WHY WE TRANSPORT FOOD: FEEDING THE BIG APPLE

Instructions:

How much farmland does it take to feed a large city? Could the farmland in all of New York State provide enough food to feed all the people in New York City? Using the following data, work as a group to answer the question below.

You may use a calculator.

Data:

For a healthy, balanced diet, the average person needs to eat about **1.25 metric tons** of food in a year.[1] That's enough to fill a large pickup truck.

In 2008, New York City had a population of about **12 million** people.[1]

The farmland in New York State covers about **3.15 million** hectares. A hectare is an area of land equivalent to about half a football field.

Each hectare of farm land in New York State can produce about **2.58 metric** tons of food in a year.[1]

Questions:

Can the farmland in all of New York State provide enough food to feed all the people in New York City? Explain why or why not, and quantify your answer:

Show your work:

Has this activity given you any ideas as to why food is transported over long distances?

WHY WE TRANSPORT FOOD: FOOD FROM OUR REGION

Instructions:

What would it be like to eat only those foods that could be produced within 100 miles of your home?

In the left column of the table below, make a list of foods or food ingredients that you typically eat. For example, if you eat home-made cookies, you might list "sugar, wheat flour, eggs." You might also list unprocessed or minimally processed foods, such as tomatoes, bananas, oatmeal or milk.

In the right column, write down whether or not you think each food or food ingredient is grown or raised within 100 miles of your home. For foods that are available in your area, if you know which times of year they are available, write that also.

If you have access to the Internet, you may use it to research the foods produced in your region.

Questions:

What foods and food ingredients do you typically consume:	Is this food or ingredient produced within 100 miles of your home? If so, when is it available?

Based on your list, would you be willing to eat only foods produced within 100 miles of your home? Why or why not?

Has this activity given you any ideas as to why food is transported over long distances?

WHY WE TRANSPORT FOOD: PLACES FAMOUS FOR FOOD

Instructions:

Each of the places listed in the first column below is known for producing one of the foods listed in the second column. Each place is either the top producer of that food *within* the United States or the top exporter of that food *to* the United States.

Draw a line matching each place to the one food it is best known for producing or exporting. There should be only one line connected to each place and to each food. An example is provided below.

Then, respond to the questions below.

Questions:

Places:	Foods:
Vietnam	Coffee beans & coffee products
California	Cocoa beans
Iowa	Wheat
Kansas	Oranges
Brazil	Blueberries
Chile	Avocados
Idaho	Pork
Florida	Broiler chickens
Maine	Potatoes
Georgia	Nuts
Côte d'Ivoire	Strawberries

What do you think are some of the reasons why these places are the top producers of these foods?

Has this activity given you any ideas as to why food is transported over long distances?

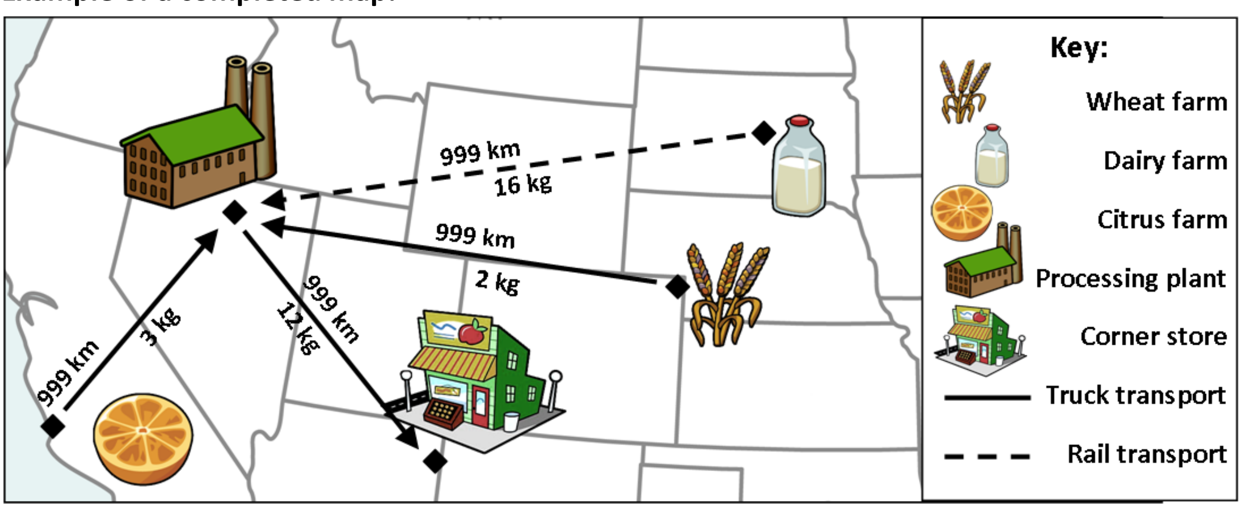
MAPPING FOOD ROUTES: INSTRUCTIONS

How and where does food travel before it gets to a retail store? You will work as a group to answer this question. Use the information given on your *Data Sheet* to map how the ingredients in a product travel from farms to a supermarket.

1. On your U.S. map, mark each point along transport routes. Use an appropriate symbol to mark the point. For example, if the point is a berry farm, you could draw a berry; if the point is a grain processor, you could draw a corn cob next to a factory.
2. On your U.S. map, draw the transport routes between each point using arrows. Work as a group to determine where the routes are and in which direction they should go. Hint: The last distribution route should end at a retail store.

   Use different types of lines (dotted, dashed, colored, etc.) to represent different modes of transport. Assume food is transported over land in a truck unless you know the food is traveling along a major rail route.
3. Using a ruler and the scale provided on your map, calculate the mileage of each transport route, or if you have Internet access, use *Google Maps* or *MapQuest*.
4. Write the mileage next to each route. Remember to include units (km).
5. Create a legend on your map that explains what each symbol represents and what different types of lines represent.
6. When investigating *how far* food is transported, you also have to consider *how much* food is being moved. Remember, the heavier the shipment, the more energy is required to move it. Using the clues given on your *Data sheet*, calculate the weight of each shipment. Hint: Start from the final product and work backward.
7. On your map, write the weight of each shipment next to its route. Include units (kg).

Example of a completed map:



MAPPING FOOD ROUTES: INSTRUCTIONS (CONTINUED)

How far do the ingredients in food travel? How does food distribution impact energy use and greenhouse gas emissions? Work as a group to answer these questions.

8. Copy the following information from your completed map onto your *Food miles worksheet*: Each route, the mode of transport, the weight of the shipment (measured in kilograms) and the distance of that route (measured in kilometers). Write your results in the first three columns.

9. For each route, multiply the weight of each shipment times the distance (measured in kilogram-kilometers). Write your results in the fifth column of your *Food miles worksheet*.

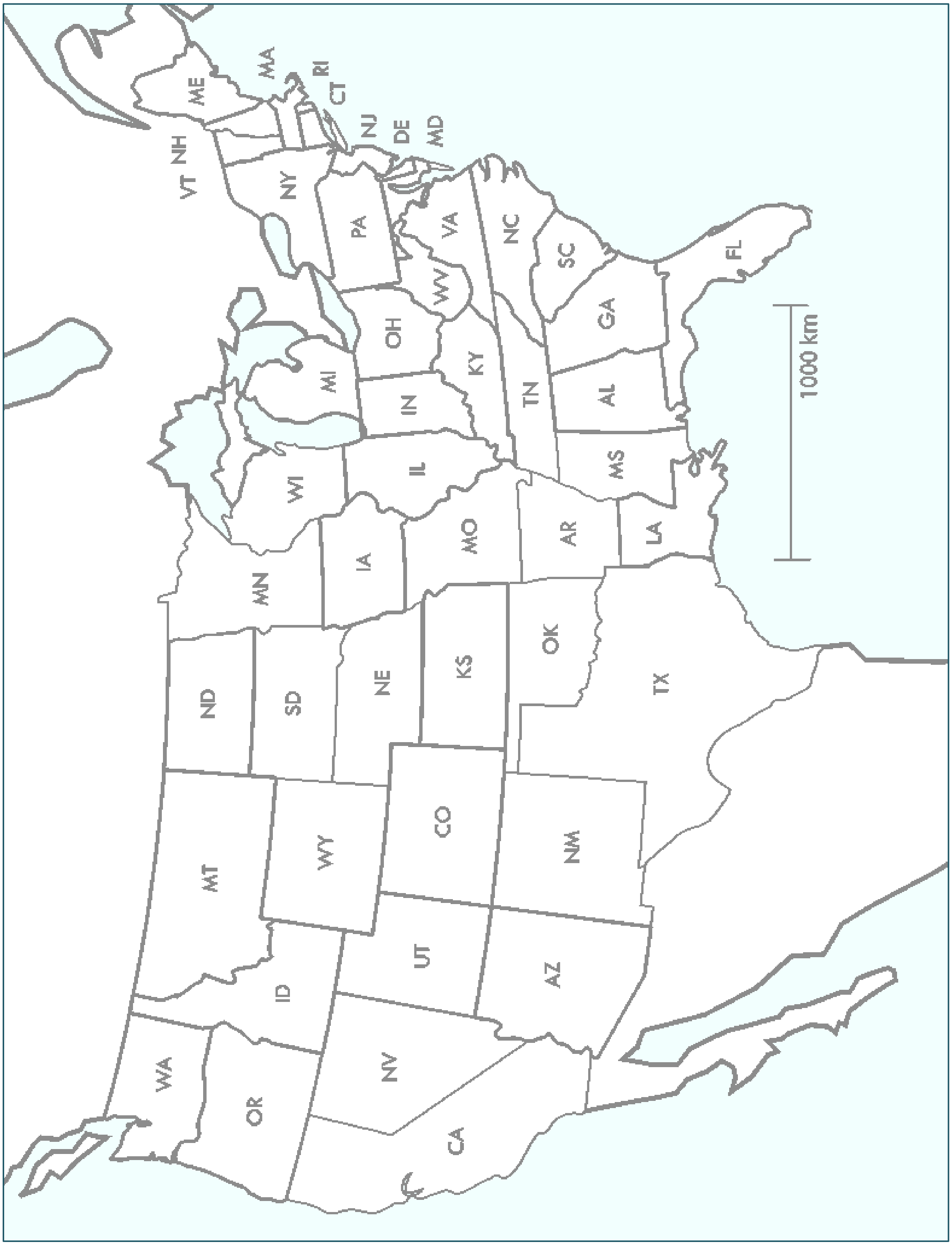
10. Using the table below as reference, calculate the energy required to move each shipment along each route (measured in kilocalories). Write your results in the sixth column of your *Food miles worksheet*.

11. Using the table below as reference, calculate the greenhouse gas emissions created by moving each shipment along each route (measured in grams of carbon dioxide equivalents). Write your results in the seventh column of your *Food miles worksheet*.

12. In the final two rows of your *Food miles worksheet*, calculate the total energy use and greenhouse gas emissions associated with transporting your product from field to retail.

Mode of transport:	**Energy use:**[2]	**Greenhouse gas emissions:**[2]
Boat	0.05 kcal / kg-km	0.011 g CO_2e / kg-km
Rail	0.07 kcal / kg-km	0.018 g CO_2e / kg-km
Truck	0.65 kcal / kg-km	0.180 g CO_2e / kg-km
Air	2.39 kcal / kg-km	0.680 g CO_2e / kg-km

MAPPING FOOD ROUTES: U.S. MAP



MAPPING FOOD ROUTES: FOOD MILES WORKSHEET

Route (from):	Route (to):	Mode of transport:	Weight (kg):	Distance (km):	Weight × distance (kg-km):	Energy (kcal):	GHG emissions (g CO_2e):
EXAMPLE: ORCHARD (FL)	JUICE PROCESSOR	TRUCK	10 KG	100 KM	1,000 KG-KM	650 KCAL	180 G CO_2E
Total energy and greenhouse gas emissions:							
Total energy and greenhouse gas emissions per 1kg of product:							

MAPPING FOOD ROUTES: YOGURT DATA SHEET

Use the information about the following distribution points to map how the ingredients in **100 1 kg containers of strawberry yogurt** (each container is about six single-serving 6-ounce cups) travel from farms to a supermarket.

Distribution points are not listed in the order that they are connected, so you'll have to decide as a group where to draw the correct transportation routes.

Dairy farm

- Located in NE Iowa (Elkader).
- Produces milk.

Dairy processing plant

- Located in Central Iowa (Des Moines).
- Processes milk, sugar and strawberries (from two locations) into strawberry yogurt.
- By weight, the final product is 93% milk, 3.5% strawberries and 3.5% sugar.
- Since about 82% of strawberries grown in the U.S. are from California, assume that 82% of the strawberries used in the yogurt are from California, and that the rest are from Florida.

Distributor

- Before heading to a supermarket, foods are often sent to a distributor where they are stored. The distributor then delivers foods to retail stores. If you know where your nearest yogurt distributor is located (ask your teacher or research this on the Internet), add this information to the map, otherwise it can be skipped.

Strawberry farm

- Located in Southern California (Oxnard).
- Produces strawberries.

Strawberry farm

- Located in Central Florida (Dover).
- Produces strawberries.

Sugar beet farm

- Located in SE North Dakota (Wahpeton).
- Produces sugar beets.

Sugar processing plant

- Located in NW Minnesota (Crookston).
- Processes sugar beets into sugar. It takes about 5.8 kg of beets to produce 1 kg of sugar.

Supermarket

- Located in the town or city nearest you.
- Sells strawberry yogurt.

Adapted from Pirog and Benjamin, *Calculating food miles for a multiple-ingredient food product*.[3]

MAPPING FOOD ROUTES: BEEF DATA SHEET

Use the following information about each distribution point to map how the animals, feed and food in a **204 kg shipment of beef** (about 1,200 hamburgers) travel from fields to a supermarket.

Distribution points are not listed in the order that they are connected, so you'll have to decide as a group where to draw the correct transportation routes.

Cow-calf operation

In a cow-calf feeder operation, baby cows (calves) are raised mostly on pastures until they are about one year of age.

- Located in Central North Dakota.
- Raises steers (castrated male cows).
- A typical steer weighs 272 kg by the time it leaves the cow-calf operation.

Feed corn grower

- Located in Southwest Minnesota (30 km from the feedlot).
- Produces feed corn.

Slaughtering, processing and packing facility

- Located in Southern Kansas (Arkansas City).
- Slaughters steers, then processes and packages the meat.
- A single 454 kg steer typically provides 204 kg of beef.

Feedlot

On a feedlot, steers gain additional weight on a diet of mostly corn.

- Located in Southwest Minnesota.
- Feeds steers a diet of mostly corn.
- A single 272 kg steer can be fattened to a full finished weight of 454 kg. Each animal is fed a diet of 1,089 kg of feed corn, along with other ingredients.

Distributor

- Before heading to a supermarket, foods are often sent to a distributor where they are stored. The distributor then delivers foods to retail stores. If you know where your nearest meat distributor is located (ask your teacher or research this on the Internet), add this information to the map, otherwise it can be skipped.

Supermarket

- Location: The town or city nearest you.
- Sells beef.

Adapted from King, Hand, DiGiacomo et al., Comparing the Structure, Size, and Performance of Local and Mainstream Food Supply Chains.[4]

REFERENCES

1. Peters CJ, Bills NL, Lembo AJ, Wilkins JL, Fick GW. Mapping potential foodsheds in New York State: a spatial model for evaluating the capacity to localize food production. *Renewable Agriculture and Food Systems*. 2008;24(1):72-84.

2. Weber CL, Matthews HS. Food-miles and the relative climate impacts of food choices in the United States. *Environmental Science and Technology*. 2008;42(10):3508-13.

3. Pirog R, Benjamin A. *Calculating Food Miles for a Multiple Ingredient Food Product*. Ames, Iowa: Leopold Center for Sustainable Agriculture; 2005.

4. King RP, Hand MS, DiGiacomo G, et al. *Comparing the Structure, Size, and Performance of Local and Mainstream Food Supply Chains*. ERS; 2010.