



Green Career Awareness Module



Lesson # and Title	Lesson Ten ▾ Cows and Carbon Footprint
Duration	45 minutes

Lesson Overview
Having learned about the impacts of raising livestock on land, water, and biodiversity, students will further their learning by engaging with content related to the importance of reducing our carbon footprint. They then learn about how cattle contribute to climate change. The lesson ends with a brief analysis of the footprint of beef vs bread to begin to prepare them for creating a climate impact scoring system during the solutions phase of the module.
Learning Objectives
By the end of this lesson, students will be able to: 1. Define <i>carbon footprint</i>, understand why it's important to find ways to reduce our carbon footprint, and describe how replacing plastics with biodegradable plastics is an example of how to reduce our carbon footprint. 2. Describe how cows contribute to climate change. 3. Analyze the footprint of different foods.
Content Standard(s)
NGSS ▾ MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. CCSS Math ▾ 7.RP.A.2: Recognize and represent proportional relationships between quantities.

CCSS Math ▾ 7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically.

CCSS Math ▾ 7.SP.A.2: Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

CCSS Math ▾ 8.F.B.4: Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph.

CCSS Math ▾ 8.SP.A.4: Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table.

Equipment, Instructional Resources, and Materials

Computer/projector

Key Vocabulary and Terms

1. Carbon footprint
2. Greenhouse gas emissions
3. Biodegradable
4. Carbon Dioxide
5. Methane
6. Freshwater Withdrawals
7. Nonrenewable Resources
8. Optional Extension: Acidifying Emissions
9. Optional Extension: Eutrophying Emissions
10. Optional Extension: Stress-Weighted Water Use

Teacher Preparation

Familiarize yourself with  Plate to Planet Lesson 10: Cows and Carbon Footprint

Lesson Procedure

Slide Deck:  **Plate to Planet Lesson 10: Cows and Carbon Footprint**

Segment Title	Activity/Task, Student Grouping, Special Accommodation, Related Career(s), and Assessment	Time
Carbon footprint and ways to reduce it	Procedure: Slides 1-6 1. Ask students if they know the definition for carbon footprint. 2. Define <i>carbon footprint</i> and explain to students why it is important to find ways for us to reduce our carbon footprint. 3. We can make algae-based plastic, which is biodegradable and sustainable, to replace fossil fuel-based plastics. 4. Show video (slide 6) Student Grouping: Whole Group ▾	15 min
How cows affect carbon footprint	Procedure: Slides 7-14 1. Ask students what they think about how food affects our carbon footprint. 2. Show the graph of gas emissions from foods a. Tell students that different foods produce different amounts of greenhouse gasses such as carbon dioxide and methane. b. Tell students that after carbon dioxide, the next most abundant greenhouse gas is methane (CH₄). Although carbon dioxide is much more abundant in the atmosphere than methane, methane traps roughly 30 times more heat than carbon dioxide. c. Ask students what they notice and wonder about the graph. 3. Show slide 9. Tell students that the reason beef has such a large carbon footprint is that they produce both carbon dioxide and methane in their bodies which escapes into the atmosphere adding to climate change. 4. Show the video on slide 10 5. Show slide 11. Tell the students that all animals breathe out carbon dioxide, but few animals emit methane. Describe why methane has a larger impact on climate change than carbon dioxide. 6. Show slide 12. Have students discuss the graphic. 7. Show slide 13. Tell students that because of the methane emissions and the number of cows on our planet, cattle produce more greenhouse gasses than all of transportation. 8. Have students discuss the questions on slide 14. Remind students that if beef	15 min

	is not local, you would need to add the emissions of the way the beef was transported to the emissions of the cattle when they were alive.	
Calculating footprint of food	Procedure: slides 15-22 1. Show the video on slide 15 2. Discuss with the students what factors were considered in estimating the carbon footprint of a sandwich 3. Show slide 16. Have students discuss what they notice and wonder 4. Tell students that some of the main things to consider when calculating the overall footprint of food are greenhouse gas emissions/fossil energy use, water use, and land use. 5. Discuss the data and questions on slide 18 6. Discuss the questions on slide 22	15 min
Extensions	Use the expanded data on slides 19-21 and introduce the ideas of Acidifying Emissions, Eutrophying Emissions, and Stress-Weighted Water Use	