WRITTEN ARGUMENT RUBRIC
EVALUATE LESSON 20

Food and Agriculture Center for Science Education

Part 2 Task Rubric

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.**

LS4.D-H2: Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. T**hus, sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth.** Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.

CE-H3: Systems can be designed to cause a desired effect.

	Emerging	Developing	Proficient
Sample Student Response	I think media claim 12 is accurate. It says that dairies help save tricolored blackbirds. This claim is accurate because the dairy system can use a grazing strategy to help preserve some of the habitat for different species.	I think media claim 12 is accurate. It says that dairies help save tricolored blackbirds. The way the dairy system is designed is meant to provide dairy products for consumers. The system was built to do this well. One unintended consequence of this design is that it contributes to a loss of biodiversity because land is cleared which destroys the habitats for many species. But using grazing can actually restore habitats for some species. For the tricolored blackbird, it looks like it prefers to have a habitat that is made when cattle graze, so a grazing practice can help save it.	I I think media claim 12 is accurate. It says that dairies help save tricolored blackbirds. It says that their natural habitat is being destroyed, which puts them under threat. The way the dairy system is designed is meant to provide dairy products for consumers. The system was built to do this well. One unintended consequence of this design is that it contributes to a loss of biodiversity. This is especially true with practices such as growing monocultured crops for dairy cattle feed. We saw that the biodiversity in a field of monocultured crop was much less than in a field of undisturbed land. Monocultured land was 0.79 biodiversity index and undisturbed land was 0.90. However, there are practices that the dairy system can use to improve biodiversity. For example, in the article tilted Grazing and Biodiversity" we saw "Metera et al. (2010) found that grazing created favorable conditions for

			the formation of habitat structure preferred by many endangered birds, small mammals, and invertebrates, positively impacting biodiversity of grasslands." This indicates that a practice such as grazing, when done appropriately, can provide habitat for certain species. If the blackbird's habitat is being wiped out, then perhaps a grazing practice is creating new habitats for the birds. Land with grazing cattle had a biodiversity index of 0.88.
How to Achieve This Level	Student completes 0-2 out of 5 Look Fors	Student completes 3-4 out of 5 Look Fors	Student completes 5 out of 5 Look Fors

Part 2 Look Fors	**Prompts to Support Students in Improving on Look Fors**
Student evaluates the claim and states if the claim is accurate, inaccurate, or misleading.	What specific evidence from the module did you use to determine the accuracy of the claim?
Student describes the intended task the dairy system was designed to complete and the unintended consequences of its design.	What do you think the dairy system was designed to do? What are some unintended consequences of its design?
Student describes the consequences of the design of the dairy system on biodiversity, including through one or more of the following mechanisms: ● Overexploitation ● Habitat Destruction ● Pollution	How is biodiversity changing in the example you shared? Which mechanism is involved in the reduction of biodiversity?
Student describes strategies the dairy system is taking to address potential impacts on biodiversity.	What changes to the design of the system are being tried out to help maintain or improve biodiversity?
Student cites two pieces of direct evidence from the module to verify how they are supporting or refuting the claim. Evidence can come from: ● Student models ● Other resources in the module (texts, data sets, etc).	In your response, highlight direct evidence you used from the module. Use a different color for each source.

Part 3 Task Rubric

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

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.

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

	Emerging	Developing	Proficient
Sample Student Response	I think the impact of the dairy industry on the environment is overall somewhat negative. I think that it has negative impacts like water pollution and it adds greenhouse gases to the atmosphere, even though it doesn't add as many as other industries. It also seems to have some negative impacts on biodiversity when fields are cleared to grow monocultured crops.	I think the impact of the dairy industry on the environment is overall somewhat negative. The dairy system is made up of dairy cows raised to produce milk that is processed into dairy products for consumers who depend on agricultural products such as dairy for food. However, the dairy system also has costs and unintended consequences such as pollution, impacts on worker health, and chemical pollution. We also found out that the dairy system contributes greenhouse gases to the environment and it has negative impacts on biodiversity in some cases, though through practices like grazing the impacts on biodiversity can be helped. Overall I think that the downsides outweigh the benefits of the system.	I think the impact of the dairy industry on the environment is overall somewhat negative. The dairy system is made up of dairy cows raised to produce milk that is processed into dairy products for consumers who depend on agricultural products such as dairy for food. The dairy system was designed to make a lot of products for little cost, but doing so has resulted in downsides that extend beyond the boundary of the design of the system, such as an environmental cost like pollution, social impacts such as health problems for workers, and environmental impacts like chemical pollution, contribution of greenhouse gases to the atmosphere, and loss of biodiversity when land is cleared to grow monocultured crops to feed cattle. The article, "A Review of Potential Public Health Impacts Associated With the Global Dairy Sector," states that "Livestock production may also be the single largest sectoral source of water pollution. Major sources of water pollution from dairy farms include animal wastes, pharmaceutical residues (e.g., antibiotics and hormones), fertilizers and pesticides used for growing feed crops, and sediment from eroded pastures." The agricultural industry is also the global leader in methane emissions

			at over 3 billion tons per year, as stated by Our World in Data. But at the same time, according to Our World in Data, globally the Energy sector contributes 74% of greenhouse gas emissions, while Livestock only contributes 5.8%. So this means that the dairy industry is probably not as large of an emitter of greenhouse gases as other industries. We also saw that a practice such as grazing can have a positive impact on biodiversity by providing new habitats for wildlife, compared to monocultured crop fields. That article stated that, "Metera et al. (2010) found that grazing created favorable conditions for the formation of habitat structure preferred by many endangered birds, small mammals, and invertebrates, positively impacting biodiversity of grasslands." So overall, I think the system has some downsides and some benefits.
How to Achieve This Level	Student completes 0-1 out of 4 Look Fors	Student completes 2-3 out of 4 Look Fors	Student completes 4 out of 4 Look Fors

Part 3 Look Fors	**Prompts to Support Students in Improving on Look Fors**
Student makes a claim about the overall positive or negative effects of the dairy system on the environment.	Was the claim you made about the effects of the dairy system on the environment positive, negative, or somewhere in between?
Student describes the tasks(s) of the dairy system that are relevant to the argument and the possible unintended consequences of the way the dairy system was designed.	What tasks was the dairy system designed to complete? What are the unintended consequences of the system?
Student explains the costs and benefits of the dairy system overall, including economic, social, environmental, and/or geopolitical costs and benefits. Students uses one cost or benefit from each module: ● Dairy system, pollution, and health ● Dairy system and climate ● Dairy system and biodiversity	What economic, social, environmental, or geopolitical costs or benefits did you include? Did you include costs and benefits from Modules 1, 2, and 3?
Student cites three pieces of direct evidence from the unit in support of their claim. Evidence can be taken from: ● Student models ● Other resources in the whole unit (texts, data sets, etc.)	What specific evidence from the module did you use to determine the accuracy of the claim? In your argument, highlight the direct evidence you used from the module. Use a different color for each source.

Part 4 Task Rubric

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.

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.

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

	Emerging	Developing	Proficient
Sample Student Response	The argument presented is pretty good. I think it could add more evidence about exactly how much greenhouse gasses are produced by the dairy system and more about the benefits of the dairy system.	The argument presented about the overall impact of the dairy system on the environment I think is pretty good First, I want to point out that this argument does a good job of showing both sides, the costs and the benefits of the dairy system. Secondly, this argument does state the impact the dairy system has on biodiversity and on pollution. It specifically addresses habitat destruction and how different parts of the dairy system cause pollution that can harm people. Here are some questions that I believe should be addressed in the next iteration of this argument: You suggest that dairy cattle cause climate change. Can you provide data to back that up? Similarly, I also believe these parts of the argument could be edited for clarity. You write that dairy food systems do impact biodiversity by eliminating native habitats. What solutions can the dairy food system come up with to help reestablish those native habitats that they initially destroyed?	The argument presented about the overall impact of the dairy system on the environment I think is pretty good First, I want to point out that this argument does a good job of showing both sides, the costs and the benefits of the dairy system. Secondly, this argument does state the impact the dairy system has on biodiversity and on pollution. It specifically addresses habitat destruction and how different parts of the dairy system cause pollution that can harm people. Here are some questions that I believe should be addressed in the next iteration of this argument: You suggest that dairy cattle cause climate change. Can you provide data to back that up? Similarly, I also believe these parts of the argument could be edited for clarity. You write that dairy food systems do impact biodiversity by eliminating native habitats. What solutions can the dairy food system come up with to help reestablish those native habitats that they initially destroyed? Finally, I think we disagree on how the dairy system is impacting climate. I think you could improve your argument by seeking out new information such as: 1. Data about how much greenhouse gases are produced by the dairy industry compared to others. 2. A description of what happens to methane after it enters the atmosphere.

How to Achieve This Level	Student completes 0-1 out of 4 Look Fors	Student completes 2-3 out of 4 Look Fors	Student completes 4 out of 4 Look Fors

Part 4 Look Fors	**Prompts to Support Students in Improving on Look Fors**
Student respectfully provides critiques on their peer's argument by probing reasoning and evidence.	Do you think your feedback was respectful? Did you respectfully probe your peer's reasoning and evidence in their argument?
Student respectfully provides critiques on their peer's argument by challenging ideas and conclusions.	Which conclusions did you challenge? How have you done so?
Student critique focuses on the tasks the dairy system was designed to accomplish and its unintended effects.	How did your critique focus on the system's impact? How did it focus on the tasks the system was designed to accomplish?
Student makes a suggestion for what additional information is required to resolve an area of disagreement.	What suggestions have you offered to resolve any areas of disagreement?

To Support Students in Revising Their Tasks Based on Peer or Teacher Feedback

- Prior to submitting their work, hold a peer-feedback session using a protocol such as Tell-Ask-Give or with norms such as SPARK. Then have students revise their work based on the peer feedback.
- After submitting their work and receiving feedback and a grade, hold a session for students to norm on the features of high-quality work. Choose three samples of student work (one Emerging, one Developing, and one Proficient), anonymize them, and distribute them to students. Ask students to analyze the three samples of work and annotate what features of the work are high-quality examples of the Look Fors and what features are not. Share out the features of high-quality work that students identified and ask them to point to specific examples in the work samples. Build a class list of features of high-quality work. Then, allow students time to revise their work based on the list they generated and resubmit it for a revised grade.