

TEACHER GUIDE

EVALUATE LESSON 14



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

What We Figure Out:

We return to Media Claims 2, 5, 6, 7, 9, and 10 and evaluate them for their accuracy. We figure out that some of these media claims are inaccurate or misleading. They seem to only tell part of the story. It is true that dairy production contributes greenhouse gases to the atmosphere. However, many of these claims do not give context to share that greenhouse gas emissions from the agricultural industry are much less than that of other industries. We acknowledge that the emissions can still be improved upon, but we are seeing how media claims are sometimes only partially accurate.

3D Learning Objectives:

Students evaluate the validity of media claims about the quantity and significance of the impact of the dairy production system on climate.

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

Students provide respectful critiques of the arguments of their peers by asking questions and probing reasoning about how the costs and benefits of the way the dairy system was designed to accomplish its tasks.

Time estimate:

50 minutes

Materials:

Lesson 14 Student Guide
Lesson 1 Student Handout Media Claims (1 packet per group)
Lesson 14 Student Handout Critique Notes
Lesson 14 Written Argument Rubric



Targeted Elements

SEP:

ARG-H3:
Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence and challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining what additional information is required to resolve contradictions.

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

INFO-H4:
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.

DCI:

ESS2.D-H3:
Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.

ESS3.A-H2:
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.

CCC:

SPQ-H1:
The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

SYS-H1:
Systems can be designed to do specific tasks.

Directions



Part 1: Our Motivation

USE OF PHENOMENA

In this lesson, students will use what they have figured out about the Module Phenomenon, how cow burps could be influencing climate change, 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? Students can respond to this question in their Lesson 14 Student Guide Part 1: Our Motivation. In student responses, listen for the following:

- We have created models for how greenhouse gases, such as methane from cow burps and carbon dioxide from transit, are impacting the greenhouse effect.
- We have analyzed data about the quantities of greenhouse gas contributions from different industries.
- We have used a computational model to make predictions about global temperature change in the future.

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 impact on climate better.

Build off student responses to share that what we have figured out about how the dairy system affects climate 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 2, 5, 6, 7, 9, and 10. 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 Greenhouse Effect 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 how dairy production might impact the climate?

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 2, 5, 6, 7, 9, and 10 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 14 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 _____." to support students in this reflection.

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 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.

TEACHER SUPPORT

This is now the second time students have evaluated the validity of the media claims. In Lesson 6, you supported students in choosing a claim and deciding if the claim was accurate, misleading, or inaccurate. Here, to progress students' proficiency with this SEP, you may want to support students in selecting and using evidence that is relevant to deciding if the claim is accurate, inaccurate, or misleading. You can ask students to generate a few different pieces of evidence and guide them through how to decide which piece of evidence would be best to support or refute the media claim. You can also have a conversation about how some claims can be misleading by only telling part of the story, which is particularly relevant to these media claims about the dairy system and climate.

After students have completed the task, you can use the Lesson 14 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 of these 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 it is true that dairy production contributes greenhouse gases to the atmosphere. However, many of these claims do not give context to share that greenhouse gas emissions from the agricultural industry are much less than that of other industries. Acknowledge that the emissions can still be improved upon, but we are seeing how media claims are sometimes only partially accurate.

**Part 3: Construct a Written Argument**

Next, students will return to their argument from Lesson 14 Part 3: Construct a Written Argument 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 both modules 1 and 2 to do so.

Ask students to gather their resources from the module, including models, data sets, and texts from the unit so far.

First, ask students to generate a list of considerations from this module that are important to use in revising their new arguments.

Questions to help 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 greenhouse gas emissions of the dairy system?
- What can you now add to the list of social, environmental, economic, and geopolitical costs, risks, and benefits that we already knew about the dairy system?

As students share, use a Domino Share Routine to have them build off each other's contributions.

1. Students participate in a free discussion or open exchange with a small group after being given time to think through their responses.
2. Ask one student representative from each group or pair to share what they heard in their conversations.
3. As each subsequent representative shares, they can agree with what has been said, add to it, or disagree and suggest revisions to it.

Listen for responses that describe:

- Ideas about how carbon dioxide and methane impact the greenhouse effect.
- Which parts of the dairy system contribute to greenhouse gas emissions.
- The relative quantities of greenhouse gas emissions of the dairy system relative to other industrial systems.
- How methane from cow burps is part of a carbon cycle that removes it from the atmosphere.

Next, ask students to return to their argument from Lesson 6 about what they thought the overall impact of dairy production is on the environment. Students will now revise their arguments to try to come up with a holistic view of the dairy system based on what they learned in both module one and module two of this unit.

Provide students with the 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 revise their arguments based on their new understandings from this module. Students can record their new argument in Lesson 14 Student Guide Part 3: Constructing a Written Argument.

TEACHER SUPPORT

This is now the second time students have written or revised this argument. In Lesson 6, student support focused on introducing students to using a claim, evidence, and reasoning for the argument. Here, to progress students' proficiency in developing these arguments, you may want to provide additional support for students to focus on developing their evidence or their reasoning using the Look Fors. For example, students may need specific support in choosing evidence from their resources or deciding if evidence is relevant to their claims, supports or does not support their claim.

STUDENT SUPPORT

If students need additional support in writing their arguments, consider:

- Reminding students that they can use any of their resources from throughout the unit to help them write their arguments.
- Focusing students' attention on pieces of evidence they may be overlooking.

- Providing a graphic organizer for writing scientific arguments or having students create their own based on the Look Fors.
- Unpacking the Look Fors together with students and discussing what features of high-quality arguments look like.

After students have written their arguments, provide the Lesson 14 Student Self-Assessment handout. Ask students to complete the Written Argument Self-Reflection checklist to ensure they have met the requirements. If students find they don't have all the elements in the checklist, suggest they look again at the arguments they have written. Give students time to revise their written argument based on their self-reflection.

After students have completed the task, you can use the Lesson 14 Written Argument Rubric: Part 3 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 of these 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: Respectfully Critique an Argument

After students have written their arguments, instruct them to share their arguments with their peers and provide respectful critiques of their peers' ideas using the protocol below. Once again provide the Look Fors for students to review prior to beginning the task. Students can use these Look Fors to guide their responses. Students can capture their critiques that they will later share with their partner on their Lesson 14 Student Handout Critique Notes.

In pairs, have students share their revised arguments following the Sharing 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. Switch roles.
5. Both students list areas of strength of each other's arguments (prompts 1 and 2 on the notes handout).
6. Both students list areas of improvement on each other's arguments (prompts 3-5 on the notes handout).

TEACHER SUPPORT

If this is the first time students have used a respectful sharing protocol, use the protocol shown below:

1. Ask for a volunteer to serve as "Student B" in the protocol.
2. Model this protocol with the student while you serve as "Student A" and the student serves as "Student B."

3. Once the demonstration is complete, students join into pairs to complete the argument protocol outlined above.

Allow students some time to engage in the protocol to provide feedback on each other's arguments. As students work, circulate that room to ask pressing questions. For example:

- What was your peer's claim? How did they support that with reasoning?
- What evidence did your peer provide? How well do you think it supports their claim?
- What area of their argument can be improved? How will you ask them to improve it?

CCSS SUPPORT

SL 9-10.1(d): Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented. Students engage in this standard when they provide a respectful critique of their peers' ideas. Their assessment of these ideas should be based on evidence and reasoning as opposed to opinion.

After students have completed the task, you can use the Lesson 14 Written Argument Rubric: Part 4 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 of these to have students reflect on and improve their work should you decide that additional steps are needed for your class to achieve proficiency.



Part 5: 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 dairy 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 biodiversity. Then, direct the class back to the Driving Question Board and point out the Biodiversity and Environment category of questions.

Lead a class discussion for students to share what needs further investigation to truly assess environmental impact and address contradictions among their arguments.

Student answers may look like:

- We need to know more about how the dairy system impacts other parts of the environment, such as other plants and animals.

- We need to know more about how crops being grown can impact other plants and animals.
- We need to know more about what the dairy system does to help the impacts they are creating.

STUDENT SUPPORT

Give students the opportunity for self-assessment by having them complete the second part of Lesson 14 Student Self-Assessment, SEP Engagement Self-Reflection. This is the same **optional tool** from Lesson 6 for students to reflect on their learning in this module and their engagement with the argumentation SEP. After completing this form, students may share their responses with an elbow partner.