

5.2: Grading Beef Ecosystem Products and Services Worksheet

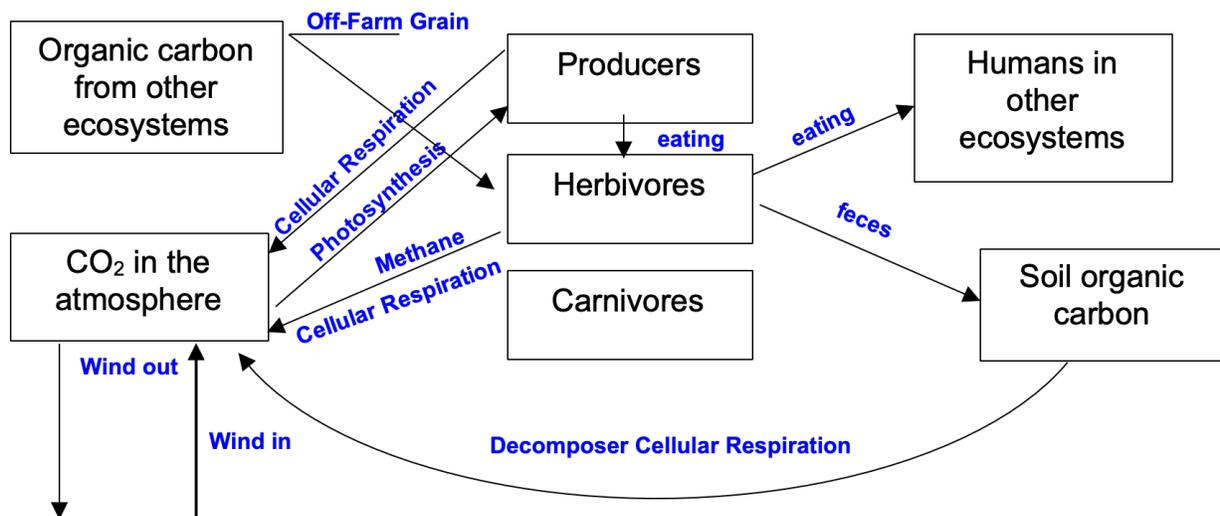
*This worksheet has “grading” in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below.*

Red italics suggest ways to grade student responses by giving them points for correct or partially correct answers. There are 22 points total on this worksheet.

Answer these questions based on the Beef Ecosystem Services Reading, then share what you have learned with people who have read about other ecosystems

A. Carbon Fluxes in a Beef Ecosystem

1. The boxes below show the two main carbon pools in (or connected with) a beef backgrounding operation. Draw and label arrows to show the carbon fluxes for each of the processes in the table for Question 2.



1 point for each line and label; 11 points total

2. Here are some processes that happen in a beef farm ecosystem. Describe how each process moves carbon from one pool to another.

Process	How the Process Moves Carbon Between Pools
The wind blows, carrying CO ₂ into and out of the beef farm.	<i>The wind blows carbon dioxide into and around the beef farm where it is available for plants to use for photosynthesis. The wind also blows carbon dioxide produced by plant and animal cellular respiration out of the beef farm and into other ecosystems.</i>
Cows move and breathe	<i>Cows perform cellular respiration in their cells which moves organic carbon from the food they eat into the air as they exhale carbon dioxide.</i>

Grasses chosen by humans grow	<i>Grasses (producers) move inorganic carbon in the air (CO₂) and store it in their bodies for photosynthesis, which also releases oxygen into the air. Grasses also release CO₂ as a result of cellular respiration.</i>
The cows eat corn grain and hay from other farms.	<i>When cows eat grain and hay from other farms, organic carbon stored in the grain and hay is used by the cows as they do cellular respiration in their cells, moving carbon into the air as carbon dioxide.</i>
Humans eat beef from the cows.	<i>Organic carbon in the cows leaves the ecosystem to be eaten by humans.</i>

1 point for each section; 5 points total

3. The wind blows through the beef farm all year. If you could measure all the CO₂ in the wind blowing into the beef farm and compare it with all the CO₂ in the wind blowing out of the beef farm, what would you expect to find?

- a) There would be a little more CO₂ in the wind blowing in
- b) *There would be a little more CO₂ in the wind blowing out***
- c) There would be just as much CO₂ in the wind blowing in as there is in the wind blowing out

Explain your answer.

Cows are not very efficient at converting the feed they consume into organic mass in their bodies. Most of the carbon the cows consume is exhaled as CO₂ or lost in manure. Most cattle farm operations will add more carbon to the environment than it will take a way, thus resulting in more CO₂ being added into the wind blowing out.

1 point for correct force choice; 1 point for explanation; 2 points total

B. Ecosystem Services in a Beef Farm Ecosystem

Explain some of the main ways that a beef farm provides materials and ecosystem services that are useful to humans.

Answers may vary. The two main materials a beef farm provides are meat (food) and manure that is used as fertilizer. It also provides habitat for many different plants and animals that do not impact the productivity of the cattle such as mosquitoes.

1 point for explaining the materials a beef farm provides

C. Carbon in a Beef Farm Ecosystem

Around a beef farm ecosystem, how would you expect the amount of carbon dioxide in the air to change in the **summer**? The amount of carbon dioxide in the air around the beef farm (choose one):

- a. Would increase
- b. *Would decrease***
- c. Would stay about the same

Explain your answer. What might cause the amount of CO₂ in the air around the beef farm to change during the summer?

Level 4 responses may suggest that when photosynthesis occurs, more carbon atoms move from carbon dioxide in the air to plants. During the summer, the rate of photosynthesis increases and the number of annual plants increase. Since atoms last forever, the overall amount of carbon dioxide in the atmosphere has to decrease.

1 point for correctly answering forced choice; 1 point for correctly explaining how carbon dioxide fluxes in summer; 2 points total

D. Something interesting that you learned

What is something interesting that you learned about a beef farm ecosystem from your readings and discussion?

Answers will vary.

1 point for a relevant and meaningful response.