

Dear Educator,

The coronavirus pandemic has thrown a spotlight on the complex process involved in getting food from farms to our tables in the U.S. But there are even greater challenges ahead. The United Nations projects that the global population will reach nearly 10 billion by the year 2050. Feeding this many people at a time when Earth's resources are already strained is a daunting task for farmers, who must find ways to provide *sustainable* nutrition — food that benefits human welfare *and* the environment.

Farming for the Future is a free educational program that explores the concept of sustainable nutrition by focusing on dairy farms, which already produce foods that pack a nutritional punch in an affordable and increasingly sustainable way. Created by the curriculum experts at Young Minds Inspired (YMI) in cooperation with American Dairy Association North East (ADANE), the program features standards-based activities that will engage your students in critical thinking as they research, debate, and brainstorm how farmers can feed the world in ways that support nutritional, economic, and environmental needs. The activities support Common Core and Next Generation Science Standards.

We hope that you will share this valuable program with other teachers in your school. Although the materials are copyrighted, you may make as many copies as needed for educational purposes. Return the enclosed reply card to let us know your opinion of this program, or comment at ymiclassroom.com/feedback-adane-hs. We look forward to your comments.

Sincerely,

John Chrisman, CEO
American Dairy Association
North East

Dr. Dominic Kinsley
Editor in Chief
Young Minds Inspired



For questions, contact YMI toll-free at 1-800-859-8005 or by email at feedback@ymiclassroom.com.

FARMING *for the* FUTURE

Target Audience

Students in high school science and social studies classes

Program Objectives

- Guide students in understanding sustainable nutrition as the intersection between health, economic, environmental, and social impacts.
- Examine the value of dairy farming in sustainable food systems that support the needs of global populations, benefit animal care, reduce impact on surrounding ecosystems, and support local economies.
- Encourage students to think critically and to examine contemporary issues from a global perspective.
- Demonstrate how milk and dairy products are continually tested to ensure safety and quality.

Program Components

- This one-page teacher's guide
- Three reproducible activity sheets
- A colorful classroom wall poster
- Access to Interactive Virtual Farm Tours at americandairy.com/dairy-farms/virtual-farm-tours/
- A reply card for your comments
- Microsite with standards chart, answer key, bonus activity, supporting resources, and an online feedback form at ymiclassroom.com/adane-hs

How to Use This Program

Photocopy and distribute the activity sheets before displaying the poster in your classroom. Schedule the activities and provide ample time for classroom discussion of the relevant concepts. Students will need access to the internet for research. Activity sheet answers will vary. Download an answer key and bonus activity at ymiclassroom.com/adane-hs.



What Is Sustainable Nutrition?

Begin by discussing what students may already know about sustainable nutrition. Ask them to consider each issue on the activity sheet on a local, national, and global scale. Then allow time for them to work in small teams to research and brainstorm ideas to complete the sheet.

EXTENSIONS

- Explain to students that one study projected that 1 in 6 children in the U.S. may have experienced food insecurity in 2021. Have the class research efforts by the dairy industry to close the hunger gap and ask students to brainstorm new products or distribution channels to get more dairy nutrition into the hands of more people, domestically or globally. Suggested links to get them started: usdairy.com/about-us/innovation-center and dairyfoods.com.
- Use this lesson as a starting point for teaching students to understand the difference between “essential” nutrients and those that the body can produce, complete versus incomplete proteins, or fortified versus naturally occurring nutrients.



Greener Pastures

Divide the class into groups of 2-3 students and provide time for them to research and complete the chart on the activity sheet following the example. Conclude with a discussion about each of the technologies featured, asking students which efforts were most interesting or surprising, and which they thought might have the greatest impact.

EXTENSIONS

- High start-up costs can be a major barrier preventing small farms from implementing some of the technologies featured on



the chart. Have students research and brainstorm ways to bring these systems to more farms without the burden of major debt (e.g., regional cooperatives).

- Using what they've learned, ask students to engineer additional systems farmers can use to grow their businesses while supporting local ecosystems and communities.



Smart Barns = Healthy Cows

This research activity prompts students to choose sustainable

approaches to update a dairy barn with modern technology. It can be found at ymiclassroom.com/adane-hs.



Full Circle

Begin by asking students what they know about dairy farming and processing of milk products. How far do they think milk travels from the farm to their grocery store? How do we know milk is safe to drink? Students can find the answers on americandairy.com, particularly in the Dairy Farm Facts and Milk's Farm to Table Journey at americandairy.com/dairy-farms. After students take the quizzes in Parts 1 and 2, discuss the results as a class. Review any myths or misconceptions and ask students to share how their understanding may have changed. You can use this as an opportunity to discuss the importance of critical thinking that involves looking at issues from multiple perspectives.

Conclude the activity by letting students meet some of the farm families highlighted in the Fun on the Farm videos at americandairy.com/dairy-farms/fun-on-farm.

Part 1 Answers: 1. A; 2. D; 3. C; 4. A; 5. C; 6. T; 7. T; 8. T; 9. T (dairy cows voluntarily go in for milking two or three times a day); 10. T.

Part 2 Answers: 1. nutritious; 2. robotic; 3. degrees; 4. insulated; 5. standardized; 6. pasteurized; homogenized; 7. packaged; 8. grocery

EXTENSIONS

- Have students research local farms and related businesses at the library or online. Ask them to record and share details about how the business contributes to the local economy and food supply. Students can also explore career options at O*NET Online (onetonline.org/find/career?c-1) and share details and skills of any interesting jobs.
- If you live in an agricultural area, ask students to bring in news articles about local farms that focus on animal care, economic issues, environment, and/or innovation in the region for the class to discuss.

Resources

- American Dairy Association North East: americandairy.com
- Fun on the Farm: americandairy.com/dairy-farms/fun-on-farm/
- Sustainability on Dairy Farms: americandairy.com/sustainability/
- Virtual Dairy Farm Tours: americandairy.com/dairy-farms/virtual-farm-tours
- Your Local Dairy Farmers: A Sustainable Story: americandairy.com/dairy-diary/your-local-dairy-farmers-a-sustainable-story/
- Raising Crops for Dairy Cows: youtu.be/tA53MToFmWY
- Feeding America: feedingamerica.org/about-us/press-room/one-year-later
- Lessons: ymiclassroom.com/adane-hs

Milk Production

- “Journey of Milk from Cow to Cup”: youtube.com/watch?v=88mvvUthzLM&t=1s

What Is Sustainable Nutrition?

Sustainability is a buzzword in media reports and government policy, but what does it really mean? For farmers like Ed Facer at Star Rock Farms in Conestoga, Pa., it means carefully following agricultural practices that will support the needs of the farm *and* its community now and for generations to come.

Part 1: Green Communities

Write your definition of sustainability in the following space. Give an example, such as solar energy, and explain what factors can make it sustainable.

Now list three considerations that you think would make a farm or other food source sustainable:

1. _____
2. _____
3. _____

List two local initiatives you've noticed in your community to increase sustainability, particularly in the food system. Use this example as a guide:

The local grocery store has a produce section identified as grown on nearby farms.

1. _____
2. _____

Food for Thought

When considering sustainable nutrition, the key is to strike a *balance* among environmental concerns, economics, and health needs. For example, almond beverage has been hailed as a greener alternative to cow's milk because it uses less water to produce. But did you know that it would take at least 32 ounces of almond beverage to get the same amount of protein as an 8-ounce glass of milk?* And, unlike almond beverages and other alternatives, dairy milk is produced locally in all 50 states, reducing the need for long-distance transportation.



*<https://www.americandairy.com/wp-content/uploads/2021/05/NDC-Alternate-Beverage-Flash-Cards.pdf>



Local milk is available 365 days a year.

Part 2: Green Earth

The United Nations projects that global population will reach nearly 10 billion by the year 2050. What do you think it will take to feed that many people in a sustainable way? Here are some links to help you research the various aspects of this issue, in addition to sources you find:

- The Environmental and Nutritional Impact of Removing Dairy Cattle: <https://californiadairymagazine.com/2021/05/21/the-environmental-and-nutritional-impact-of-removing-dairy-cattle/>
- World Resources Report, Creating a Sustainable Food Future: research.wri.org/wrr-food
- Nourishing people sustainably: usdairy.com/news-articles/sustainable-diets-must-nourish-people-protect-planet
- Innovation Center for U.S. Dairy: usdairy.com/about-us/innovation-center



Ed Facer from Star Rock Dairy, Conestoga, Pa., shows recycled local ice cream, which is fed to cows as part of their daily food intake.

On a separate sheet of paper, list and analyze a few of the proposals you read about, as well as any of your own ideas. Use the example below as a guide.

Proposal	Pros	Cons
Create community gardens for people to grow their own produce	<ul style="list-style-type: none"> • Access to fresh fruits and vegetables • Tailored to regional diets and environments 	<ul style="list-style-type: none"> • Volunteers must be willing to participate • Land required • Unpredictable environmental conditions • Limited nutrient profile for volume produced

Now take a look at the nutritional profile of milk on the wall poster. Reflect on this information and your research findings to write a short position paper describing the role dairy could play in sustainable diets on a global scale. Think about the amount of food, and the different types of food, that would be required to replicate the nutrients found in milk. How would the environmental footprint and cost of all those varied resources compare to the cost and footprint of providing three servings of dairy, considering that a cow can produce up to eight gallons of milk per day?



AMERICAN DAIRY ASSOCIATION NORTH EAST



Greener Pastures

Technology and modern agricultural practices enable dairy farmers to be good stewards of the environment while building successful businesses. For example, farms like Worth-the-Wait in Pennsylvania use cover crops to reduce erosion and establish a quality filtration system. And for dairy farmers in the Chesapeake Bay watershed — an ecosystem that is home to 18 million people and fed by 150 major rivers and streams and 100,000 tributaries — protecting local waterways is critical.



Cover crops, like those shown here, are widely used by dairy farmers.

Visit americandairy.com/sustainability/dairy-and-the-environment/ to learn how dairy farmers are working to protect the Chesapeake Bay watershed and support local ecosystems. As you read each article and page linked there, think about the complex economic and environmental considerations that impact each decision. You can also watch interviews at [youtube.com/playlist?list=PLQvbnhTt22BRnK7C6AvSkcGr6xNkBxDRO](https://www.youtube.com/playlist?list=PLQvbnhTt22BRnK7C6AvSkcGr6xNkBxDRO).



Chris and Laura Landis of Worth-the-Wait Farm in Stevens, Pa.

Use this chart to list how each agricultural practice or technology benefits the local ecosystem and/or community, and the farm itself. One has been provided as an example.

Technology/ System	Benefits to Ecosystem and Community	Benefits to Farm
Riparian (or forest) buffers	<ul style="list-style-type: none"> • Filters pollutants from storm runoff, leading to cleaner groundwater and streams • Increases wildlife habitats • Healthier drinking water 	<ul style="list-style-type: none"> • Less work/money spent on soil maintenance • Removes less productive, highly erodible cropland from use, allowing farmers to focus resources on more productive cropland
Cover crops and no-till fields		
Recycled manure and methane digester		
Manure storage		
Recycled materials for barn stall bedding		
Reuse of water two to three times for farm operations		
Woodchip bioreactor		
Precision feeding		



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Full Circle

Milk is a nutritional powerhouse, and over the past decades, agricultural practices have enabled dairy farmers to produce more milk with fewer resources. In fact, from 2007-2017, dairy farmers reduced their carbon footprint by 19% while working to provide the best housing, food, and medical care for their cows. After all, dairy farmers depend on their cows, so they are dedicated to keeping them healthy and comfortable.



Elizabeth Maslyn of Hemdale Farm in Seneca Castle, N.Y., works on the farm between classes.

Part 1: Myth vs. Reality

How much do you already know about the care of dairy cows and the value of their milk? Take this quiz to test your knowledge. In the left column, circle the correct answer. In the right column, check off whether the statement is true or false. Visit americandairy.com to get answers and more.

- About _____ of U.S. dairy farms are family owned and operated.
A. 95% C. 70%
B. 45% D. 15%
- Cow manure can be recycled into _____ and even pots for planting.
A. energy C. bedding for cows
B. fertilizer D. all of the above
- Many dairy farmers also recycle _____ up to 3 times — first, for cooling milk, then for cleaning stalls, and finally as a nutrient-rich fertilizer for the fields.
A. packaging C. water
B. corn husks D. storage tanks
- Each cow produces approximately _____ gallons of milk per day.
A. 8 gallons C. 35 gallons
B. 25 ounces D. 1 gallon
- Milk is tested for _____ on the farm and at the processing plant to be sure it is safe for consumers to drink.
A. total mixed rations
B. color
C. antibiotics
D. excess fat
- Cows spend about 8 hours chewing their cud every day.
 True False
- Cows can get nutrition from byproducts of other farms, like citrus pulp from juice farms and cottonseed from cotton farms.
 True False
- Cows' diets are carefully designed by farmers and nutritionists to provide the best nutrition possible for optimal health.
 True False
- Robotic milking systems enable cows to be milked on their own schedules — two to three times per day — and help farmers spend time caring for cows in other ways.
 True False
- In freestall barns, cows can move about to eat, drink, and rest whenever they like; these enclosures let in fresh air and sunshine, while providing shade and protection from the wind, cold, or rain.
 True False

Part 2: Farm to Family

Have you ever wondered how the dairy products you enjoy get from the farm to your refrigerator? It takes careful coordination by a bustling, localized industry and frequent testing along the way that ensures that milk is one of the safest foods you can purchase. And it is never touched by human hands until you open the container.

Check out how Elizabeth grew up on her farm and continues to work there! Visit [youtube.com/watch?v=OKRvHRzIkaY](https://www.youtube.com/watch?v=OKRvHRzIkaY).

To test how much you know, use the word bank to fill in the blanks. To learn more, watch “Journey of Milk: Cow to Cup” at [youtube.com/watch?v=88mvvUthzLM&t=1s](https://www.youtube.com/watch?v=88mvvUthzLM&t=1s).

robotic degrees grocery
homogenized insulated nutritious
pasteurized packaged standardized

- On a dairy farm, cows receive plenty of _____ food, fresh water, comfortable housing, and regular veterinary care.
- Using a _____ milking machine, cows choose when they want to be milked, generally two to three times a day.
- Milk is cooled to 35 _____ and then transported in a milk truck, which is a refrigerator on wheels.
- _____ tanker trucks haul this fresh milk to a processing facility.
- Then, it is _____ to various fat levels (fat-free, 1%, 2%, or “whole” milk).
- Next, the milk is _____, or heated to kill potentially harmful bacteria, and _____ so it doesn't separate and rise to the top.
- Finally, the milk is _____ or processed into cheese, yogurt, etc.
- Refrigerated trucks transport milk and dairy foods to _____ stores or local schools for you and your family to enjoy!



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