TEACHER GUIDE
EVALUATE LESSON 25

Food and Agriculture Center for Science Education

Module Question: *How can we improve on the costs and risks of the dairy system?*

What We Figure Out:

Across all our presentations, we see that there are a wide variety of solutions that the dairy system can implement to improve on the costs it currently has on the environment. We share these solutions with our peers and with relevant community members.

3D Learning Objective:	**Time estimate:**	**Materials:**
Students communicate scientific information about the redesign of the dairy system to explain how it can more responsibly manage natural resources, improve on the system's risks, and maintain its benefits.	100 minutes	Lesson 25 Student Guide Lesson 25 Rubric Lesson 25 Student Self Evaluation Handout Solutions Presentations from Lesson 24

Targeted Elements

SEP:	**DCI:**	**CCC:**
INFO-H5: **Communicate scientific and/or technical information or ideas (**e.g., about phenomena and/or **the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and** mathematically)**.**	**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.** **ESS3.C-H1:** **The sustainability of human societies and the biodiversity that supports them**	**SYS-H1:** **Systems can be designed to do specific tasks.**

		requires responsible management of natural resources.	

Directions

💡 Part 1: Our Motivation

Ask students to return to the list of steps of the engineering design process that they created in Lesson 21 Part 1. Ask students what they figured out in the previous lesson and what they think the best next steps are as part of the engineering design process. In student responses, listen for the following ideas:

- We prepared initial drafts of presentations for our solutions and received peer feedback. Next, we want to revise our solution and share it with a relevant audience.

Build off student responses to share that to be able to help address the impacts that the dairy system is having on the environment, it will help us to follow the engineering design process and, next, present our solutions to a relevant audience. Students can record what they want to figure out and the next step in the engineering design process in Lesson 25 Student Guide Part 1: Our Motivation. This will help students understand how this lesson connects to what they were previously trying to figure out about determining an approach to solving problems.

✏️ Part 2: Revising Solutions Presentations

Share with students that they will have an opportunity to revise their Solutions Presentations before presenting them to a local stakeholder or other community member.

Ask students to review the feedback provided by their peers in Lesson 24 and implement any suggestions they choose to their solution presentation. Encourage student groups to reflect on the feedback received and the revisions they can make to their proposed solutions. Share the importance of incorporating feedback from perspectives other than their own to improve on their solution design and that even if students disagree with the feedback, try hard to find the best intent in how that feedback can help them.

Start by having students carefully review the feedback received from their peers. Allow students time to work in their groups to analyze and implement the feedback. As students work, circulate the room to support students in interpreting the feedback. Ask questions such as:

- What were some common themes in the feedback you received?
- What were some recurring feedback points across the feedback from different peers?
- How will you prioritize implementing the feedback you received?
- What feedback seems most critical? What feels most relevant? What feedback feels like you should implement first?

Help students identify additional resources or supports students need to implement their action plans effectively. This could include providing access to relevant materials, support from you, or additional collaboration time with peers. Regularly check in with students to monitor their progress in implementing the feedback. Provide guidance and encouragement as needed to keep them on track.

STUDENT SUPPORT
If students need additional support implementing feedback, consider:
- Providing a graphic organizer for students to organize their feedback and to help prioritize different feedback items.
- Focusing students' attention on areas of feedback that are high priority.

Provide the Lesson 25 Student Self-Assessment handout. Ask students to complete the Solutions Presentation Self-Reflection checklist to give an opportunity for them to self-assess and ensure they have met the requirements. If students find they didn't have all of the elements in the checklist, direct them back to their Look Fors and suggest they revise their work.

CCSS SUPPORT
SL 9-10.4: Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
Through their work on their Solutions Presentations, students are working to improve their work. Students should consider organization, audience, and the requirements of the task when developing their presentations.

Conclude this part of the lesson by having students reflect on the growth and improvement students have demonstrated throughout the process of receiving feedback and making revisions. Most importantly, ask students to reflect on how respectful the feedback process was, how useful the feedback from their peers was, and how to take different kinds of feedback and find the most meaningful pieces to implement.

After students have completed the task, you can use the Lesson 25 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.

Part 3: Local Stakeholder Presentation

After students have implemented their revisions, each of the problem groups should choose one or more local stakeholders with which to share their presentations. Local stakeholders could include Dairy Herd Managers, Crop Farmers, Soil Management Engineers, Environmental Engineers, Large Animal Veterinarians, or Dairy Co-Op Owners. Look for persons involved with making decisions within the dairy system.

Students will share their presentations with the class and with local stakeholders, either in person or digitally. Organize the presentation session as is most appropriate for the local-school context. This may mean students invite the stakeholder into class for the presentation, presentations occur in a digital video conference, via email or a video sent to the stakeholder, or by going to a community meeting to share the presentation.

STUDENT SUPPORT
Each student will have their own comfort level presenting their ideas in front of a large group. It's important to encourage problem groups to organize their presentation approach based on their strengths while making sure everyone's voices or opinions are heard and honored.

Students can also present their solution to the class, or you can invite the class to the presentation sessions with the local stakeholders. Students will record a summary of the problems and solutions presented by each group in the table provided in the Lesson 25 Student Guide Part 3.

STUDENT SUPPORT
Some students might find this topic very relevant or interesting. Encourage them to continue their learning and growth in this area by sharing their presentations with their family or additional stakeholders/groups in the community who might find this information relevant. You can also ask students to research this topic in more depth and ask local stakeholders what solutions they are trying out and if the student can volunteer to be a part of the work the stakeholder is doing.

Part 4: Reflections

After each group has shared their presentation, instruct students to use the Lesson 25 Student Guide Part 4 Reflections questions to choose a presentation group to share a reflection with. Students should prepare a short, 2- to 3-minute video or written note addressing the following:

- Give a shout-out to something they thought their peers did well on in their presentations.
- Describe why the chosen presentation resonated with them or changed their thinking.
- Describe if, after the presentation, you would re-categorize any of your media claims from your original media claim sort from Lesson 1.

STUDENT SUPPORT

Give students the opportunity for self-assessment by having them complete the second part of the Lesson 25 Student Self Assessment, SEP Engagement Self-Reflection. This is the same optional assessment tool from Lessons 6, 14, and 20 for students reflect on their learning in this module and their engagement with the Obtaining Information SEP. After completing this form, students may share their responses with an elbow partner.