



# Cattle Grazing Systems

## *Fifth Grade Earth and Life Science*

### Task Overview

In this task, students will obtain information from various media sources, such as infographics, videos, and data sets to explain how an agricultural management practice—the rotational grazing of cattle—can improve a pasture ecosystem. Students will explore the components of the rotational grazing system and how the system improves vegetative cover, grass and root growth, dry matter production, soil erosion, and stream health (using three criteria for stream health—bank erosion, sediment suspension, and the amount of fecal matter in the water). Students will use what they learned in the task to explain the original phenomena—before and after images showing a previously degraded pasture system that has been improved by using a rotational grazing system.

### Background Information

Rotational grazing is one of the grassland management strategies that students learn about in this transfer task. It is a process in which farmers plan how they will move or rotate their cattle to different pastures or pieces of land (ecosystems) to promote healthy grassland development. This management technique allows farmers to provide their cattle with nutritious forages, prevent overgrazing of any area, and cultivate healthy interactions between individual ecosystem components.

Students should have had opportunities to master the content within the New York Agriculture in the Classroom Next Generation Beef Toolkit - [Ecosystems and Soil Health](#).

- As students participate in the first part of the toolkit experience, they will get a broad understanding of ecosystems and biodiversity while learning about humans' impact on the land.
- In the second half of the toolkit experience, students will learn how humans can regenerate ecosystems that might have been negatively impacted or increase the productivity of less productive land while engaging with a real-life agriculturalist.



## Next Generation Science Standards

### Three-Dimensional Claim

In this task, students will **obtain and combine information from various media sources to explain how agricultural practices, such as the type of grazing system used by a cattle producer, can improve and protect an ecosystem.**

This task is intended to elicit student learning of the following **NGSS elements** for each of the three dimensions:

#### Disciplinary Core Ideas

##### *Ecosystem Dynamics, Functioning and Resilience*

- *ESS3.C-E1*: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

#### Science and Engineering Practices

##### *Obtaining, Evaluating, and Communicating Information*

- *INFO-E4*: Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.

#### Crosscutting Concepts

##### *Systems and System Models*

- *SYS-E2*: A system can be described in terms of its components and their interactions.

## New York State P-12 Learning Standards

- *5-ESS3-1*: Obtain and combine information about ways individual communities use scientific ideas to protect Earth's resources and environment.



## Suggestions for Use

This task is intended to be used for formative assessment purposes - to identify students' strengths and needs with the above dimensions in order to provide feedback to students, and guide shifts in instruction.

## Assumptions

Students should have engaged with instructional experiences that ask them to obtain and combine information from different media sources. They should also understand that human activities affect ecosystems, including the land and the plants that grow on it, and that humans and communities can do things to protect these ecosystems. Students should also have experience with systems thinking and cause-and-effect relationships.

## Materials Needed

- [Cattle Grazing Systems Student Task](#)
- Writing utensil



## Assessment Guidance

### Introduction



(Image A)

(Image B)

When cows graze on pastureland, it feeds the cows, but it can serve other purposes as well. Above, you can see two images of the same pasture. The image on the left (Image A) shows a degraded pasture ecosystem. The image on the right (Image B) is of the same ecosystem but was taken years after the farmer introduced rotational grazing.

**“I notice/wonder” chart:** NOT ASSESSED. This chart is to generate initial thoughts about relevancy and authenticity. We encourage you to use this chart to engage students in small group and whole class discussions before they engage with the rest of the task.



## Prompt 1

**Prompt 1:** NOT ASSESSED. This is a scaffolding prompt.

## Prompt 2

**Prompt 2:** NOT ASSESSED. This is a scaffolding prompt.

## Prompt 3a, 3b

**Prompt 3a, 3b:** NOT ASSESSED. These are scaffolding prompts.

## Prompt 3c

**Prompt 3c:** Based on what we have discovered so far, make predictions about grass growth and raindrop splash erosion in a pasture that uses a rotational grazing system where the cattle are rotated throughout the pasture to different grazing paddocks (as opposed to keeping them in the same space). Explain your answers.



### Prompt 3c Performance Outcome:

Obtain and combine information from different media sources to predict how an agricultural practice, like a rotational grazing system, impacts an ecosystem.

<b>SEP</b>	Obtain and combine information from reliable media to explain a phenomena or solutions to a design problem.
<b>DCI</b>	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.
<b>CCC</b>	A system can be described in terms of its components and their interactions.

### Prompt 3c Rubric

*\*Parts a and b are not assessed*

	Emerging	Developing	Proficient
<b>Sample Student Response*</b>	<p>The cows will graze too much so the grass will be thinner.</p> <p><b>OR</b></p> <p>I think the grass will be thicker.</p> <p><b>OR</b></p> <p>The grass gets to rest so there will be more erosion.</p>	<p>Grass in the rotational grazing system has time to rest after grazing. I think the grass will grow taller and thicker and there will be less erosion.</p> <p><b>OR</b></p> <p>Grass in the rotational grazing system has time to rest after grazing. When grass has time to rest, its roots will grow thicker and deeper and the grass will grow taller and thicker.</p>	<p>Grass in the rotational grazing system has time to rest after grazing. I predict grass that gets to rest will grow taller and thicker and its roots will be deeper than if the farmer kept the cattle in the same space the whole time. When grass is thicker, it covers the soil better and there is less bare ground. So, I predict there will be less raindrop splash erosion and grass can continue to grow on that ground.</p>
<b>Look-Fors</b>	Makes one <b>relevant and partial</b> prediction based on the <b>accurate but incomplete</b> information	Makes one <b>relevant</b> prediction based on <b>accurate</b> and <b>complete</b> information, or two	Makes two <b>relevant</b> predictions based on <b>accurate</b> and <b>complete</b> information from the two



	<p>from one of the first two prompts.</p> <p><b>AND/OR</b></p> <p>Makes <b>irrelevant prediction(s)</b> based on <b>inaccurate</b> information from one of the first two prompts.</p> <p><b>AND/OR</b></p> <p>Makes <b>irrelevant</b> or <b>illogical</b> prediction(s) based on an <b>inaccurate</b> understanding of the rotational grazing system.</p>	<p><b>relevant, partial</b> predictions based on <b>accurate</b> but <b>incomplete</b> information from the two graphics in prompts 1 and 2 and the rotational grazing system model presented in prompt 3.</p> <p>The prediction(s) are based on an <b>accurate</b> understanding that the rotational grazing system allows the pasture to rest after/between grazing periods</p> <p><b>AND</b></p> <p>That rest allows the grass to grow longer and/or thicker and/or the roots to grow thicker and/or deeper.</p> <p><b>OR</b></p> <p>Either the rest or the thicker/longer grass helps prevent/reduce raindrop splash erosion so grass can keep growing.</p>	<p>different graphics in prompts 1 and 2 and the rotational grazing system model presented in prompt 3.</p> <p>The two predictions are based on an <b>accurate</b> understanding that the rotational grazing system allows the pasture to rest after/between grazing periods</p> <p><b>AND</b></p> <p>That rest allows the grass and its roots to grow longer, thicker, and deeper</p> <p><b>AND</b></p> <p>That thicker, longer grass covers the ground better and prevents/reduces raindrop splash erosion so the grass can keep growing.</p>
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## Prompt 4

**Prompt 4:** NOT ASSESSED. This is a scaffolding prompt.





## Prompt 5a, 5b

**Prompt 5a, 5b:** NOT ASSESSED. These are scaffolding prompts.

## Prompt 5c

**Prompt 5c:** Using what you learned about grass/root growth, raindrop splash erosion, dry matter production, and stream health, explain how the rotational grazing system improved and protected the pasture ecosystem.



(Image A)



(Image B)





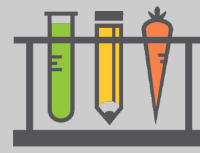
**Prompt 5c Performance Outcome:**

Obtain and combine information from various media sources to explain how an agricultural practice, such as a rotational grazing system can improve and protect a pasture ecosystem.

<b>SEP</b>	Obtain and combine information from reliable media to explain a phenomena or solutions to a design problem.
<b>DCI</b>	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.
<b>CCC</b>	A system can be described in terms of its components and their interactions.

**Prompt 2 Rubric**

	Emerging	Developing	Proficient
<b>Sample Student Response</b>	<p>Pasture A has a lot of bare ground and short grass. Pasture B is improved because there isn't as much bare ground. It looks healthier.</p> <p><b>OR</b></p> <p>The pasture used to have some bare ground and erosion, but after grazing it got better. The cows ate all the grass, but the grass got greener and longer and the stream is healthier.</p>	<p>The pasture used to have a bare ground and was overgrazed. After the farmer started using a rotational grazing system the pasture got better. The grass is thicker and taller and there isn't much bare ground. This means there is less raindrop splash erosion. The stream is healthier, too, with less feces and bad stuff in the water.</p>	<p>The pasture used to have a lot of bare ground and thin, short grass. You can see how badly the stream bank is eroded, with hoof prints in the bare soil. This pasture was probably overgrazed and didn't have much grass/DM for the cows to eat.</p> <p>After the farmer started using a rotational grazing system, the grass grew thicker and taller. It covered the bare soil, producing more grass/DM for the cows to eat and decreasing raindrop</p>



			<p>splash erosion. There is also less streambank erosion and less sediment and feces being washed into the stream, improving the stream's health. The pasture ecosystem is improved and protected by using the rotational grazing system.</p>
<b>Look-Fors</b>	<p>Uses <b>some accurate</b> information from the provided media and data sources that is <b>too general</b> to <b>fully</b> explain the phenomena—how implementing a rotational grazing system improved and protected the pasture ecosystem.</p> <p><b>OR</b></p> <p>Uses <b>some accurate and/or inaccurate</b> information from the provided media and data sources that is <b>too general</b> to <b>fully</b> explain the phenomena <b>and/or does not connect the changes</b> in the pasture images <b>to the use of</b> a rotational grazing system.</p>	<p>Uses and combines <b>accurate</b> information from the provided media and data sources that is <b>too general</b> to <b>fully</b> explain the phenomena.</p> <p><b>OR</b></p> <p>Uses and combines <b>accurate</b> information from the provided media and data sources to <b>fully</b> explain the phenomena, while including some <b>inaccurate</b> information.</p>	<p>Uses and combines <b>sufficient and accurate</b> information from the provided media and data sources to <b>fully</b> explain the phenomena—how implementing a rotational grazing system improved and protected the pasture ecosystem.</p>



## References

Stewart, R.L., Jr., J.C.B. Dubeux, Jr., L.E. Sollenberger, J.M.B. Vendramini, and S.M. Interrante. 2005. The stocking method affects plant responses of Pensacola bahiagrass pastures. Forage & Grazinglands doi: 10.1094/FG-2005-1028-01-RS. <https://doi.org/10.1094/FG-2005-1028-01-RS>

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