



# Lesson 3: Dairy and the Environment

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## “Goin’ Round and Round”

### Standards:

These lesson tools meet the following Common CORE and PA educational standards.

#### Grade 3:

Common Core — CCSS.ELA-LITERACY.RF.3.3, CCSS.ELA-LITERACY.RI.3.4, CCSS.ELA-LITERACY.L.3.4, CCSS.ELA-LITERACY.RI.3.7, CCSS.ELA-LITERACY.RF.3.3, CCSS.ELA-LITERACY.RF.3.4, CCSS.ELA-LITERACY.SL.3.1, CCSS.ELA-LITERACY.SL.3.6, CCSS.MATH.CONTENT.MD.3.3, PA Standards — Math: 2.3.3, 2.4.3, 2.5.3, 2.6.3, 2.7.3, Reading: 1.1.3, 1.2.3, 1.3.3, 1.6.3

#### Grade 4:

Common Core: CCSS.ELA-LITERACY.RI.4.4, CCSS.ELA-LITERACY.RF.4.3, CCSS.ELA-LITERACY.L.4.4, CCSS.ELA-LITERACY.SL.4.1, CCSS.ELA-LITERACY.4-ESS3-1, PA Standards — Math (Anchors: M4.E.1, M4.E.2), Reading Assessment Anchors: R4.A.1.1, R4.A.1.2, R4.A.1.3, R4.A.1.4, R4.A.1.6, R4.A.2.1, R4.A.2.2, R4.A.2.3, R4.A.2.4, R4.A.2.5, R4.A.2.6, R4.B.3, Science: 3.1.4, 3.2.4, 3.4.4, 3.6.4, 3.7.4, 3.8.4, 4.1.4, 4.2.4, 4.3.4, 4.4.4, 4.8.4, Anchors: S4.A.1.1, S4.A.1.3, S4.A.2.1, S4.A.3.1, S4.A.3.2, S4.A.3.3, S4.B.3.3, S4.C.2.1, S4.D.1.2

#### Grade 5:

Common Core: CCSS.ELA-LITERACY.L.5.4, CCSS.ELA-LITERACY.RL.5.4, CCSS.ELA-LITERACY.RI.5.4, CCSS.ELA-LITERACY.RI.5.10, CCSS.ELA-LITERACY.RF.5.4, CCSS.ELA-LITERACY.RI.5.1, CCSS.ELA-LITERACY.RI.5.3, CCSS.ELA-LITERACY.SL.5.1, ESS3-1, PA Standards: Math: 2.5.5, 2.6.5, 2.7.5, Reading: 1.1.5, 1.2.5, 1.3.5, 1.6.5

### Objectives:

- Students will describe the role that dairy farmers play in protecting our environment.
- Students will identify two things dairy farmers recycle on the farm.
- Students will explain the connection between the farmer, the consumer and the environment.

**Approximate Lesson Length:** 40 minutes (without additional classroom activity on page 3)

### Materials Needed:

- A copy of the “Goin’ Round & Round” worksheets for each student
- A copy of the “Goin’ Round & Round” guided reading pamphlets for each student
- “Discover Dairy . . . in Our Environment” video (available for download or streaming on [www.discoverdairy.com](http://www.discoverdairy.com)) and projection device for showing it to the class
- A copy of the “Goin’ Round & Round” overhead on Page 5
- Overhead projector or white board for iPad app
- Pencil or pen for each student
- For higher learning activity:
  - ⇒ One brown paper bag for each student
  - ⇒ Sixteen marbles for every 12 students

### Lesson Components:

Component	Time	Component	Time
Video Motivator & Discussion	10 min.	Classroom Lesson & Instruction	10 min.
Guided Reading &	10 min.	Classroom Worksheet &	10 min.
Additional Marble Activity	30 min	(Hands-on group exercise idea)	

### Motivator:

Introduce the “Discover Dairy . . . in Our Environment” video. Explain to students that in the video, they will see how dairy farmers play a significant role in the environment by protecting our water, air and soil quality. Write the following questions on the chalkboard or overhead. Ask students to listen for answers while watching the video, and encourage them to write down the answers on a piece of paper as they hear them.

- Why is it important for farmers to take care of the environment? (Because they live and work in it.)
- Name two things that dairy farmers recycle. (manure and water)
- Name government agency that regulates the environment. (Environmental Protection Agency)
- What can cow manure be made into? (fertilizer for soil, electricity)

### Video:

Show the “Discover Dairy . . . and The Environment” video and then summarize it with the class. Review the questions above.



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## Enrichment:

Choose a selection from the children's literature book list online at [www.discoverdairy.com](http://www.discoverdairy.com) or visit [www.operation-dairy.com](http://www.operation-dairy.com) to play an interactive game about the dairy farm. Adopt A Cow for a year-long dairy discovery!

## Lesson:

Ask students why protecting the environment is important to us? (*Answers may vary — so that plants can grow, so that we have enough clean water to drink, so that we have clean air to breathe, so that we have enough food to eat, etc.*) Tell the class that our food, water and air supply all are dependent on the environment.

Ask students whose job it is to take care of our environment. (*Entertain answers.*) Tell the class that everyone plays a role in protecting the environment — from business professionals commuting to their jobs, to factory owners, to farm owners like dairy farmers, to each and every person in the class. Ask what happens if we don't take care of the environment.

Explain to students that they will learn about the role that agriculture operations like the dairy farm play in taking care of our environment. The farmer is one of many individuals who must take responsibility for using environmentally friendly practices in his/her businesses to protect the environment. We all must do our part to protect the environment for future generations.

## Classroom Activity:

Create an overhead or use the Ipad app graphic of the illustrations on page 5 of this lesson and use it to take students through the process of how nutrients are recycled on the farm:

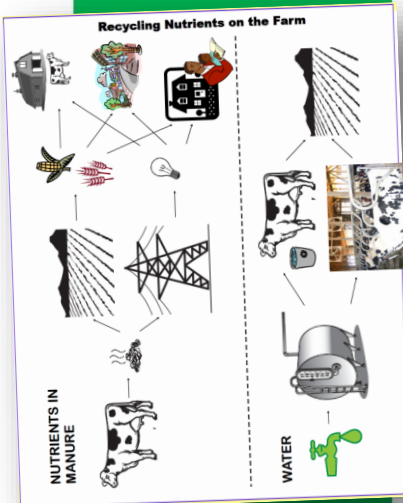
- Cows are just like any other living being. They drink lots of water and eat lots of feed. In addition to producing milk, their bodies produce waste. What kind of waste comes from a dairy cow? (*The answer is cow manure.*)
- This waste must be properly handled to protect the environment. Organizations like the Environmental Protection Agency have guidelines in place that farmers must follow to protect the environment, and most farmers meet or exceed those guidelines.
- Explain that manure, which is rich in soil-building nutrients, is recycled by spreading it on nearby crop fields to replenish the nutrients in the soil. The manure is spread according to detailed nutrient management plans regulated by the federal government. These plans ensure that the farmer is abiding by clean water laws and protecting the water on and near their farm.
- In some cases, the manure is also recycled through a methane digester. The digester converts the manure into methane, which is an electricity-generating biogas. Farms with this type of technology generate more than enough electricity for their farms and often sell the excess electricity back to the community.

## Additional Classroom Activity:

(Takes about 20-30 minutes of classroom time)

*This activity is intended to enhance higher-level thinking skills.* It addresses PA Math Standards for fourth grade. If used with younger students, the exercise will require more guidance from teacher. Divide the class into groups of 12 students each. Give each student a paper bag with a label on it. Label the bags as follows:

- ♦ “COW” (Place 16 marbles in this bag)
- ♦ “FIELD”
- ♦ “ANIMAL FEED”
- ♦ “ELECTRICITY”
- ♦ “COMMUNITY”
- ♦ “LOCAL BUSINESSES”





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Explain to students that they will participate in a role-playing activity to show how nutrients are recycled from a dairy farm. Tell the class that the cow is starting out with all of the nutrients in her bag. Then go through the following steps:

- 1 The “COW” gives eight marbles to the student holding the “MANURE” bag and gives the other eight marbles to the student holding the “MILK” bag.
- 2 The student holding the “MANURE” bag gives four marbles to the “FIELD” student and four marbles to the “METHANE DIGESTER” student.
- 3 The “FIELD” gives two marbles to the “ANIMAL FEED” student and two marbles to the “FOOD” student.
- 4 The “METHANE DIGESTER” gives all four marbles to the “ELECTRICITY”.
- 5 The “ANIMAL FEED” student gives both marbles to the “COW.”
- 6 The “FOOD” student gives both marbles to “US.”
- 7 The “ELECTRICITY” gives two marbles to the “COMMUNITY” and two marbles to the “FARM.”
- 8 “COMMUNITY” gives one marble to “LOCAL BUSINESSES” & one marble to “US.”
- 9 The “COW” gives one marble to “MANURE” and one marble to “MILK.”
- 10 The “MILK” student gives all of his/her marbles to “US.”

Hand out the “Going ’Round & ’Round” worksheets. Have students label the axes on the graph found in the “Extra Credit” section of worksheet 3.2. The X axis (horizontal) should be labeled “Number of Marbles” and the Y axis (vertical) should be labeled “End Users.”

Ask students to identify who the four remaining holders of the nutrients (or marbles) are. (*Answers are “Us,” “Local Businesses,” “Farm” and “Manure.”*) Ask students to list those holders on the Y axis and number the X axis from 1-14. Now tell students to chart how many marbles each end user has in their bag.

### **Summary question:**

Who ends up with the most marbles? How were the nutrients from the cow recycled and who benefited the most from the process? When does the process end?

(*It never ends — the nutrients continue to recycle through the process.*)

### **Guided Reading Lesson:**

Hand out the reading pamphlets to review the lesson.

### **Evaluation:**

Explain that what happens on a dairy farm is just one example of how nutrients are recycled for our environment. Tell students that farmers follow strict guidelines to ensure they are operating their farms to protect the environment and our natural resources. Remind them that it is everyone’s responsibility to protect our environment.

Ask questions to review the lesson. See examples below:

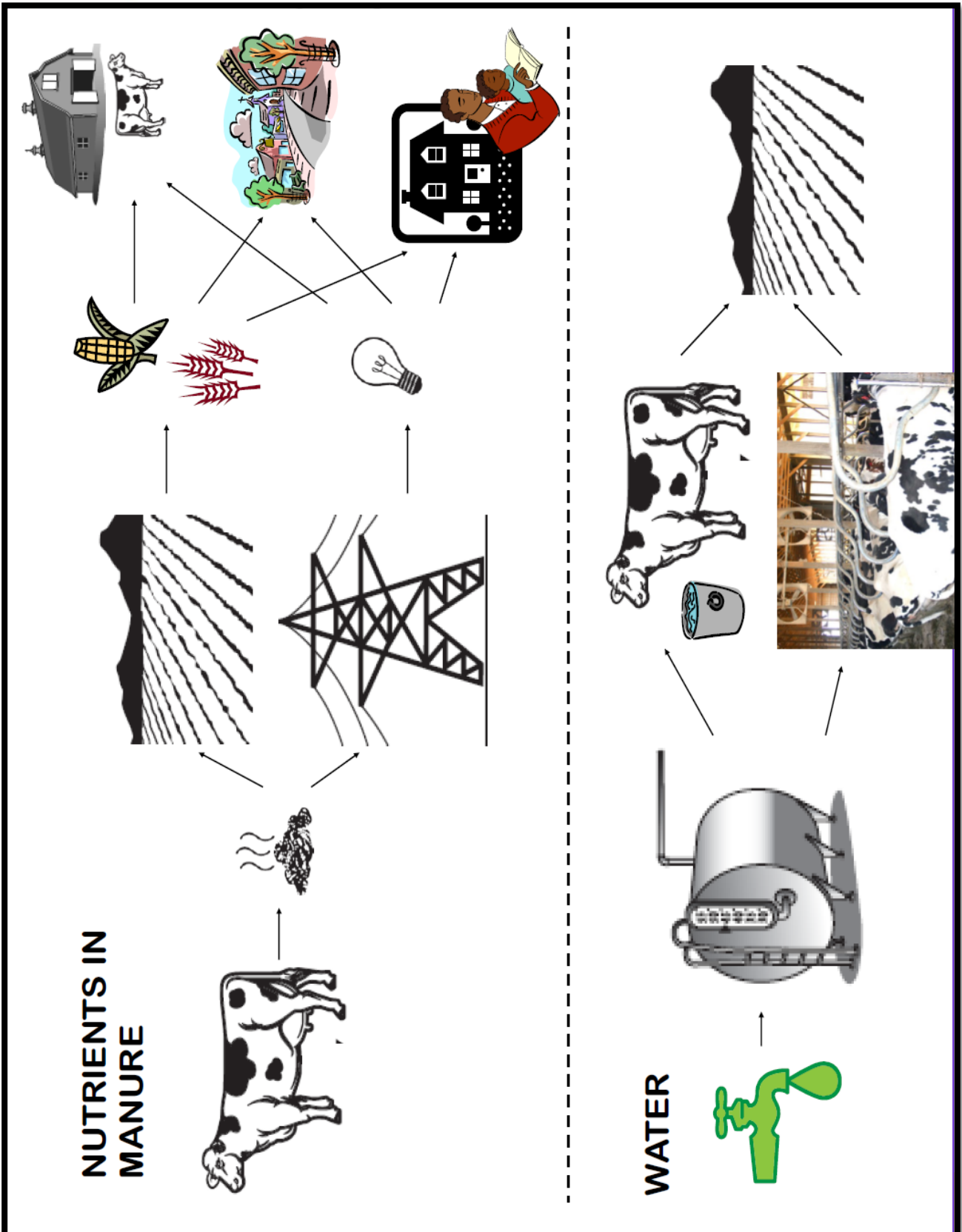
- ◆ How do farmers recycle water on their farms? (The wastewater from milking is used to clean the barn and irrigate the fields.)
- ◆ How can we help take care of the environment? (Conserve water in our homes, recycle recyclable products in our homes, not litter.)

*If desired*, use Worksheets 3.1 and 3.2 that accompany this lesson to evaluate whether students comprehended the lesson and can achieve the stated objectives. (*An answer key for the worksheets can be found online at [www.discoverdairy.com](http://www.discoverdairy.com)*). For a writing assessment opportunity, encourage the students to complete the writing assignment.

## Teaching Tip:

*Using the Worksheets and Reading Guides enables you to reinforce lesson content while teaching to specific math and reading standards. Options for writing assessment are also included within the worksheet.*





# Worksheet 3.1: Dairy and the Environment

Read each of the scenarios below and circle whether the situation involves recycling or not:

- ◆ A farmer stores the water he uses to wash his milking equipment in a tank and then uses it to wash down the alleys on which the cows stand.
- ◆ A farmer drains the water he uses to wash his milking equipment into a holding tank that is used to irrigate the crops.
- ◆ A farmer lets the water he uses to wash his equipment go down the drain. The drain empties into the manure storage pit and eventually is spread onto the field.



The nutrients in manure and water are two things recycled on a dairy farm. Circle which one fits the following descriptions.

1. It is used to produce electricity for the local community.
2. It is used to irrigate the crops in the field.
3. It is used to quickly cool the milk from the cows.
4. It is used to fertilize the crops in the field.



**Writing Enrichment:** On a separate piece of paper, compare and contrast how you recycle at your house with how a dairy farmer recycles on the farm. What things do you recycle, and what things does the farmer recycle? How are each recycled?



# Worksheet 3.2: Dairy and the Environment

Answer the questions below and complete the graph as described.

1. Name two things that can be recycled on a dairy farm:

\_\_\_\_\_

2. Name two things that cow waste or manure can be recycled into:

\_\_\_\_\_

3. What government agency has outlined regulations for farmers to follow to protect the environment?

\_\_\_\_\_

**HIGHER LEARNING ACTIVITY:** Use the graph below to record data from the additional classroom activity outlined in the lesson plan. Chart how many marbles each role player has left in their bag and label each axis accordingly.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COW																
FEED																
FIELD																
ELECTRICITY																
COMMUNITY																
BUSINESSES																
MANURE																
METHANE DIGESTER																
FOOD																
MILK																
US																
FARM																

LABEL Y AXIS:

LABEL X AXIS: \_\_\_\_\_