

# STUDENT GUIDE

## EXPLAIN LESSON 23



### Part 1: Our Motivation

Record the next steps you want to take in the engineering design process.



### Part 2: Investigating Solutions for Dairy Production Practices

Read each proposed solution and summarize the central idea in 2-3 sentences. Be sure to answer:

- What solution is being proposed by the text?
- How will this solution change the design of the dairy system?
- What impact will that change have on the outputs of the dairy system or on its externalized costs?
- How will this solution improve the responsible management of natural resources by the dairy system?

**Summarize (Text 1)**

**Summarize (Text 2)**



**Summarize (Text 3)**

Analyze the solution by listing the social, economic, environmental, and scientific benefits and potential costs and risks of the solution itself.

**Benefits (Text 1)****Costs and Risks (Text 1)****Benefits (Text 2)****Costs and Risks (Text 2)**

Benefits (Text 3)	Costs and Risks (Text 3)

Overall, how do you think these solutions increase or maintain the benefits of the dairy system, while decreasing its costs and/or risks of the problem your group is focusing on?



### Part 3: Evaluating Possible Solutions

Using the Engineering Design Matrix, evaluate your solutions. Follow these steps to use the Engineering Design Matrix:

1. Identify the specific criteria you will be using from your list in Lesson 21. Write those criteria in the first column on the left side.
2. Next, write the three proposed solutions you analyzed from Lesson 22. Write those solutions in the top row.
3. Now, assign a weight for each criterion from 1 to 5 (with 5 as the highest value). This should reflect how important you think the criterion is.
4. Rate each proposed solution using a scale of 1-5, where 5 is the best, based on how well that solution meets the given criteria. Multiple criteria may have the same ranking of importance.
5. For each solution, score each option on a scale of 1-5 (5 being best) based on how well that option meets the criteria.
6. Multiply the weight for each solution by the score you gave the option to get the weighted score. Now, compare the overall scores of your potential solutions.

		Solution Option 1	Solution Option 2	Solution Option 3
Selection Criterion	Weight	Score: Weighted Score:	Score: Weighted Score:	Score: Weighted Score:

Which criterion did you rank as “most important?” Why did you prioritize it over the others?

Choose one solution that you think performed best in one criterion and explain why you think it performed better than the others. Be sure to describe the social, economic, environmental, and scientific considerations of how this solution performs.

Based on the results of the Engineering Design Matrix, which solution is most promising? Why? Be sure to describe how this solution performed in selected criteria and what tradeoffs you are making by choosing this solution.

Which solution will you choose? Why? Be sure to describe the environmental, social, ethical, and/or economic considerations involved in your choice.

What new tasks will the dairy system accomplish if the solution you choose is implemented?