LESSON 1: THE NEED TO NOURISH

OVERVIEW

In this lesson, students explore the ways that innovative agricultural practices contribute to environmental sustainability while also ensuring that people around the world can access affordable, nutritious foods.

TIME

Two 45-minute classes

OBJECTIVES

In this lesson, students will:

- Identify dairy farming myths related to the environment;
- Research and describe innovative initiatives in the U.S. dairy farming industry; and
- Research and describe innovative environmentally sustainable farming practices.

STANDARDS

NGSS

ESS3.C: Human Impacts on Earth Systems

The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3).

CDC NHES

1.8.3 Analyze how the environment affects personal health.
1.8.8 Examine the likelihood of injury or illness if engaging in unhealthy behaviors.
8.8.3 Work cooperatively to advocate for healthy individuals, families, and schools.
8.8.4 Identify ways in which health messages and communication techniques can be altered for different audiences.

MATERIALS

In addition to common classroom materials and an Internet connection, students will need:

- Initiative Research Questions Guide
- Environmentally Sustainable Agricultural Practice Questions Guide
- Presentation Assessment Rubric

PREPARATION

- Print or provide access to student materials.
- Arrange students into groups of 3-4.

INTRODUCTION

Explain to students:

"Agriculture is a vital part of our lives. Over the past several centuries, farmers have been able to increase our global food supply to meet the demands of our growing population. But with growth comes responsibility; we must not just take from the Earth, we must also be stewards of the resources Earth provides to us.

In the past, many agricultural practices were largely focused on meeting the growing demand for food, whether from fields of produce, livestock ranches, or dairy farms. And as the demand grew, so did many farms and food-related businesses. However, the changing needs of our planet have driven the agricultural industry to explore ways in which we can both nourish our growing population and still be responsible stewards of the land and environment."

Tell students that in this lesson, they will be taking a closer look at the sustainable agricultural practices used in dairy farming in the United States.

LESSON PROCEDURE

Step 1

Ask students to list any negative comments they may have heard about farming. Record the answers on a whiteboard. Answers may include potential problems such as use of water, over-farming, pollution, methane gas emissions, etc.

Step 2

Explain to students that while it's important to be aware of any environmental consequences of farming, many of the concerns are, in fact, myths or no longer a significant concern due to advances in technology and on-farm practices.

Have students read **Can Dairy Be Sustainable? Yes, And Here's Why** to learn more about some dairy farming myths. Have students identify some myths mentioned in the article and share them with the class. Some highlights from the article include:

- **Myth:** Dairy farming is wasteful because we have to feed the cows food we could eat.

  Truth: 80% of what dairy cows eat can't and won't be consumed by people. (almond hulls, cottonseeds, citrus pulp and peel, and corn grain remaining from the production of ethanol).

- **Myth:** Methane emissions are responsible for global warming.

  Truth: According to the EPA, 80% of all GHG (greenhouse gas) emissions in the U.S. come from transportation, power production, and other industries. Only 4% of GHGs come from livestock, including the feed sector.

Step 3

Explain that dairy farmers have started some major initiatives in order to address potential environmental issues in farming. Arrange the students into groups of 3-4. Assign each group one of the dairy farming initiatives listed below. Have them answer the questions on the student reproducible. They may not be able to find information to answer all of the questions, and they might have additional information to add. They may

also choose to use additional sources to do their research. The table is included only to be a guiding research resource.

- Net Zero
- Dairy Sustainability Alliance
- U.S. Dairy Stewardship Commitment
- National Dairy FARM Program

See the *Initiative Research Questions* Assignment.

Step 4

Have students report back to the class what they learned about each initiative.

Step 5

Explain that the initiatives have many goals, and it takes innovative ideas and practices to meet those goals. Remind students of some of the innovative practices they read about in the **Can Dairy Be Sustainable? Yes, And Here's Why** article. Explain that they will be selecting one innovative environmentally sustainable agricultural practice and will collaborate to research it. In their groups, have them select one of these topics (or choose their own).

- Conservation cropping systems (including conservation tillage or no-till, cover crops, crop rotation, buffer strips and other practices)
- Upcycling animal feed
- Adopting agroforestry practices
- Renewable energy (solar and wind) on farms
- Anaerobic digestion
- LED lighting, high-efficiency refrigeration on farms

Step 6

Have students use this guide when researching their selected practice.

See *Environmentally Sustainable Agricultural Practice Questions* Activity.

Step 7

Have students create brief online presentations about their selected practice using PowerPoint, **Prezi**, or another presentation tool. Younger students may instead create posters. Share the Presentation Assessment Rubric (below) with students so that they are aware of your presentation expectations.

Step 8

Have students report back to the class what they learned about each initiative.

ASSESSMENT

Use this rubric to evaluate the presentations or posters for each group.

See *Presentation Assessment Rubric* Sheet.

EXTENSIONS

- If possible, plan a visit to a farm so that students can see the innovative practices in action. If you are unable to schedule an in person visit, have students visit one of these **virtual farm tours** instead.
- STEM Lessons: Use the *Undeniably Dairy STEM Lessons* **Innovations from Farm to Community** and **Converting Poop to Power** to learn about how farmers are using sustainability practices.

INITIATIVE RESEARCH QUESTIONS ASSIGNMENT

Initiative Name
Who started the initiative?
What are the goals of the initiative?
What are some parts of the plan to meet the goals?
Who helps to meet the initiative's goals?
What effect can the initiative have on the environment?
How is the impact of the initiative measured?

ENVIRONMENTALLY SUSTAINABLE AGRICULTURE PRACTICE QUESTIONS ACTIVITY

Selected Practice
What does this practice replace in previous farming practices?
Where can it be used? (which types of farms, etc.)
What positive impacts does it have on the environment?
What is difficult about implementing this practice?
Are there any negative consequences of this practice?
How can you get the word out about this practice?

PRESENTATION ASSESSMENT RUBRIC

Measure	Exceeded Expectations (3 points each)	Met Expectations (2 points each)	Does Not Meet Expectations (0-1 point each)
Collaboration	All students participated in the development of the presentation or poster.	Most students participated in the development of the presentation or poster.	Few students participated in the development of the presentation or poster.
Sources	Students compiled at least three reputable sources of information about their selected practice.	Students compiled two reputable sources of information about their selected practice.	Students did not find reputable sources of information about their selected practice.
Presentation Impact	The presentation or poster was sufficiently detailed and had the ability to influence its audience.	The presentation or poster was sufficiently detailed OR it had the ability to influence its audience.	The presentation or poster was not sufficiently detailed, nor did it have the ability to influence its audience.
Accuracy	The content within the presentation or poster was fully accurate.	The content in the presentation or poster was mostly accurate.	The content in the presentation or poster was inaccurate.
Presentation Quality	Much care was taken with the presentation's or poster's graphics, spelling, and grammar.	Some care was taken with the presentation's or poster's graphics, spelling, and grammar.	Little care was taken with the presentation's or poster's graphics, spelling, and grammar.