

Unit 3: Global and Local

Introduction

The foods we eat connect us to a food system. One can eat an apple from a neighboring orchard or an apple from New Zealand. The goal of this lesson is for students to become familiar with the local and global aspects of our food system. The first activity will help define the terms “local,” “regional,” and “global.” Students will then consider the differences in energy consumed in local and global food systems. Other ideas are offered in the Going Further section.



NY State Learning Standards
English Language Arts 4
Social Studies 3, 4
Mathematics, Science, and
Technology 3, 7

Getting to the Core

Apples are grown in many different parts of the world; over 50 million tons of apples are grown each year worldwide. In the grocery store you may find apples from a nearby orchard or all the way from New Zealand. Washington State produces 60 % of apples grown in the United States (5.65 billion pounds in 2010); the next biggest producer is New York State (1.2 billion pounds in 2010).

Source: http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Current_News_Release/appleaug.pdf



Learning Objectives

- Explain the differences between local and global food systems
- Compare the benefits and drawbacks/challenges of local and global food systems
- Understand the seasonality of food
- Understand the role of energy in the food system
- Describe the impacts of transporting food

Key Concepts

- **Local Food System**
- **Global Food System**
- **Regional Food System**
- **Season**
- **Food Miles**
- **Costs**
- **Foodshed**
- **Foodprint**

Background

Food systems are often characterized as, “local,” “regional,” and “global.” The distinctions between these different systems are based on the distances between the sources of the food (where it is grown, raised or caught) and the place where it is consumed. Note that these distances are relative, not absolute. Also, local may mean something different for someone in a large city, versus a small, diversified farming community, versus a large, sparsely populated Western state. Another important distinction between these systems involves the hidden costs and benefits of each that may not show up in the price we pay for food. For example, the global system uses anywhere from 4 to 7 times as much energy (fuel to transport the food), and produces 5 to 17 times more carbon dioxide than a regional or local food system. Local food systems benefit the local economy by keeping food-related businesses in the community, by employing residents of a community, by keeping local farms in business, and by keeping the rural landscapes agricultural.

A “community” food system emphasizes relationships between people in different sectors in the food system – farmers, processors, distributors, and consumers, for example. (See Food Systems 101 for more information on these types of food systems.)

The distribution of farms and agricultural businesses around the world has shifted to places where food can be produced cheaply; food is then sold on the global market. This global system has enabled production to increase to meet the demands of the population. Local food systems can be participants in the global food system. The issues surrounding the globalization of our food system are complex and extensive. There are significant benefits to our global community while our local communities may experience some drawbacks.

In the past 50 years there has been a significant increase in fossil fuel use around the world. In the U.S., one factor in this increase is the use of fossil fuels for producing and transporting food. In 1965, there were 787,000 combination trucks registered in the United States, and these vehicles consumed 6.658 billion gallons of fuel. In 2003, there were 2,245,085 combination trucks that used 26.9 billion gallons of fuel. Many of these trucks transport food throughout the country. The Center for Agricultural Business found that more than 485,000 truckloads of fresh fruit and vegetables leave California every year and travel from 100 to 2,100 miles to reach their destinations.

Food miles refer to the distance food travels from where it is grown or raised to where it is eaten. Several studies have estimated that fresh produce in the United States travels an average of 1500 miles before it is consumed. An analysis of the USDA Agricultural Marketing Service’s 1997 arrival data from Jessup, MD, found that the produce they distributed had traveled on average more than 1685 miles, with the average distance for fruits being 2146 and the average for vegetables 1596 miles.

Activity 1: Introduction of Terms

Driving Question

What are local, regional, global, and community food systems?



Time Estimate
40 minutes

Learning Objectives:

- Explain the differences between local and global food systems
- Compare the benefits and drawbacks/challenges of local and global food systems

Materials

- blackboard/whiteboard/chart paper

Procedure:

- Begin this activity by discussing the terms Global, Regional, Local and Community. Note that these terms are relative, and different people may have different opinions. Some guiding questions include:
 - What does the term “local” mean to you?
 - What is your local area?
 - What makes a food a local food?
 - What does the term “regional” mean to you?
 - What region do we live in?
 - What might make a food a regional food?
 - What does the term “global” mean to you?
 - What might make a food a global food?
 - What does the term “community” mean to you?
 - What is your community?
 - What might make a food a community food?
 - When you eat an orange, where did it come from?
- Based upon the discussion students have just had about the terms, explain that food systems can be local, regional, or global, depending on how far the food travelled to reach the consumer. Explain that the distances are not absolute, but relative, and dependent on circumstances. Community food systems are similar to local food systems, but place a greater emphasis on the needs of the community and on relationships among the players in the food system.
- Optional: If youth feel they need absolute numbers to distinguish the types of food systems have them work together as a group to decide what constitutes local, regional, global, and community, in your area.
- Next, consider the benefits and drawbacks of each type of food system. You can do this as a large group, or break the class into smaller groups and have each group focus on one type of food system. Things to consider include food quality, economic impact, environmental impact, who benefits and who does not, how the food system impacts your community. The following worksheet



may be used to guide small group work.

- As a follow-up, have each small group create a marketing campaign to convince the class that “their” type of food system is best. Alternatively, have each small group present the pros and cons of “their” system to the rest of the group.

Related Links:

Local Harvest – A website of resources for locally sourced foods. Discusses methods of accessing local foods, including a database of farms and farmers markets around the country. <http://www.localharvest.org>

Eat Local Challenge – A group blog focused on eating locally – including reasons to eat local and individuals' experiences with local food around the country. <http://eatlocalchallenge.com>

Food Routes – Food Routes Network provides communications tools, technical support, networking and information resources to organizations nationwide that are working to rebuild local, community-based food systems. FRN is dedicated to reintroducing Americans to their food – the seeds it grows from, the farmers who produce it, and the routes that carry it from the fields to their tables. <http://www.foodroutes.org>

Redefining Progress – A public policy think tank focusing on economics that considers sustainability and social justice. Click on the Educators tab for lesson plans and classroom resources on sustainability. <http://www.rprogress.org>

Local Foodshed Mapping Tool for New York State – The Local Foodshed Mapping Project investigated the capacity of agricultural land in New York State to meet the food needs of the state's population centers. The Local Foodshed Mapping Tool is an internet map server (IMS) that provides a means for interactively exploring results from this study. <http://www.cmapping.cfm>

Cool Foods Campaign – The “Cool Foods” Campaign aims to take a bite out of global warming by changing the way you eat. <http://www.coolfoodscampaign.org>

Food and Climate Change – Recent evidence about the contribution of food and farming to climate change. <http://www.sustainweb.org/foodandclimatechange>

Eat Low Carbon Diet Calculator – Allows you to drag-and-drop various foods into a virtual pan to determine carbon emissions of different meal choices. <http://www.eatlowcarbon.org>

Name: _____

Types of Food Systems Worksheet

Type of Food System:

Best thing about this type of food system:

Worst thing about this type of food system:

What do you think might make this type of food system better?

What do you know about the quality of food in this type of food system?

How does this type of food system impact the local economy? The global economy?

How does this type of food system impact the environment?

Who benefits in this type of food system? Who does not?

How does this type of food system impact your community?

Activity 2: Seasonality of Food

Driving Question

What is seasonality?

When is produce freshly available in our area? Why?



Time Estimate
20 minutes

Learning Objectives

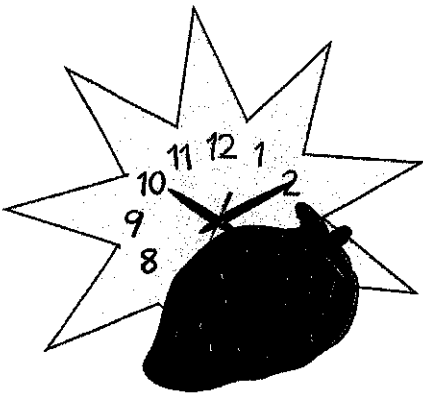
- Understand the seasonality of food

Materials

- Seasonal Availability of Produce list for your area (see “Related Links” below)
- internet or library access, if desired for research

Procedure

- Have the group discuss their knowledge of and experiences with strawberries. Some guiding questions:
 - Have you ever eaten strawberries?
 - What are some of the different ways you have eaten strawberries? (fresh, frozen, jam, yogurt, ice cream, shortcake, etc)
 - Have you ever seen strawberries growing?
 - Have you ever picked strawberries? If so, where? When? What time of year was it?
 - Can you pick strawberries here in the winter?
 - When are strawberries ripe locally? (i.e. when are they ready to be picked, what is your local season for strawberries)
- Are there any foods that we cannot grow in our area? Do we eat these foods? When? Where do we get them? Where do they come from?
- Lead a discussion about the Seasonality Availability of Produce list. What do students notice about this list? Why are some items listed in summer but not in winter? How do you know when a food is “in season?”
- What is a growing season? What is a harvest season? What is an availability period? How do these differ and overlap?
- Break into small groups of 3-4 students. Have each group choose a produce item, and make a list of the forms in which it can be eaten when not in season. What has to be done to the fresh product to make it so it can be eaten out of season?
- Have each group create a marketing campaign or presentation about their fruit or vegetable – presenting where it can be grown, the growing and harvesting season, when it is available fresh and through storage, forms it can be eaten in, where to get it locally, what’s good about it, etc.



Related Links

Seasonal Produce Lists - Because of the varied climate in the Northeast, different fruits and vegetables are available at different times of the year. This site provides lists, by season, of locally fresh produce in the northeast.
<http://webarchive.human.cornell.edu/foodguide/archive/index.html?CFID=81752>

Simple Steps: Eat Local - Find produce in season or farmers’ markets near you.
<http://www.simplesteps.org/eat-local>

Activity 3:

Food Miles/Energy Comparison

Driving Question

How much energy does it take for me to eat a strawberry?



Time Estimate
40 minutes

Learning Objectives:

- Compare the benefits and drawbacks/challenges of local and global food systems
- Understand the role of energy in the food system
- Describe the impacts of transporting food

Materials

- food systems models from Unit 2, Activity 1
- Table 1: Strawberry Scenarios
- Table 2: Energy Key
- energy worksheets
- maps of the country and of your local area
- writing board and markers
- paper and pencils
- calculators

Procedure

- Divide into groups of 3-4.
- Have each group select a strawberry scenario. A complete scenario includes one choice from each from the lists of farm type, market type, consumer transportation, and shopping information. If time permits, have each group create a story about the characters in the scenario.
- Using the Energy Key, maps, and other resources as necessary, each group should complete an Energy Cost Worksheet for their scenario. Youth may be able to think of additional factors that should be considered.
- Each small group should present their scenario and their energy calculations to the whole group.
- Discuss the implications of what the groups have discovered about different scenarios. Some guiding questions to consider:
 - Which scenario used the most energy? The least?
 - What factor had the biggest effect on the energy used?
 - What could we do to reduce energy consumption in each of these scenarios?
 - Was the same number of strawberries involved in each scenario?
 - What would happen if we only bought strawberries from California?
 - What would happen if we only bought strawberries locally?
 - What is the best way to buy strawberries?



Related Links

Google Maps – Map your location and get directions to local farms and farmers markets.
<http://maps.google.com>

Energy Information Administration: Annual Energy Review – Annual energy statistics including energy production, consumption, and trade. <http://www.eia.doe.gov/emeu/aer/pdf/aer.pdf>

Food, Fuel, and Freeways: An Iowa perspective on how far food travels, fuel usage, and greenhouse gas emissions – Report on a study comparing food miles and CO2 emissions in conventional and local/regional food systems.
<http://www.leopold.iastate.edu/pubs/staff/ppp/index.htm>

Eat Low Carbon Diet Calculator – Calculate the carbon emissions of your meal.
<http://www.eatlowcarbon.org>

Food Environment Atlas – A tool created by the USDA's Economic Research Service that provides a spatial view of ability to access healthy food for communities across the country.
<http://maps.ers.usda.gov/FoodAtlas>

Reducing Food Miles: ATTRA – A collection of resources, publications, and tools related to food miles. http://attra.ncat.org/attra-pub/farm_energy/food_miles.html

Life Cycles Food Miles – Learn about and calculate your food miles. Food miles are the distance food travels from the farm to your plate. http://lifecyclesproject.ca/initiatives/food_miles

Table 1. Strawberry Scenarios

FARM TYPE	
Small scale	Farmer raises only a few (2 to 4) acres of strawberries and sells them directly to the customer from the farm or from a farmer's market. Few external inputs are used and yields are modest.
Retail	Farmer raises a medium acreage (approximately 10 acres) of strawberries and sells them directly to the customer from the farm or from a farmers' market. Inputs are greater than small scale and yields are higher.
Wholesale	Farmer raises a large acreage (50 or more acres) of strawberries and sells them to stores or distributors. There is no direct connection with the customer. Yields and inputs tend to be high.
Processing	The farmer raises a large acreage (50 or more acres) of strawberries and sells them to a processing plant to be made into a strawberry product (such as jam). There is no direct connection with the customer. Yields and inputs vary.
Berry Form	<ul style="list-style-type: none"> • Fresh • Frozen • Jam
MARKET TYPE	
On farm	Pick-your-own or a farm stand located on or near the farm.
Farmers' market	A place at which many farmers sell produce or other farm products. The market is usually located near a population center.
Cooperative Grocer	A medium sized store that sells produce and other food and non-food items. The market is usually located near a population center and is owned by its members.
Supermarket	A large store that sells produce and other food and non-food items. The market is usually located near a population center. Availability of local produce may be limited.
CONSUMER TRANSPORTATION Use of these options depends on consumers, proximity to the market, and proximity to public transit services.	<ul style="list-style-type: none"> • Automobile • Walk • Bike • Public Transit
SHOPPING TRIP	Shopping trips vary from a trip for only berries to a full week's groceries.
Just berries	Assumes that the consumer only buys strawberries. Common for any market type
Small trip	Assumes that the consumer buys strawberries and one-third of the weekly groceries. Common for any market type.
Week's groceries	Assumes that the consumer buys strawberries and an entire week's groceries. Common for a trip to a supermarket

Table 2. Energy Key

1 – Derived from Galletta and Funt (1980). The cost shown for “Wholesale – Northeast” is from the energy budget of Maryland strawberry production (Galletta and Funt, 1980, p. 300); the cost shown for “Wholesale – CA” is an average of two California energy budgets (Galletta and Funt, 1980, p.302-3); the cost shown for “Processing” is a weighted average from energy budgets of California and Oregon (Galletta and Funt, 1980, p.302-4).

2 – Derived from Pimentel and Pimentel (1996).

3 – Based on fuel efficiency, energy value of fuel, and cargo capacity of vehicle. Fuel efficiencies of “trucks” and “vans/pickups” are 1999 estimates from the U.S. Department of Energy, Energy Information Administration (2002). Energy values (in kcal) for diesel and gasoline are from Cervinka (1980, p 15). Cargo capacity is assumed to be 40,000lbs of produce for trucks and 1,000lbs of produce for vans/pickups.

4 – Energy cost of consumer driving to and from market based on vehicle fuel efficiency and energy value of fuel. Fuel efficiencies of “cars” are 1999 estimates from U.S. Department of Energy, Energy Information Administration (2002). Energy values for gasoline are from Cervinka (1980, p 15).

5 – Distributes the energy cost of traveling to/from market amongst all items purchased during a shopping trip (not just strawberries). The amount of weight added to weight of berries based on the average amount of food consumed per capita in the U.S. Food Supply, 1,670lbs per person per year (Putnum, et al, 2000). A “small trip” assumes 1/3 of weekly food purchased during trip. A “week’s groceries” assumes that an entire week’s worth of food is purchased.

METHOD	FOSSIL ENERGY COST	COMMENTS
Production¹:		
Small scale	205 kcal/lb	
Retail	506 kcal/lb	
Wholesale – CA	321 kcal/lb	
Wholesale – FL	946 kcal/lb	
Wholesale – Northeast	803 kcal/lb	
Processing – CA/OR	390 kcal/lb	
Harvest:		
Hand picked	0 kcal/lb	Assume all strawberries are hand picked
Processing²:		
Jam	261 kcal/lb	Assume 1lb berries makes 1lb of jam
Freezing	825 kcal/lb	Assume 1lb berries makes 1lb frozen
Fresh	0 kcal/lb	
Packaging²:		
Glass jar	1,023 kcal/lb	For storing jam - jar holds 1lb
Paper box	722 kcal/lb	For frozen berries - box holds 1lb
Plastic bag	559 kcal/lb	For berries frozen at home - bag holds 1lb
Wood basket	69 kcal/lb	For fresh berries - basket holds 1lb
Storage²:		
Frozen	120 kcal/lb/month	Assume berries stored for 6 months
Refrigerated	60 kcal/lb/month	Fresh berries refrigerated during transport
Shelf	0 kcal/lb /month	Storage for jam
Transport³:		
Truck	0.18 kcal/lb /mile	Used for wholesale and processed berries
Van / Pick-up	2.24 kcal/lb /mile	Used for small scale and retail berries
Consumer⁴:		
Car (just berries)	1790 kcal/mi	Units purchased = wt berries
Car (small trip)	1790 kcal/mi	Units purchased = wt berries + 11 lbs/person 5
Car (week’s groceries)	1790 kcal/mi	Units purchased = wt berries + 32 lbs/person
Bike or walk	0 kcal/mi	

Name: _____

Energy Cost Worksheet

Scenario:

Farm type & location:

Berry form:

Market type & location:

Consumer transportation & location:

Shopping information:

Stage in food system	Energy cost per unit		Distance traveled/du-ration stored		Amount purchased		Total energy use
Production		+	N/A	+		=	
Harvest		+	N/A	+		=	
Processing		+	N/A	+		=	
Packaging		+	N/A	+		=	
Storage		+		+		=	
Transport		+		+		=	
Consumer		+		+		=	
Total						=	

Activity 4: Miles in Your Breakfast

Driving Question

How far did my breakfast travel?



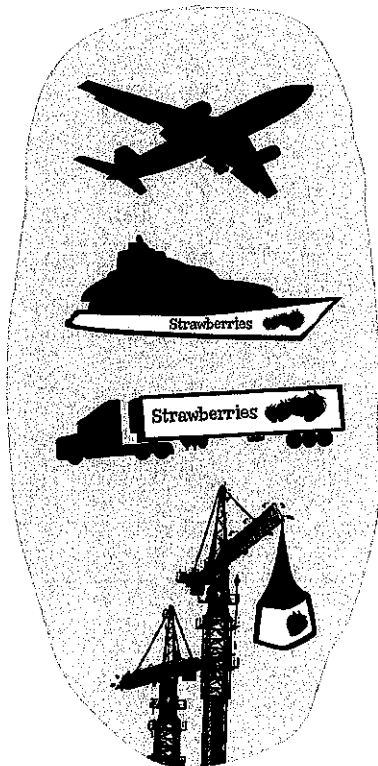
Time Estimate
40 minutes

Learning Objectives

- Compare the benefits and drawbacks/challenges of local and global food systems

Materials

- paper and pencils/pens
- copies of the box below of major crops and states that export them
- calculators if desired
- markers, scissors, tape or glue
- maps of the US/world/region (enough copies for one per pair of students)



Procedure

- As this activity works with students' personal food consumption, remember to be aware of food insecurity and other food sensitivity issues. Use your judgment on how to approach this activity.
- Individually or in small groups, have students write down what they ate for breakfast. Be specific and include all of the components.
- Next, students should break each food item into its ingredients.
- Considering each ingredient individually, students should decide where they think it was probably grown or raised. Students may know specifically where some of the items came from (e.g. if they were homegrown, or procured from a local farmer); for items whose origin is less clear, have students use their general knowledge, or use the resources in the box below to create an educated guess about how far food may have travelled. You might also ask students to bring in the packaging related to their breakfast, or to bring in any information from the packaging regarding the source of the food.
- Add up the distances of each item; how far did the breakfast travel in total?
- On average, food travels over 1500 miles from farm to table. Did your breakfast travel more or less than the average?
- Pair and share.
- In pairs, draw and cut out a picture of each food item discussed. Give each pair a map. Tape or glue each item to the place on the map that it came from. This will create a visual that will allow students to better understand the distance their food has travelled.
- Still in pairs, students should consider which items in their breakfast could be produced locally.
- Back in the large group, discuss the activity. Why did we do this? What did we learn? Why does it matter?

Some of the major crops in the United States and the states that export them:

Corn: Illinois, Iowa, Nebraska, Indiana, Minnesota, & Ohio.

Dairy Products: Wisconsin, California, New York, Pennsylvania, & Minnesota.

Beef: Texas, Nebraska, Kansas, Colorado, Iowa, Oklahoma, & California.

Soybeans: Illinois, Iowa, Nebraska, Indiana, Minnesota, & Ohio.

Pork: Iowa, Illinois, Minnesota, Nebraska, Indiana, North Carolina, & Missouri.

Chickens: Arkansas, Georgia, Alabama, North Carolina, Mississippi, & Texas. Wheat: North Dakota, Kansas, Montana, Oklahoma, Washington, & Minnesota.

Eggs: California, Georgia, Arkansas, Indiana, Pennsylvania & Texas.

Potatoes: Idaho, Washington, California, North Dakota, Maine, & Wisconsin.

Tomatoes: Florida, California, Virginia, Ohio, Georgia, & Michigan.

For more detail, or additional crops, consult resources such as:

<http://faostat.fao.org/site/339/default.aspx>

http://www.nass.usda.gov/Charts_and_Maps/index.asp

<http://www.fas.usda.gov/psdonline/psdHome.aspx>

http://www.nass.usda.gov/Charts_and_Maps/Crops_County/index.asp#br

<http://www.leopold.iastate.edu/resources/fruitveg/fruitveg.php>

Related Links

Where do your fresh fruits and vegetables come from? – U.S. supermarkets and restaurants sell fresh fruit and vegetables from all over the world. This resource shows common origins of more than 95 different produce commodities that are shipped into or across the United States each year.

<http://www.leopold.iastate.edu/resources/fruitveg/fruitveg.php>

Find the Farmer – Stone-Buhr flour company allows consumers to locate the farms that grew the grain milled to create their flour. Type in a product's lot code in the field to the left, and the site will introduce you to the local growers responsible for the final product. <http://www.findthefarmer.com>

Life Cycles Food Miles – Learn about and calculate your food miles. Food miles are the distance food travels from the farm to your plate.

http://lifecyclesproject.ca/initiatives/food_miles

Diets and NY's Ag Footprint - Article reporting a Cornell University study on the "foodprint" size of different types of diets.

http://www.news.cornell.edu/stories/oct07/diets.ag_footprint.sl.html

Know Your Farmer Know Your Food - This is a USDA-wide effort to create new economic opportunities by better connecting consumers with local producers. It is also the start of a national conversation about the importance of understanding where your food comes from and how it gets to your plate.

<http://www.usda.gov/wps/portal/usda/knowyourfarmer?navid=KNOWYOURFARMER>

Food for Thought Journal

Reflect on your learning in this unit. What have you learned about the food system? How does what you've learned connect with your own life? Why does it matter? Do you think any of this information will influence your food choices in the future? Why or why not? Are there any changes you would like to make in the food system or in the way you participate in it? What questions do you have now about the food system?

Going Further

- Describe the growing season in your area – how long is it, average temperatures, average rainfall, etc.
- Calculate your environmental footprint.
- Determine your “foodprint.”
 - Diets and NY’s Ag Footprint - Article reporting a Cornell University study on the “foodprint” size of different types of diets.
http://http://www.news.cornell.edu/stories/oct07/diets.ag_footprint.sl.html
- Get the flyer from a local grocery store, and see if you can determine which of the foods advertised are local, regional, or global.
- Try to eat only locally for a week.
 - Simple Steps: Eat Local <http://www.simplesteps.org/eat-local> - Find produce in season or farmers’ markets near you.
- Try to eat only seasonally for a week
 - Seasonal Produce Lists - Because of the varied climate in the Northeast, different fruits and vegetables are available at different times of the year. This site provides lists, by season, of locally fresh produce in the northeast.
<http://webarchive.human.cornell.edu/foodguide/archive/index.html?CFI=8966335a1c80d60451752>
- Community mapping: Take a map of your town, neighborhood, or region. Assign a different color (marker, colored dot, etc) to each of local, global, regional, and community. Mark on the map the locations of institutions that participate in each of these food systems (such as grocery stores, restaurants, farms, etc.). What can you discover from this map?
- Prepare a meal in class that uses only local ingredients. Ask local stores and farms if they would donate to your project if funds are not available.

Assessment Ideas

Portfolio: Select a meal you recently had at home. This could be the meal from the Unit 1 portfolio piece, or another meal. For this meal:

- Create a map showing where each food item could have come from (like you did in Activity 4).
- Explain whether each item is from the local, regional, or global food system.
- Describe the growing season for this food. If you ate it out of season, explain what needed to happen to make it available (storage, preservation, etc.).
- Calculate the energy used to get each food item to your table, and the total energy used to create the meal.

Quiz suggestions:

- Explain the differences between local and global food systems.
- Compare local and global food systems. What are the benefits and drawbacks of each?
- In your opinion, is a local or a global food system better? Write a paragraph using facts about food systems to support your opinion.
- What does it mean for food to be ‘in season’?
- Calculate the energy used in getting the food from farm to table in the scenario described below. Show your work. (Teachers—create a scenario based on the energy worksheets. Give students copies of the worksheets.)
- Describe the impacts of transporting food.