New Jersey Agriculture in the Classroom

Sun to Moo to You

OVERVIEW: Students investigate the transfer of energy in the process of making milk.

OBJECTIVES: The student will be able to:

Define kinetic energy
Describe the process of milk production
Explain how kinetic energy is used by cows in producing milk

GRADES: 3-5

MATERIALS:
The Journey of Milk video, available to download at *njagclassroom.org*, under Teacher Resources, Animal Agriculture, Dairy.
Glass of hay
Bouncing ball such as a basketball or kickball, 1 per group
Using Energy activity sheet, 1 per student
Using Energy Activity Sheet Answer Key

VOCABULARY:
Energy: power derived from the utilization of physical or chemical resources

Kinetic energy: the energy of motion

Photosynthesis: the process by which plants convert carbon dioxide, water, and light energy into sugars and oxygen in order to store energy; the opposite of cell respiration

PROCEDURE:
Ask the students to think of their favorite sport. How would they feel if they played in the championship game of this sport and had not had anything to eat? Pair students up and have them share their responses with their partner.

Survey the class for different responses. How many said tired, sick, or grumpy? Brainstorm with the students why they might feel tired. Ask how they would feel if, after the game, you offered them a nice, cold glass of… hay?!

Show the students a glass full of hay or grass. Explain that dairy cows convert the feed they eat into the milk we consume on a daily basis. Energy plays an important role in this process. Explain to students what kinetic energy is and how it can be used or absorbed..

Show the students *The Journey of Milk*, a video about the process of making milk. Instruct the students to look for ways dairy cows use and consume energy at each step of production.

Discuss the video with the students and work as a class to construct a production timeline on the board. Explain that in each of these steps, energy transfers. Tell students in a moment, they will go outside to see how energy moves between objects and people.

Take the students outside. Organize the students into groups of four and provide each group with a bouncing ball. Instruct the students to pass the ball between their group members in a variety of patterns. The teacher determines the patterns and may wish to blow a whistle to get the students' attention in changing patterns. Possible pattern ideas include bounce pass, chest pass, skipping every other person, increasing the number of bounces with each pass, passing the ball clockwise vs. counter-clockwise, etc.

Take the students inside the classroom to debrief the activity. Ideas for discussion:

- Use student volunteers to demonstrate how we use kinetic energy to pass the ball.
- Use student volunteers to demonstrate how we absorb kinetic energy when we catch the ball.
- What happens to energy when the ball bounces?
- What happens to the ball when it is windy outside?
- What happens if you bounce a ball on grass? A basketball court?

Explain that just as we used energy to pass the ball, we use energy to do many other things in our daily lives as well. Distribute the *Using Energy* activity sheet. Instruct the students to first identify and label ways our bodies use energy.

Next, they will identify and label how dairy cows use energy. Focus on the energy dairy cows use to create milk. Remind students that plants use energy from the sun for photosynthesis, to make food. Have the partners share with entire class.

Briefly, review the timeline created at the beginning of the lesson and review how energy moves between each step of the process.

EVALUATION:

Students write a paragraph explaining where the energy comes from and where it goes when cows create milk.

NEW JERSEY LEARNING STANDARDS

New Jersey Learning Standards:

Science 4-PS3-2 5-PS3-1

Language Arts 3- LS4-1 3-LS4-2 3-LS4-3 3-LS4-4 4- PS3-1

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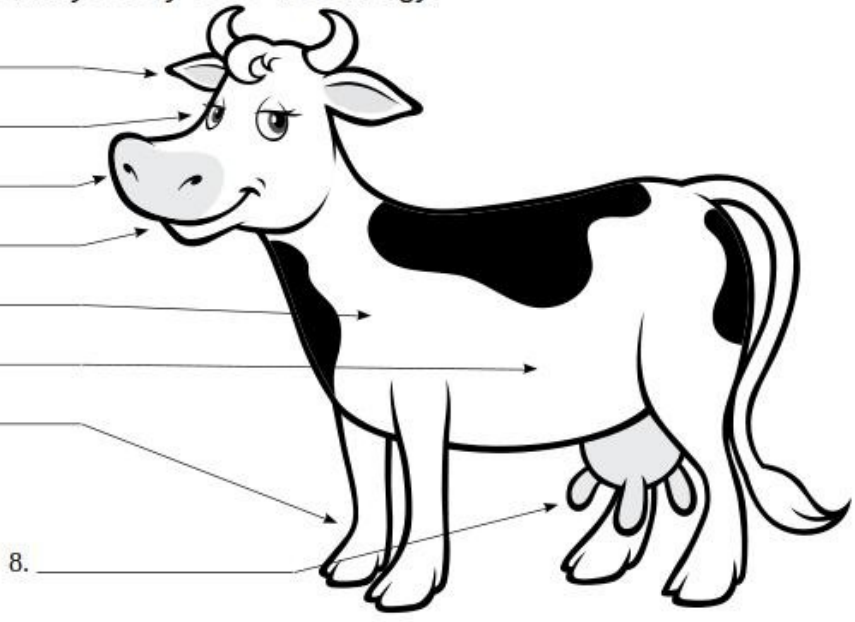
Using Energy

1. Identify and label ways our bodies use energy.

2. Identify and label ways dairy cows use energy.



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Using Energy Answer Sheet

1. Identify and label ways our bodies use energy.

2. Identify and label ways dairy cows use energy.