

TEACHER GUIDE

EVALUATE LESSON 6



Driving Question: *What is the impact of dairy production on the environment?*

What We Figure Out:

We figure out that some of the media claims are accurate and inaccurate. For example, we have evidence to support that livestock production is a major polluter of water, which means Claim 1 is accurate. We also have evidence to say that Claim 4 is accurate because whole-fat dairy consumption likely has little effect on heart disease risk. We also think that Claim 8 is accurate because we have evidence to say that exposure to cattle on a farm can decrease the incidence of asthma in children. Finally, we think that Claim 13 is accurate because we have evidence to say that livestock production is a significant contributor to air pollution.

3D Learning Objectives:

Students **evaluate the validity of media claims** about the **health, pollution, and food production costs, risks, and benefits of the dairy production system.**

Students **construct an argument using evidence** about the overall **economic, social, environmental, and geopolitical costs and benefits** of the **design of the dairy system.**

Time estimate:

50 minutes

Materials:

Lesson 6 Student Guide
Lesson 6 Written Argument Rubric
Lesson 6 Student Handout Student Self-Assessment
Media Claims Packet (from Lesson 1)

Targeted Elements

SEP:

ARG-H4:

Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence.

DCI:

ETS2.B-H1:

Modern civilization depends on major technological systems, including those related to agriculture, health, water energy,

CCC:

SYS-H1:

Systems can be designed to do specific tasks.



<p>INFO-H4:</p> <p>Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible.</p>	<p>transportation, manufacturing, construction, and communications.</p> <p>ESS3.A-H2:</p> <p>All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.</p>	<p>SYS-H2:</p> <p>When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.</p>
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Directions



Part 1: Our Motivation

USE OF PHENOMENA

In this lesson, students will use what they have figured out about the Module Phenomenon, how dairy products get to our tables, to return to the Anchor Phenomenon and evaluate selected media claims once again.

Prompt students to consider where the class stands in explaining the Anchor Phenomenon. What has the class learned about the dairy system's impact on the environment? In student responses, listen for the following:

- We have created models of the dairy industry that show the inputs, outputs, and boundaries of the system.
- We have seen that the system was designed to bring products to our table, but it has several costs in the process. Some of these are impacts on the environment.

Direct students' attention to their media claims from Lesson 1. Ask students how they think what they have figured out so far will help them re-evaluate these media claims.

- Listen for student responses that indicate that students should have some new information now to evaluate the media claims about the dairy industry's health effects and pollution better.

Build off student responses to share that what we have figured out about how the dairy system gets products to our table will help us reassess the media claims and determine how the dairy production system impacts the environment. You can also point to any student questions on the Driving Question Board about Media Claims 1, 4, 8, and 13. Direct students' attention to these media claims and share that students will now re-evaluate the validity of these claims based on the new evidence they have gathered in the module. They will then revise their arguments for what they think the overall impact of the dairy system is on the environment.



Part 2: Evaluate Claims

Ask students to look back at the Dairy System Model they created in this module. Ask students to discuss as a group how their system models can help inform how they will help evaluate the validity of the media claims representing the dairy industry's impact on the environment. Share these questions with the group to help facilitate the discussion:

- What new knowledge have you gained to answer the Driving Question, *"How does dairy production impact the environment?"*
- What new evidence did you gain about the inputs and outputs of each component of the system?
- What social, environmental, economic, and geopolitical costs, risks, and benefits does the dairy system have?

Share with students that they will complete a performance assessment in this lesson and that they will sometimes work in groups and, at other times, individually. Share that students can use any of the resources from the module to support them in the performance assessment tasks in this lesson.

For the first assessment task item, give students access to Media Claims 1, 4, 8, and 13 from the Lesson 1 Media Claims. Ask students to use the new information they gathered in their models and the rest of the evidence throughout the module to re-sort these media claims into the three categories shown on their Lesson 6 Student Guide Part 2: Evaluate Claims. Students can work in groups to discuss and sort these claims.

STUDENT SUPPORT

You may want to allow time for students to return to the chart they made in Lesson 1 when sorting all thirteen media claims. Students can now reflect on how their thinking has changed. You can provide a sentence stem such as, "I used to think _____, and now I think _____."

Allow students time to work. As students work, circulate the room, and ask pressing questions such as:

- What evidence do you have to evaluate this claim?
- Why are you placing this claim in that column?
- Are there any claims that you changed your mind on? Which ones? Why?

- How has your thinking changed since you first sorted these claims?
- What do you now know about the tasks the dairy system is designed to accomplish? What do you know about its unintended effects?

When groups have finished sorting the claims, students should work independently to assess the validity of a single media claim of their choice. Share the Lesson 6 Written Argument Rubric: Part 2 Task Look Fors with students and read them together. Share that students can use these Look Fors as a guide on how to achieve proficiency on the task. You can use the Lesson 6 Written Argument Rubric: Part 2 Task Rubric to assess students' performance on this task. At the bottom, this rubric also contains guidance for how to support students in using a peer feedback protocol and an activity to discuss and norm on what features of high-quality student responses look like. Use either or both to have students reflect on and improve their work should you decide that additional steps are needed for your class to achieve proficiency.

After returning their work to students, you can hold a reflective conversation about the veracity of the media claims. Be sure to highlight to students that these media claims presented a fair and accurate representation of the scientific evidence that students have gathered. Throughout the unit, students will continue to see if all the remaining media claims fairly and accurately represent the scientific evidence.



Part 3: Construct a Written Argument

Next, students will return to their argument from Lesson 1 Part 4: Writing an Initial Argument About Dairy's Impact on the Environment and revise their argument to indicate if they think the dairy system has an overall positive or negative impact on the environment. Students should use the evidence they gathered in this module to do so.

To support students in writing an argument, ask students to recall the key components of a scientific argument, recording descriptions on the board for students to refer to.

- C = The claim
- E = Evidence from data
- R = Reasoning based on science that describes why the evidence supports the claim

STUDENT SUPPORT

A Claim, Evidence, and Reasoning format for writing scientific arguments is a common scaffold used in middle school science. However, some students might not have as much experience with Claim, Evidence, and Reasoning. To increase access for all learners, consider trying these two strategies if you see students needing support.

Strategy #1 Explain the CER differently:

- The claim is a statement that answers your question. Your claim should be one sentence in length. For this lesson, your claim will be around agreeing/disagreeing with a media claim.
- The evidence you provide is going to support your claim. In this module, you can use evidence from your dairy component cards, readings, and models to back up your claim.
- The reasoning is an explanation of why your evidence supports your claim.

Strategy #2 CER for a non-science example:

- Use a relevant example that would relate to your students likes (Ex. Best sports team, best restaurant in town, best subject in school). Have students walk through the CER based on the topic you chose. This might look like:
 - Claim: The lacrosse team is the best at Science High School.
 - Evidence: The lacrosse team has won the most state championships (5) since the school was started in 1995.
 - Reasoning: No other sports team at Science High School has won more than two state championships. Since sports are evaluated by their performance at county/state tournaments to choose the top team, this proves that the lacrosse team is the best at Science High School.

Provide students with the Lesson 6 Written Argument Rubric: Part 3 Task Look Fors, read them together, and again allow them to use the Look Fors to guide their responses. Allow students time to individually construct a new argument based on their new understandings from this module. Students can record their new argument in Lesson 6 Student Guide Part 3: Construct a Written Argument. If students need additional support writing an argument, you can provide this prompt as a sentence starter.

- I think that dairy production is (helpful/somewhat helpful/somewhat harmful/harmful) for the environment because (evidence that supports your argument, and reasoning that describes why the evidence supports the claim, based on current scientific knowledge).

CCSS SUPPORT

WHST 9-10.1: Write arguments focused on discipline-specific content.

Students will engage in these standards as they use evidence from the module to create an argument regarding the overall environmental impact of the dairy system. To write a comprehensive argument, students will need to rely on scientific evidence they have explored throughout the module. Students will also provide their peers with a respectful critique of their claims.

After students have written their arguments, provide the Lesson 6 Student Handout Student Self-Assessment. Ask students to complete the Written Argument Self-Reflection checklist to give an opportunity for them to ensure they have met the requirements. If students don't

have all the elements in the checklist, direct them back to their Class Consensus Model and suggest they look for additional evidence. Be sure to provide them with time revise their written argument based on their self-reflection.

Then, have students share their written arguments in pairs and provide a respectful critique of the ideas of their peers. Use the protocol below to support students in providing a respectful critique of their peer's argument.

STUDENT SUPPORT

To support students in respectfully sharing their argument, use the following protocol:

1. Student A shares their argument and the reasoning behind it. Student B listens.
2. Student B rephrases the argument shared by Student A and acknowledges the strengths of the argument. Student A listens.
3. Student A shares gratitude for Student B listening and acknowledging their ideas.
4. Students switch roles and repeat steps 1-3.
5. Both students list areas of agreement in which their arguments overlap underneath their written argument (on the same page).
6. Both students list areas of disagreement that emerged underneath their written argument (on the same page).

If it is your first time using this or a similar protocol, you may want to model it for students. Ask for a volunteer to serve as “Student B” in the protocol. Model this protocol presenting an argument as “Student A” while the volunteer models serving as “Student B.” Once the demonstration is complete, students join into pairs to complete the argument protocol outlined above.

SEP SUPPORT

ARG-H4: Construct, use, and/or present an oral and written argument or counter arguments based on data and evidence.

In middle school, students constructed scientific arguments to support or refute an explanation of a phenomenon. In this unit, students build on their middle school experience to also construct counterarguments based on evidence. In this task, students will only be assessed on their written arguments. In upcoming modules, students will progress their work with this SEP to include how to write a counter-argument using evidence.

If you have time available, use a sharing routine such as a Mingle-Pair-Share to have students share and discuss their arguments with one another.

1. Students move around the classroom and find a peer who is not a part of their usual group.
2. Students take turns sharing their arguments.
3. Students then find a new peer and share their arguments once again.

You can also consider using another strategy, such as Agree-Disagree Line, so that the class can visualize where everyone stands on the issue.

1. Share that a line across the center of the room will represent a continuum of how much students think dairy production is beneficial or harmful to the environment.
2. Direct students to stand on the line in a position that corresponds with their position. One far end of the line means students think the dairy system very much benefits the environment, and the other far end of the line means students think the dairy system is very harmful to the environment. Students can stand either on these extreme ends or anywhere along the line between them.
3. After students line up, ask selected students to share their reasoning for why they lined up where they did. Allow students to argue their different positions and how they are supporting their position.

Collect student responses and use the Lesson 6 Written Argument Rubric: Part 3 Task Rubric to evaluate student responses. At the bottom, this rubric also contains guidance for how to support students in using a peer feedback protocol and an activity to discuss and norm on what features of high-quality student responses look like. Use either or both to have students reflect on and improve their work should you decide that additional steps are needed for your class to achieve proficiency.



Part 4: Navigation to the Next Module

After students have shared, provided feedback, and noted areas of agreement and disagreement in their arguments, summarize the areas of disagreement to help students see that there is still more they need to figure out about how the dairy industry impacts the environment. Return to the class list of media claims from Lesson 1 and point out that we still placed several remaining claims in the unsure category, including those related to how the dairy system impacts climate. Then, direct the class back to the Driving Question Board and point out the Greenhouse Gas and Climate category of questions.

Lead a class discussion for students to share what from these categories needs further investigation to assess the remaining media claims and to resolve the contradictions in their arguments and determine the environmental impact of dairy production.

In student responses, listen for the following ideas:

- We need to know more about how greenhouse gases impact the environment.
- We need to know more about how the dairy system can impact the climate.
- We aren't sure what greenhouse gases have to do with dairy production and cows.
- We aren't sure about what methane does to the climate or what it has to do with cows.

STUDENT SUPPORT

Give students the opportunity for self-assessment of their classroom experience by having them complete the second part of Lesson 6 Student Self-Assessment, SEP Engagement Self-Reflection. This is an **optional activity** to help students reflect on their learning in this module and their engagement with the argumentation SEP. This self-assessment can give insight into how students feel engaging with this SEP. It also offers insights into how the students improve on this practice throughout each module. After completing this form, students may share their responses with an elbow partner or submit them directly to the teacher. You can use the responses in this form to provide additional support for respectful argumentation if students report that their experience can be improved. For example, you may wish to re-demonstrate the respectful argumentation protocol, have students demonstrate it, or have students record their arguments, play them back, and analyze how respectful they were.