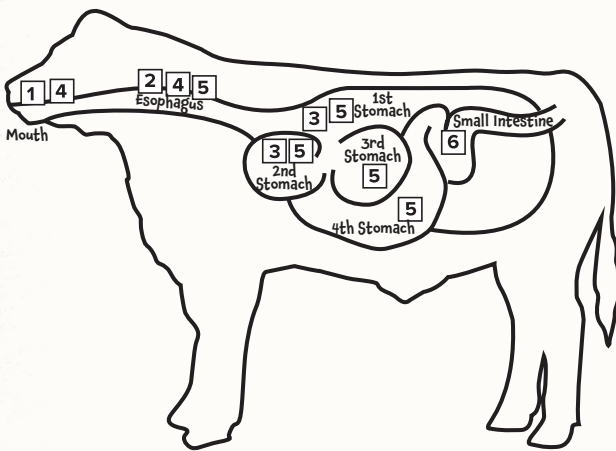
Activity Sheet Instructions

Using Activity Sheet One

Duplicate and distribute activity sheet. Allow students to work in pairs to process the information on this worksheet. Allow groups to report on their findings at the end of the lesson or at the beginning of the next lesson.

Answers for Activity Sheet One

Students should fill in the boxes with the appropriate numbers (1-6) that correspond with the numbered steps above the diagram.



Find Out

1. Sheep, oxen, llama, deer, goats, giraffes., and camels are also ruminants -- Animals with split hooves and four stomach compartments.

Using Activity Sheet Two

Duplicate and distribute activity sheet two. Compare the list of food sources for cattle with the recorded list. Allow students to work in pairs or cooperative groups to process the information on this worksheet. Allow groups to report on their findings at the end of the lesson or the beginning of the next lesson. Encourage students to put into practice their application ideas for conserving and recycling.

Answers for Activity Sheet Two

Processing information

Answers will vary. Student response should indicate the products inedible to humans are recycled into beef, milk and byproducts, with manure used as a natural fertilizer to support growth of future feeds and foods.

Application

Answers will vary. Student response. Should include those products commonly recycled in your community. Creative conservation suggestions should be encouraged.

Find Out

Answers will vary. Accept responses that are supported with reasonable explanations.

Activity Sheet Instructions

Using Activity Sheet Three

Remind students of opening riddle. Duplicate and distribute activity sheet three. Allow students to read the material silently and highlight or underline new information. Discuss the part microorganisms and macroorganisms play in decomposition. Challenge students to describe a world without decomposition. Compare earthworms and cattle as models of conservation. Challenge interested individuals to construct a mini compost bin and report their observations. Encourage students to report on ways they can reduce or use fewer resources.

Answers for Activity Sheet Three

Application

Answers will vary. Student responses may include turning off water while brushing teeth, walking instead of driving short distances, planning errands to cut down on gasoline, use, carpooling, using both sides of paper, etc.

Find Out

1. Each earthworm contains both female and male reproductive systems, but fertilization still takes two.
2. Bacteria and other microorganisms need air and moisture to survive. They multiply in a dark, warm, moist environment. Decomposers work best at a temperature of 50° to 113°F or 10° to 45°C. As decomposition progresses, temperatures may increase to 158°F or 70°C.
3. Temperatures below 50°F and above 158°F hinder decomposition, as do dryness and bright light.

Using Activity Sheet Four

Duplicate and distribute activity sheet four. Remind students of reduce, reuse and upcycle. Challenge students to work together in pairs or cooperative groups to add to the list of nature' models for reusing, reducing or recycling. Allow groups to report their findings as you construct a classroom list on chart paper. Encourage students who have listed positive applications for reusing resources.

Answers for Activity Sheet Four

Answers may vary. Accept responses supported by reasonable explanation.

Application

Answers may vary.

Activity Sheet Instructions

Using Activity Sheet Five

This worksheet allows students to demonstrate their understanding of vocabulary and concepts contained in the worksheets and in the class discussion period. Use as both a pre-test and post-test, if desired.

Answers for Activity Sheet Five

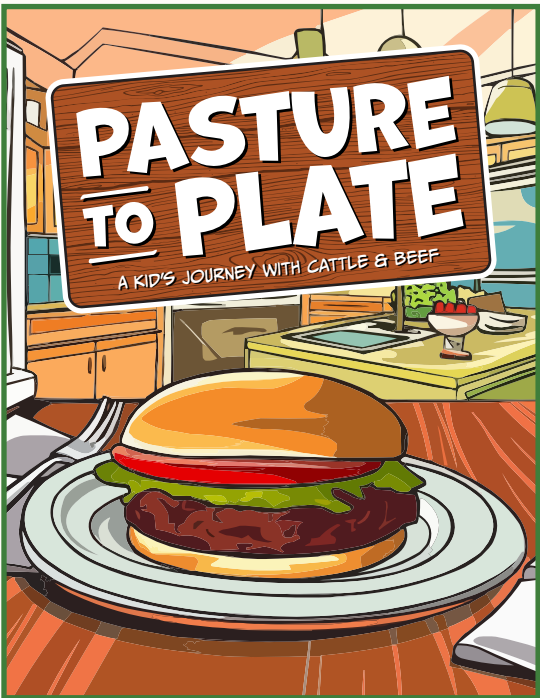
1. They consume inedible byproducts and produce things humans can use, such as beef, milk and other products.
2. Cattle, llama, sheep, goats, giraffes, oxen and camels are classified as ruminants.
3. Bacteria or fungi.
4. Earthworms, mites, grubs, and insects are macroorganisms.
5. Bacteria and other microorganisms digest garbage that has been shredded by worms and other macroorganisms. Earthworms also eat bacteria and produce fertile castings which enrich the soil.

Other Resources



Pasture to Plate A Kid's Journey with Cattle & Beef

Order from BeefStore.org.
Sold in quantities of 100.



Beef Learning Resources

agfoundation.org/resources/search?search=Beef





ILLINOIS

BEEF

Funded by Beef Farmers and Ranchers

IllinoisBeef.com