



# AGLAND EDUCATOR'S GUIDE

with artwork and references from Mitchell Tolle's book, *The Most Wonderful Dream*



Kentucky Agriculture &  
Environment in the Classroom, Inc.



## When Kentucky Farm Bureau commissioned artist/author, Mitchell Tolle, to make a book

for children, the goal was clear: Let's make a book to excite and inspire children to think about the noble work of **Kentucky farmers**. What emerged from the mind and hands of Tolle is a book profound with its simple message and stunning with its beautiful paintings and drawings. In 32 over-sized pages, with words and pictures, Tolle has given us a classic story, one that intrigues, entertains, and invites us to turn the page.

This Educator's Guide was created to compliment the book in the classroom, but we also feel it works with education found at the **Kentucky State Fair AGLAND**. We have paired portions of Tolle's story with lessons and activities to help students further understand how our farmers work with the tremendous natural resources Kentucky provides.

**Mitchell Tolle** is a Kentucky artist of national acclaim. He attended the Art Academy in Cincinnati, became an artist for the Army, painted a U.S. President and for more than three decades, he and Linda entertained guests from more than 80 nations who traveled to their Gallery in Berea, Kentucky to see and purchase his original paintings and drawings. When Kentucky Farm Bureau approached Mitchell about creating a book to tell the story of farming in Kentucky, he agreed to do it.

*"Kentucky is a place of dreams and beauty," the artist says. "Here, we believe labor has dignity and effort measures reward. Kentucky's mighty rivers and foggy hills, her rugged valleys and fresh plowed fields, her music makers and patient quilters, weary farmers and skilled stone masons invite my hands to paint and draw. Here, depending on God and each other in the sensible way to live."*

Mitchell and his wife of 48 years, Linda, have three children and nine grandchildren and live on a small farm in central Kentucky.

Paintings and drawings by Mitchell Tolle

Guide development and layout by Farm Scholar, LLC.

Lessons courtesy of Kentucky Agriculture and Environment in the Classroom, Kentucky Farm Bureau, and Kentucky Department of Agriculture, with assistance from the Kentucky Agriculture Development Fund.





# Linking Farm to Table

**Grade Levels:** K - 5

**Time Duration:** 15-30 minutes

**Students will:**

- Understand the origin of their food before processing.
- Understand that farmers grow or raise the plants and animals we use for food.
- Make an ingredient model of a meal.

**Material Suggestions:**

- Food products (mix of fresh and processed options, condiments, etc.)
- Baskets or grocery bags with “Farm” and “Store” labels
- Linking Farm to Table Activity Sheets
- Linking Farm to Table Card Game ([teachkyag.org](http://teachkyag.org))

**Procedures:**

1. Show students the food products or the pictures of food products and ask them to decide if the foods should be placed in the “Farm” or “Store” containers, depending on where they came from. Let them categorize all the foods.
2. Reinforce their choices in the “Farm” container, then say that most all foods originate on farms and are provided by plants, animals, or both.
3. Move to the “Store” container and discuss how each has a farm connection. Then ask, “WHO grows our food?” We hope they say farmers.
4. OPTIONAL: Give students one of the Linking Farm to Table Activity Sheets as an assessment.
5. You may also use the Linking Farm to Table Card Game:
  - a. Pass out all the “ingredient” cards (1 to each student) or lay them out on a table. A display board may also be used in the front of the group if you wish to affix Velcro or magnets on the cards. The goal is to link the chain of ingredients for each meal and/or find similarities between ingredients.
  - b. If time allows, a fun ice breaker at the beginning of the lesson could be to allow the students to organize the ingredients on their own, and ask them why they grouped them that way. There is no right or wrong.
  - c. Bring out the “meal” cards and walk the students through the Spaghetti and Meatballs meal. Ask where each of the components come from, and have the students who have those ingredient cards come to the front and link arms.  
  
Pasta > Wheat > Tomato Sauce > Tomatoes > Ground Meat > Beef, Pork or Chicken is acceptable.
  - d. You may also link the animal’s food (corn and soybeans) to each animal. Be sure to have a conversation about producers (plants) and consumers (humans and animals, primary and secondary). Forages (grasses and hays) are also in animal diets.
  - e. See if the students can then complete the “chain” for other meals. Some ingredients will be used more than once.
  - f. OPTIONAL: Ask students to make the farm to table link of their school lunch with the included worksheet.

Farms are magical places, but do most of today’s youth understand that a farm’s purpose is more than a fun place to climb on hay bales, pick pumpkins, and feed farm animals?

As Billy looks forward to visiting his Granddad’s farm, we are reminded that fewer children live on working farms with each generation.

This lesson helps students learn that our food is produced on farms just like the one in the story.

**Kentucky Academic Standards**

Science

Interdependent Relationships in Ecosystems

Practical Living & Vocational Studies


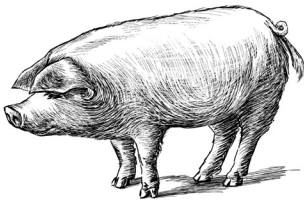



2.30 Students evaluate consumer products and services and make effective consumer decisions.

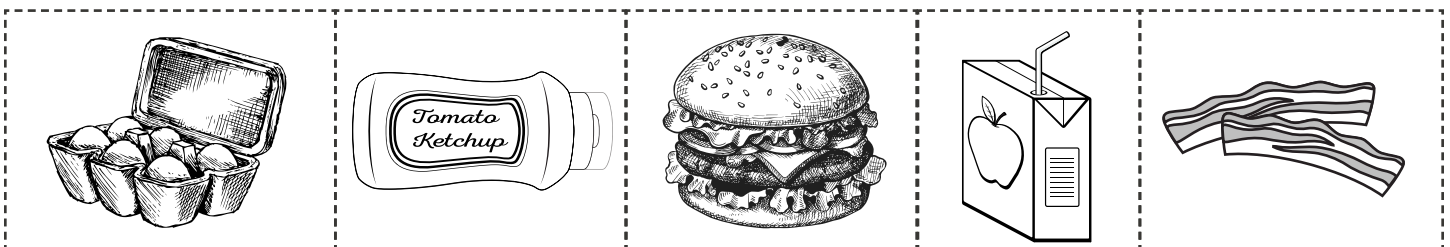
2.33 Students demonstrate the skills to evaluate and use services and resources available in their community.

5.4 Students use a decision-making process to make informed decisions among options.

# Linking Farm to Table

Cut out the processed products at the bottom and glue them next to the produce or animal they come from. Then, draw or write the name of another processed product that can be made from or comes from the same produce or animal.

Produce & Animals	Processed Product 1	Processed Product 2
		
		
		
		
		



# Linking Farm to Table

Use what you learned in class to find the farm links to your meal. Draw a picture or write the foods you ate for your school lunch in the box below. Then draw pictures of or write in the farm ingredients needed to make that meal underneath in the correct food group category. Did you have a balanced meal?

## My School Lunch

### Proteins

### Dairy

### Grains

## Fruits & Vegetables



# Agriculture Where I Live

**Grade Levels:** 2 - 12

**Time Duration:** 15-30 minutes

## Students will:

- Identify their home county and the agriculture that can be found there.
- Understand factors that affect agriculture production in their county.

## Material Suggestions:

- “Agriculture Where I Live” Activity Sheet
- “Ag Data by County” at [www.kyfoodandfarm.com](http://www.kyfoodandfarm.com).
- “My Kentucky Home” Agriculture and Natural Resource Map - available from [teachkyag.org](http://teachkyag.org).

## Procedures:

1. Visit [www.kyfoodandfarm.com](http://www.kyfoodandfarm.com) and click on the “Ag Data by County” tab in the top menu. Click on the county in which your students live and review the data and rankings on a Smart Board or screen.
2. Then have students complete the “Agriculture Where I Live” Activity Sheet.
3. Younger students may be asked to draw a picture of a farm that can be found nearby. Look at the data to decide what crops and livestock should be included in their picture.
4. Older students may be asked to create a graph comparing all agriculture commodities (sales, acreage, or both) in their county OR they may compare one data set from their county to the same data set from other counties nearby, i.e. cattle numbers for Madison, Clark, and Garrard Counties.
5. Want to learn more? Complete the [My Kentucky Home Provides What I Need lesson](#) (best for Grades 4+) and/or watch video: [Kentucky Agriculture: Our Farms, Our Food, Our Future](#). Both lessons can be found at [www.teachkyag.org](http://www.teachkyag.org) - [Teacher Resources](#).

Kentucky is dotted with many farms just like the one Billy visited. In fact, every Kentucky county has some form of agriculture production.

The number and size of farms, however, are dependent upon topography (variations in elevation), natural resource availability, population, and access to markets.

Cattle are most concentrated in central Kentucky due to our rolling, green pastures found there.

Grain crops, poultry, and hogs are more concentrated in western Kentucky; grain crop production is most economical in large areas of flat land, and the livestock that eat those grains are produced near their food source.

Larger fruit and vegetable farms tend to be closer to areas with bigger populations.

There is less agriculture production in eastern Kentucky due to steep hills and mountains, large forested areas, and a focus on other natural resources. Opportunities are growing, however, for smaller farms to cater to local customers interested in knowing who produces their food.

## Kentucky Academic Standards

### Science

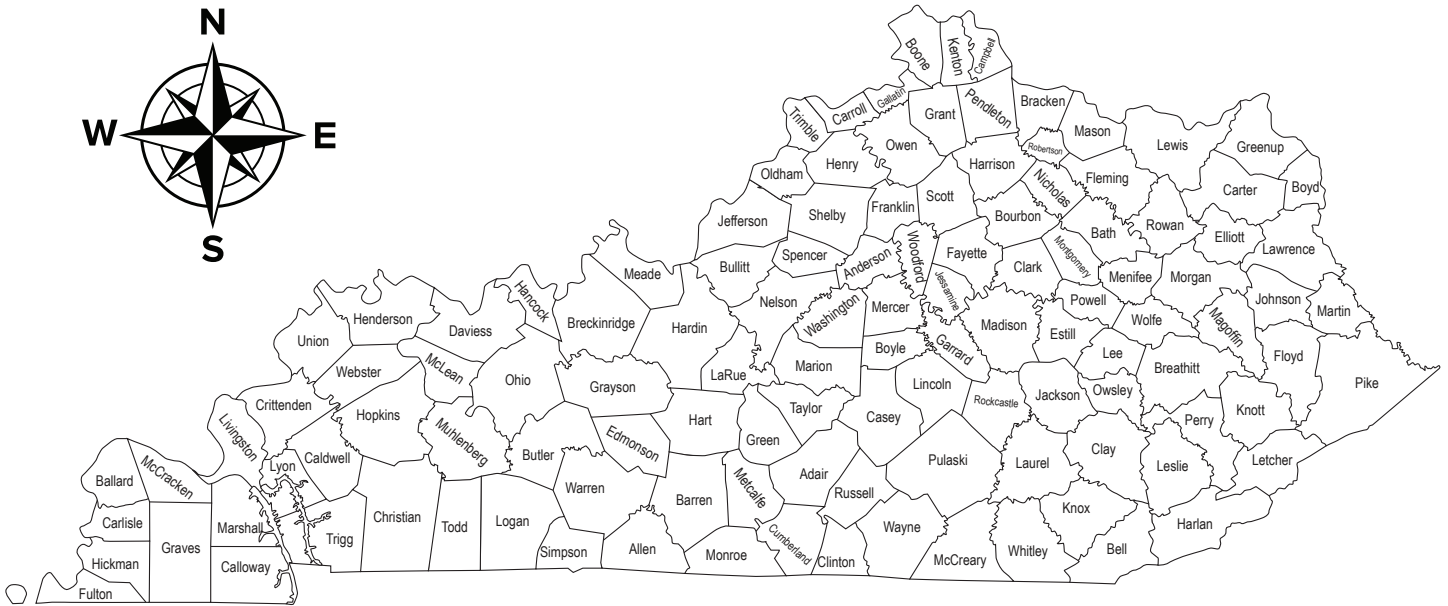
Interdependent Relationships in Ecosystems

### Practical Living

2.19 Students recognize and understand the relationship between people and geography and apply their knowledge in real-life situations.

# Agriculture Where I Live

Color the county in which you live on the map, then  
conduct research to find the answers to the questions below.  
County agriculture data can be found at [www.kyfoodandfarm.com](http://www.kyfoodandfarm.com).



In which county do you live? \_\_\_\_\_

How many farms are in your county? \_\_\_\_\_

Of Kentucky's 120 counties, how does your county rank for agriculture sales? \_\_\_\_\_

Which of the following are produced in your county?

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Corn              | <input type="checkbox"/> Fruits/Berries             | <input type="checkbox"/> Milk               |
| <input type="checkbox"/> Wheat             | <input type="checkbox"/> Tree Nuts                  | <input type="checkbox"/> Hogs               |
| <input type="checkbox"/> Soybeans          | <input type="checkbox"/> Hay                        | <input type="checkbox"/> Sheep/Goats        |
| <input type="checkbox"/> Tobacco           | <input type="checkbox"/> Poultry (Chickens/Turkeys) | <input type="checkbox"/> Horses/Mules       |
| <input type="checkbox"/> Vegetables/Melons | <input type="checkbox"/> Cattle                     | <input type="checkbox"/> Fish (Aquaculture) |

What crop, animal or food product brings the most money from sales to your county? \_\_\_\_\_

OPINION: Why is your county a good place to produce that crop, animal or food? \_\_\_\_\_

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# Agriculture Counts

**Grade Levels:** 6+

**Time Duration:** 60-90 minutes

## Students will:

- Use technology to find answers to questions about Kentucky agriculture.
- Use technology to research and chart agricultural statistics.
- Use math to solve questions about Kentucky agriculture.

## Material Suggestions:

- “Agriculture Counts” Activity Sheets
- National Agricultural Statistics Service Kentucky Field Office Web Site:  
[https://www.nass.usda.gov/Statistics\\_by\\_State/Kentucky](https://www.nass.usda.gov/Statistics_by_State/Kentucky)

## Procedures:

1. Have students visit the NASS web site and browse the different reports. The “Kentucky Agricultural Overview” is a good place to start. They may want to write down any terms they are unfamiliar with and search the definitions.
2. Ask students to complete the “Agriculture Counts” Activity Sheet 1. They can find the answers on the “Kentucky Agricultural Overview” page for the most recent year. You may ask students to work in groups.
3. Encourage students to write down additional questions in which they may want to find answers. A guide for asking questions has been provided on the worksheet.
4. On the “Agriculture Counts” Activity Sheet 2, students will use the information they find to represent data on a map as well as plot a line graph to see change over time.
5. For the map data, have students select a data sheet from “County Estimates.” On a separate sheet of paper, students will order the counties from highest production to lowest production to rank the counties. They will then determine how they want to present the data on their maps. A blank legend has been provided. NASS uses color gradations for determined data spreads. For example, counties producing more than 10 million bushels of corn may be colored dark green, while counties producing between 100,000 and 1 million bushels may be light green. Counties with no data will be white.
6. For the line graph, students will plot data over time. Students will select several years and then find the data on their chosen topic for those years. This exercise requires students to use “Quick Stats Searchable Database.” Once the query loads, students can choose any number of possibilities. They may want to try a few searches before choosing their topic. Be sure to have students select “State” and “Kentucky” under location. When selecting years, have them hold the “Ctrl” key to select multiple years at once. When the data is collected, they can plot it on their graph and answer the questions.
7. If students will not have access to computers on their own, you may print out the “Kentucky Agricultural Overview” for Activity Sheet 1 and work on Activity Sheet 2 as a class.



Billy sure did like agriculture facts, but where did he find them?

The **United States Department of Agriculture National Agriculture Statistics Service** counts all sorts of things in agriculture to help farmers, businesses, and lawmakers make sound decisions. They can see how production, prices, and the number of farms have changed over time. These are just a few examples of the data our government collects by asking farmers to complete surveys and a census every five years. (*A census gathers information about people. The Agriculture Census gathers information about farmers and their farms.*)

## Kentucky Academic Standards

### Math

MD, OA, NBT

### Technology

1.16 Students use computers and other kinds of technology to collect, organize, and communicate information and ideas.

6.3 Students expand their understanding of existing knowledge by making connections with new knowledge, skills and experiences.

# Agriculture Counts 1

Visit [https://www.nass.usda.gov/Statistics\\_by\\_State/Kentucky](https://www.nass.usda.gov/Statistics_by_State/Kentucky) and click on “Kentucky Agriculture Overview” to find the answers to the following questions. Write down additional questions you may have about Kentucky agriculture on the back and try to find the answers.

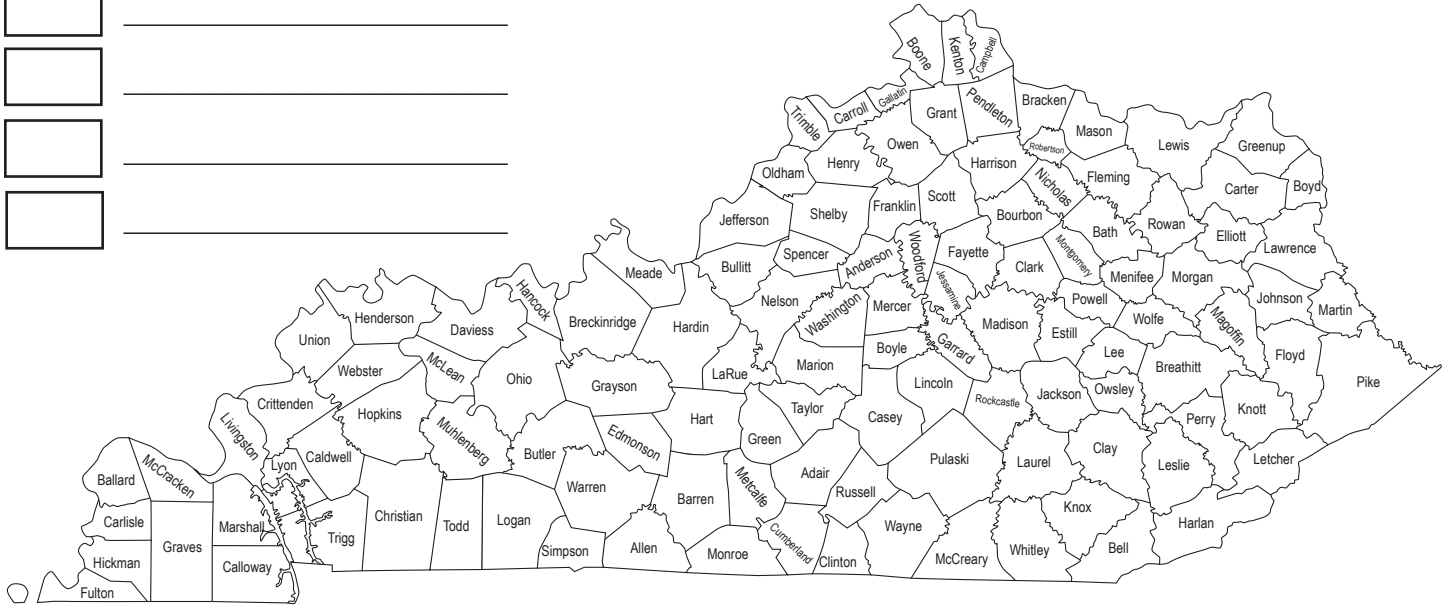
Year of Report \_\_\_\_\_

1. How many farm operations are in Kentucky? \_\_\_\_\_
2. Kentucky has more \_\_\_\_\_ than any other livestock.
3. Are there more beef cows or milk cows in Kentucky? \_\_\_\_\_
4. What is the value of milk produced by Kentucky cows? \_\_\_\_\_
5. Rank the crops (total corn, soybeans, hay, wheat, tobacco) from highest value of production to lowest value of production:
  1. \_\_\_\_\_ dollars
  2. \_\_\_\_\_ dollars
  3. \_\_\_\_\_ dollars
  4. \_\_\_\_\_ dollars
  5. \_\_\_\_\_ dollars
6. Rank the same crops from highest harvested acres to lowest harvested acres:
  1. \_\_\_\_\_ acres
  2. \_\_\_\_\_ acres
  3. \_\_\_\_\_ acres
  4. \_\_\_\_\_ acres
  5. \_\_\_\_\_ acres
7. How many hogs are in Kentucky? \_\_\_\_\_
8. Where did Kentucky rank for Total Value of Agricultural Products Sold in the 2012 Census?  
\_\_\_\_\_
9. What percentage of farmers (principal operators) were women? \_\_\_\_\_  
Male \_\_\_\_\_ + Female \_\_\_\_\_ = Total \_\_\_\_\_ / Female \_\_\_\_\_
10. How many farms earned between \$100,000 and \$249,999 in sales? \_\_\_\_\_

# Agriculture Counts 2

Using “County Estimate” data at [https://www.nass.usda.gov/Statistics\\_by\\_State/Kentucky](https://www.nass.usda.gov/Statistics_by_State/Kentucky) rank Kentucky’s counties in order of highest production to no production for your chosen crop or livestock. Then choose how to present the information in the map below.

**Production of \_\_\_\_\_ in the year \_\_\_\_\_**

Using “Quick Stats” data at [https://www.nass.usda.gov/Statistics by State/Kentucky](https://www.nass.usda.gov/Statistics_by_State/Kentucky) plot a set of data over time on the graph below. Choose the data you want to record for at least 5 years. Be sure to make the time between units and years the same, i.e. every year, every 10 years, etc.)

**My chart will track the change in**

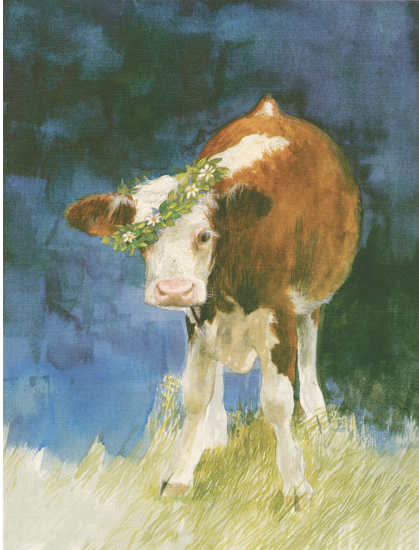
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**over the past \_\_\_\_\_ years.**

Year	# in _____ (unit)

(units) of

A blank sheet of graph paper featuring a uniform grid of small squares. The grid is composed of thin black lines forming a continuous pattern across the entire page. There are no margins, text, or other markings present.



When we hear the term “ecosystem,” we usually think of oceans, forests, or desert ecosystems. But, what about the farm as an ecosystem? An ecosystem is a group of organisms, living and non-living, and their physical environment in which they interact and exchange energy. Granddad’s farm is its own ecosystem.

The difference between the farm ecosystem and other ecosystems is that humans control many of the interactions in the farm ecosystem. Farmers care for their farm environment. They work to improve soil condition, reduce soil erosion, protect water quality, and enhance habitats for their animals. When parts of the farm ecosystem change or are out of balance, the farm is not producing food.

Billy and Addy talked about how technology, the environment, and how farming has changed over the years. That could not happen if “supa’ farmers” did not care for their resources.

Kentucky Academic Standards are listed under each activity.

**This lesson is provided by the Kentucky Agriculture and Environment in the Classroom and the Kentucky Department of Agriculture.**

# The Farm as an Ecosystem

**Grade Level:** 3-5. Can also be used for Secondary Enrichment

## Purpose

Students will:

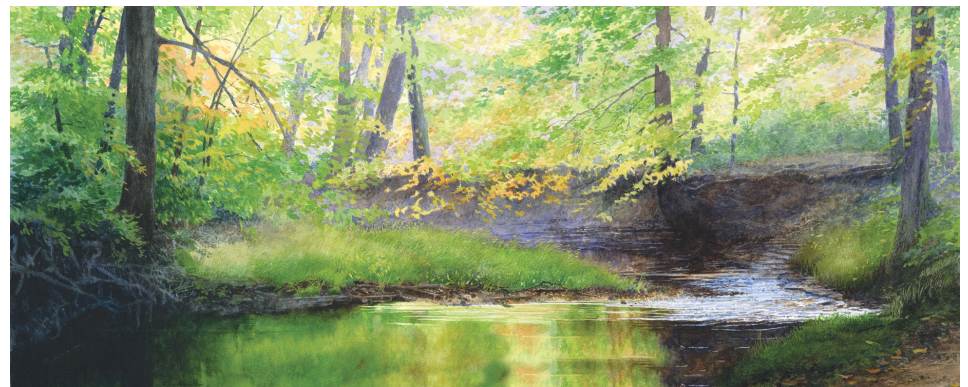
- Explain how a farm is an ecosystem.
- Identify the parts of the farm ecosystem and how they interact and depend on one another.
- Identify the producers and consumers in a farm ecosystem.
- Model the food chain/food web within a farm ecosystem.
- Learn how changes affect the farm ecosystem and availability of food.
- Identify the natural resources in a farm ecosystem and ways to protect them.
- Understand the size of their personal ecosystem.

## Activities

1. What Makes up the Farm Ecosystem?
2. Food Chain on the Farm
3. The Food Formula
4. Protecting Resources on the Farm
5. How Large is My Ecosystem?

## Materials

- “The Farm as an Ecosystem” Digital Presentation provided by the Kentucky Agriculture and Environment in the Classroom ([teachkyag.com](http://teachkyag.com))
- Additional materials are listed under each activity.



## Activity 1: What Makes up the Farm Ecosystem?

**Time Duration:** 30 - 60 minutes

**Purpose:** Students will learn the different parts of the farm ecosystem and discuss what happens when one or more parts are missing.

*3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.*

*4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.*

## Materials:

- “Parts of a Farm Ecosystem” Digital Presentation or Information Cards

## Procedures:

Icebreaker - Have students list the many “organisms” they may find in a farm food system. See how many plants, animals, decomposers, and abiotic factors (soil, sunlight, air, water) they can name on their own.

1. Read through the “Parts of a Farm Ecosystem” with students using the digital presentation, or have students review the information using the information sheets provided on the TeachKyAg flash drive. This information could be used for a gallery walk; divide the topics among nine groups to allow students to create an informative poster about their given topic and teach the class.

- sunlight
- air
- water
- soil
- plants
- livestock
- insects
- decomposers
- farmer

2. Once students understand what makes up the farm ecosystem, discuss how removing one part will affect the success of the farm. Could the farm survive without any of these parts?

Students should already understand that plants cannot survive without sunlight and water. Livestock and insects will also not survive without water, and all three are dependent upon elements in the air.

Some plants can be produced without soil (hydroponics and aquaponics) as long as they have a source of nutrients, but most require soil to anchor their roots. Those roots, in turn, keep the soil in place. Different soils contribute to a diverse mix of plants and animals that call the soil their home.

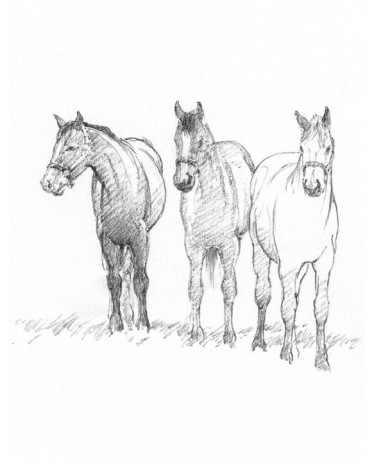
Since plants are the only organisms that produce their own food, animals (livestock and insects) would not survive without plants. Even secondary consumers (animals that eat animals) could not survive without a former food source consuming plants.

While there are pest insects that make food production difficult, beneficial insects, like bees and butterflies, are necessary for the reproduction of 90% of our world’s flowering plants. At least 150 of those plants are food crops.

Some could say that animals are not needed in the farm ecosystem, as not all farmers raise livestock, but animal waste is an important nutrient source for plants. Grazing animals are also able to digest plants that humans cannot; this allows us to grow food on land not suitable for fruit and vegetable production.

Decomposers break down wastes that collect on the earth to materials that are used by plants. Could you imagine what the world would look like if all dead plants and animals lay on top of the soil?

The farmer is a vital part of the farm ecosystem, as he or she controls what happens to promote food production. Before humans learned to farm, they hunted and gathered what was around them. When the available food decreased, they traveled to a new location. Once humans learned to cultivate plants and domesticate animals, they were able to stay in one place, and communities grew. Today’s farmers, of which there are fewer and fewer as time progresses, work to grow food with fewer resources. They have to monitor each part of the ecosystem to ensure the growing population has what it needs to survive.



## Activity 2: Food Chain on the Farm

**Time Duration:** 30 - 60 minutes

**Purpose:** Students will model the food chain from the sun to decomposers using producer and consumer examples that can be found on a farm.

*3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*

*4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (producers vs consumers)*

*5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.*

*5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.*

**Materials** (documents provided on the TeachKyAg flash drive):

- Farm Food Chain Cards (29 available) - print on card stock
- Farm Food Chain Labels - print on 4" x 3.3" shipping labels
- 30 16-oz cups or paper lunch bags for collecting energy
- 150 yellow bingo chips or beads
- Optional - "Food Chain Wheel"
- Farm Food Chain Assessment Sheet

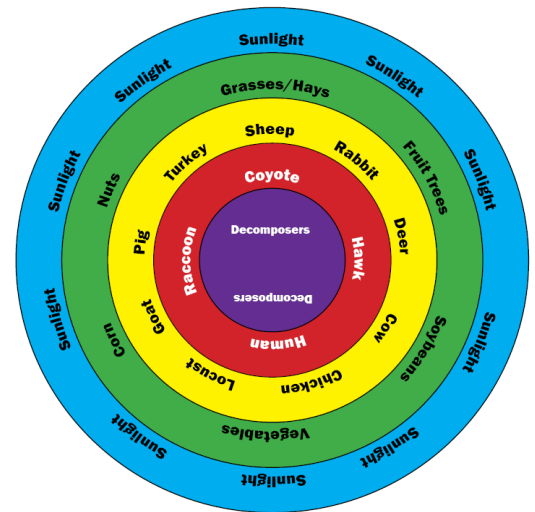
**Procedures** - Activity 2A - for Classroom or Preparation for the next Activity:

1. Provide each student a Food Chain Card. Use any extras as needed.
2. You may ask students to create their own food chains by organizing others (these will need to be evaluated), or you may have one student come to the front of the room, and the class works together to build an accurate food chain. You may want to start with the sun and a plant (producer) to build it in one direction until they understand the flow of energy.
3. Have students write down the different chains on a piece of paper. You may also use the Food Chain Wheel to provide students examples. The pieces are made available on the Teach Ky Ag flash drive if you want students to create their own.

**Procedures** - Activity 2B - for larger space or outside:

1. Provide each student a cup with a Food Chain Label affixed to the cup. If you have fewer students than cups, reduce the number of producers and consumers proportionately (4:2:1 is a good ratio). The teacher or an adult should be the SUN and the FARMER (in charge of distributing energy disks and managing PRODUCERS AND CONSUMERS) and there should be at least one DECOMPOSER. It may be helpful to let students build a few food chains with their organisms before playing the game. This way they will have a better idea of from which plants and animals they may collect energy chips.
2. Each cup with its label provides rules of play for interacting with other organisms. PRODUCERS must stand still and provide energy as needed. Primary CONSUMERS will visit the different plants to collect energy. Secondary CONSUMERS may only collect energy from other consumers.
3. The game begins by the SUN providing each PRODUCER 5 energy chips.
4. In the first round, the primary CONSUMERS (colored yellow or orange) are allowed to visit the PRODUCERS only for 30 seconds (by walking only) to collect the appropriate number of energy chips. Some animals may not eat certain plants, so they will not receive chips from those plants. If a PRODUCER is out of energy or does not have enough energy, the CONSUMER must find a different PRODUCER.

**Food Chain Wheel**



5. The SUN may replenish each PRODUCER with 2 chips each as needed during game play. Since the SUN is also the FARMER, you may want to pay attention to what your livestock CONSUMERS need.
6. In the second round, the red CONSUMERS are allowed to enter the game. Red and orange CONSUMERS may now also collect from other CONSUMERS depending on the rules on the cups. The game commences for another 30 seconds.
7. If any yellow or orange CONSUMER loses all but one energy chip, they must sit down, and the DECOMPOSER visits to collect their last chip. Those CONSUMERS are no longer in the game. Red CONSUMERS enter the game with 0 chips and will have one round to collect energy. If no energy is collected, they are no longer in the game. You may choose to let secondary CONSUMERS (colored orange or red) chase primary consumers. The secondary CONSUMER (colored orange or red) only collects if their prey is tagged. If the game gets out of hand, the FARMER may choose to remove those problematic pests.
8. Play continues for one more round.
9. At the end of the game, count how many chips are available for the farmer to sell for food.
10. The class may now play one more time with additional farming challenges added. Place the following scenarios in a hat and choose one blindly in between each round:
  - Drought. Half of the plants die due to lack of water. (Half of the plants must sit out.)
  - Poultry (chickens and turkeys) get the flu. They sit out of the game.
  - Locusts quadruple in number. Locusts may now take 4 energy discs from each plant.
  - Predators double in number. Hawks, raccoons, and coyotes take twice the energy discs from other consumers.
11. Discuss the activity with students, and ask them what they believe is the most important part of the ecosystem. How do farmers control their ecosystem? Providing enough food for their livestock? Keeping vulnerable livestock away from predators? Removing predators? Controlling insects? What happens when challenges are not under the farmer's control?
12. OPTIONAL: Ask students to complete the Farm Food Chain Assessment Sheet OR ask them to create a Farm Food Chain on their own.

## The Farm Food Chain ASSESSMENT ANSWER KEY

Answer the following questions after completing The Farm Food Chain activity.

1. Where does the flow of energy begin in a food chain?  
a. water      b. sun      c. air      d. plants
2. Which of the following are able to make their own food?  
a. plants      b. animals      c. insects      d. decomposers
3. Which animal can be a primary consumer and a secondary consumer (they eat both plants and other animals)?  
a. cow      b. goat      c. hawk      d. chicken
4. Select the food chain below that tracks the correct flow of energy?  
a. Sun > Raccoon > Mushroom > Pig  
b. Corn > Deer > Rabbit > Hawk > Worm  
c. Sun > Soybean > Chicken > Raccoon > Bacteria  
d. Worm > Grass > Pig > Human
5. Which of the following are NOT needed for growth and survival in an ecosystem?  
a. water      b. rocks      c. air      d. sunlight



### **Activity 3: The Food Formula**

Time Duration: 2 sessions a week a part; 20 - 30 minutes each session

#### **Purpose:**

- Students will conduct an investigation to determine what soil types are best for a given crop.  
*3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.*  
*5-PS1-3 Make observations and measurements to identify materials based on their properties.*

#### **Materials:**

- “The Food Formula” portion of digital presentation
- Soil samples (sand, clay, humus, local soil)
- 4 baking pans or plastic container for planting seeds in soil
- Ryegrass Seeds
- The Food Formula Observation and Data Sheet

#### **Prepare:**

This activity can be done with the whole class or small group. Discuss with students the background information on soil in the digital presentation and watch the video “Soil Supports Agriculture.”

#### **Procedures:**

1. Obtain samples of sand, clay, humus, and local soil and place in the four containers. You may have students work in smaller groups, so duplicating materials may be needed.

2. Discuss the properties of each (color, odor, texture dry, and texture wet). Sand has the largest particles and is gritty; humus has medium, soft, and silky particles; clay has the smallest particles and gets sticky when wet. The local soil may contain a mixture. Your local county extension office may be able to give you more exact information about your soil's composition. Have students hypothesize which soil will be best for growing the ryegrass seeds based on what they learned in the digital presentation and video.
3. Plant ryegrass seeds (about 20) in each container. Mist or lightly water soil until damp. Place in sunny location. Keep seeds moist and observe daily. Remember to keep other variables constant by using the same size/type containers, the same amount of soil, sand, humus, or clay, and the same amount of water.
4. After seeds have grown a few inches, discuss which type of material produced the best "crop" of ryegrass and why. Students should explain the effects of the different variables. Clay is thick and sticky. Sand may do OK but will not hold water in as well. Your local soil may or may not have been the best depending on its richness. Humus should do well because of its richness in nutrients and texture. Particles need to be loose enough for roots to grow, but not so loose water will run through too rapidly and not have time to soak roots.
5. Discuss other variables. What if you changed the type of plant that was grown in the soil? Would you get the same results? What about different amounts of water? Some plants adapt to their ecosystems, which includes soil type and water availability. Most farmers grow crops that perform well in their farms' soil types with little need for change. Organic matter and nutrients can be easily added, but changing soil structure and composition may be very costly.

#### **Activity 4: Protecting Resources on the Farm**

**Time Duration:** 45 - 60 Minutes

##### **Purpose:**

- Students will understand how plants (cover crops) on the farm prevent soil erosion and filter water.  
*4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.*  
*5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.*

##### **Materials:**

- "Protecting Resources on the Farm" portion of the digital presentation - includes a demo of the activity using plastic bottles OR use the materials below:
  - Large pan (9" x 13") with bare soil
  - Large pan with sod or soil with growing plants. You may be able to use the ryegrass from Activity 3, or dig up a layer of sod from the side of a school yard. Be sure to replace it when you are done.
  - Pitcher or bottle of water
  - Jar or bowl to collect the water "run-off"

##### **Prepare:**

Show students the "Protecting Resources on the Farm" portion of the digital presentation. Explain the term "conservation" (the controlled use and systematic protection of natural resources such as forests, soil, and water). Inform students that farmers must be conservationists and find ways to care for the soil and water on their farms to produce the best crops, provide clean water for their livestock, and assure that ground water remains clean.

Two problems farmers face are erosion and run-off:

- Erosion: Explain to students that erosion is the wearing away of the land by wind or water. See photos in the digital presentation.
- Run-off: Explain to students that the water that washes away soil and other materials during a heavy rain is called run-off. Without a filter, the soil and materials will enter waterways (creeks, streams, and rivers).

One thing farmers do to help protect soil is to sow “cover crops,” plants such as grasses or legumes that are sown to prevent erosion, change soil structure, boost nutrients, provide habitat for beneficial organisms, and filter water. Farmers also improve soil by adding organic matter and tilling the soil less than they did before. No-Till, the practice of leaving the organic matter from the previous crop on top of the soil and not breaking the soil layer with machinery, was started by Kentucky farmers. No-till reduces soil erosion and increases the amount of water that can be held in the soil.

Plants can also be planted around the edges of crop fields and waterways. These “buffer strips” or “filter strips” provide a barrier between the field and waterways. The plants will filter soil and materials from the water before it enters waterways. Farmers also keep a watchful eye on the weather. They will not apply nutrients to fields if they know it will rain in the next day or two.

Procedures:

1. Place some local soil in a large container such as a 9”x13” pan. Tilt pan and have a student gently sprinkle water, starting at top of soil. Watch what happens as the water carries bits of soil along with it. Discuss what effects erosion has on plants, why farmland is usually flat land, and how to prevent erosion (by planting).
2. Collect a piece of sod (top layer of soil with grass) and place in a similar container. You may also plant grass seeds in a container and repeat process to demonstrate how plants help prevent erosion. After the grass has started growing and has produced roots, the amount of soil washing away (eroding) should be visibly reduced.
3. Try the experiment again with contaminated water (add dirt, dead leaves, sand, etc.) and pour it over each pan. Did the pan with the cover crop filter the “contaminants” out of the water?
4. Discuss the importance of keeping soil covered. Students may also read about other ways our Kentucky farmers are protecting their ecosystems and the environment. Articles and comprehension questions are available here: <http://www.teachkyag.org/conservation.html>. Look for “Leaders in Sustainability.”
5. View an alternate version of this demonstration (using plastic bottles - included in the digital presentation): <https://youtu.be/im4HVMGI68>
6. Extension: Tilt pan or bottles and have a student use a high dryer or small fan to simulate the wind. What happens to the soil? Does the soil with a cover crop stay in place or erode away? How can the wind effect farmland? Connect to The Dust Bowl of the 1930s, which resulted from poor farming practices.

### **Activity 5: How Large is My Ecosystem?**

**Time Duration:** 15 - 30 Minutes. You may also send this activity home with students.

**Purpose:**

- Students will understand that the foods and natural resources they consume come from a broad ecosystem due to our farming, transportation, and commerce systems.  
*3-LS2-1 Construct an argument that some animals form groups that help members survive.*  
*Geography and Economics connections.*

**Materials:**

- “How Large is my Ecosystem” portion of the digital presentation
- “Kentucky Foods” and “Origins of Common Foods” lists
- World Map worksheet

**Prepare:**

Show students the “How Large is My Ecosystem” portion of the digital presentation. Explain that humans were once dependent upon eating foods and using resources that were near their homes. They formed groups to help each other find food and combine resources for a better quality of life. When food or resources were depleted, they moved to a new location or faced hunger and a lesser quality of life.

Farming can provide a wealth of resources for humans. When more food or resources are produced than what is needed for the local community, they are able to sell them to nearby communities. Trade routes by land or water, and now by air, allow food and resources to be used from across the globe.

### Procedures:

1. Ask a student to volunteer what he or she has eaten that day. Write the list of items on the board.
2. Mark the items that could have come from a Kentucky farm. This represents a relatively small, local ecosystem.
3. Then ask where the other food items came from. A list is provided, or you may have one or more students researching where some foods are commonly grown. Many processed food items have company or distributor information listed.
4. They may also look at the origins of their clothing and “goods” (this should be marked on most items).
5. Have students plot or color the origins of their food, clothing, and consumer goods on the world map. Then measure the distance between the farthest points on your map and research the distance in miles. This represents the size of the student’s ecosystem.
6. Discuss if large ecosystems are helpful or harmful to the human population and the environment. Guiding questions: What are the challenges and opportunities of having smaller and larger ecosystems? How does a large ecosystem benefit you? If you depend on food that is only produced in your town, what happens if there is a drought? What are the fuel costs associated with food traveling from across the country or across the world? Does quality of food suffer when it has to travel long distances? Does it make more sense to grow certain foods in a location with the perfect soil and climate, or would you change the soil and climate (greenhouse) to be able to grow food much closer? What are the costs associated with doing this? What foods from other countries could you not live without?

### FURTHER READING:

- *Brother Eagle, Sister Sky* (Susan Jeffers) Speech by Chief Seattle in 1850s (“All things are connected like the blood that unites us. We did not weave the web of life, we are merely a strand in it. Whatever we do to the web, we do to ourselves.”)
- *Farming* (Gail Gibbons) Each season brings specific chores, its own crops, and its own food. Farmers cope with the elements and forces of nature.
- *Life in a Bucket of Soil* (Alvin Silverstein) Ants, worms, snails, etc. and how they live and the effect they have on soil.
- *Magic School Bus Food Chains* (Patricia Relf) A class trip to the beach is a lesson about food chains. Kids discover what a tuna sandwich and pond scum have in common.
- *Magic School Bus Food Chain Frenzy* (Anne Capeci) Chapter book about Arnold’s adventure through an ecosystem and food chain.
- *McBroom’s Wonderful One Acre Farm – Three Tall Tales* (Sid Fleishman) McBroom thought he was cheated in a deal, but then the bottom of his muddy little pond dried up, leaving an acre of rich soil. The seeds grew into full-grown plants, and nickels grew into quarters.
- *What are Food Chains and Food Webs?* (Bobbie Kalman) Starting with the sun, food chains link together plants and animals in various ecosystems to help them survive.
- *Dust Bowl: An interactive history adventure* (Allison Lassieur) It is the 1930s and the US is reeling from the effects of the Great Depression. In the southern Great Plains drought has caused the rich farmland to dry up and blow away. This adventure people will take the reader on real situations at every turn, no matter which way they choose to go. It is a fun and easy way to learn more about the dust bowl and how it affected America and her famers.



# The Farm Food Chain ASSESSMENT

Answer the following questions after completing The Farm Food Chain activity.

1. Where does the flow of energy begin in a food chain?  
a. water      b. sun      c. air      d. plants
2. Which of the following are able to make their own food?  
a. plants      b. animals      c. insects      d. decomposers
3. Which animal can be a primary consumer and a secondary consumer (they eat both plants and other animals)?  
a. cow      b. goat      c. hawk      d. chicken
4. Select the food chain below that tracks the correct flow of energy?  
a. Sun > Raccoon > Mushroom > Pig  
b. Corn > Deer > Rabbit > Hawk > Worm  
c. Sun > Soybean > Chicken > Raccoon > Bacteria  
d. Worm > Grass > Pig > Human
5. Which of the following are NOT needed for growth and survival in an ecosystem?  
a. water      b. rocks      c. air      d. sunlight

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# The Food Formula Observation & Data Sheet

Use the data sheet below to write down observations about the different soils and how the ryegrass grew in each.

Soil Type	Color	Odor	Texture - Dry	Texture - Wet
Sand				
Clay				
Humus				
Local Soil				

Based on what you know now, which soil do you predict will be best for the ryegrass?

**Hypothesis:** \_\_\_\_\_

## Daily Observations by Soil Type

Write down the activity you observe in each soil every day or so. Write down any additional information that may be helpful, such as amount of sunlight and water.

Date	Sand	Clay	Humus	Local Soil

Additional information about conditions or procedures (temperature, sunlight, water applied, etc.)

## Conclusion

What was the best soil for growing ryegrass in this experiment? \_\_\_\_\_

What factors may have altered the results? \_\_\_\_\_

# Kentucky Foods

The following is a list of common foods grown or processed in Kentucky.  
Most of the vegetables listed will be enjoyed fresh or preserved at home.

## Fruits/Vegetables

Tomatoes  
Green Beans  
Potatoes  
Sweet Corn (Corn-on-the-Cob)  
Squash  
Watermelon  
Cabbage  
Lettuces  
Grapes  
Apples  
Peaches  
Cucumbers

## Meat & Dairy

Chicken  
Eggs  
Beef  
Pork  
Milk  
Eggs  
Ham, especially Country-Style Ham  
Sausage  
Bacon  
Pork Chops  
Pork Ribs  
Cheese  
Hot Dogs  
Lunch Meats

## Grain Foods

Vegetable Oil (Soybeans)  
Corn Tortillas and Chips  
Popcorn  
Cookies  
Crackers  
Biscuit and pancake mixes  
McDonald's' Biscuits and Pancakes  
Cracker Barrel Biscuits and Pancakes  
Weisenberger Mills Baking Mixes  
Krusteaz Baking Mixes  
Girl Scout Cookies

## Other

Jif Peanut Butter  
Hot Pockets  
Red Baron Pizzas  
Marzetti Branded Foods  
Sister Shubert's Dinner Rolls  
Kelloggs Pop-Tarts and NutriGrain Bars  
Airheads  
Mentos  
Kentucky Proud marked products

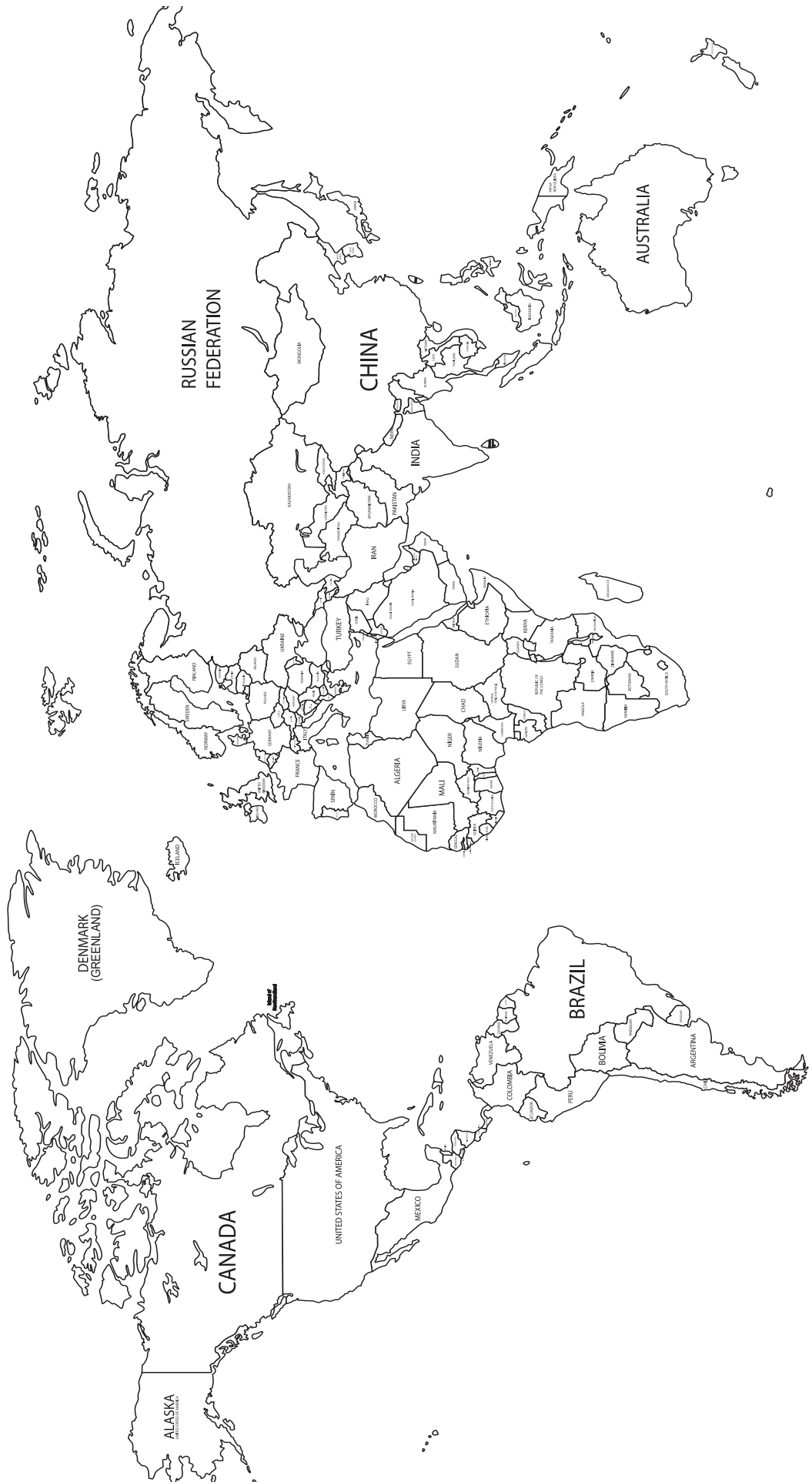
# Origins of Common Foods & Products

The countries and states listed are either the largest producer or the primary country that exports that product into the US. Students could also be asked to research this information on their own.

Almonds - US (California)	Guava - Mexico
Apples - US (Washington, Michigan, New York)	Kiwi - Chile
Avocados - Mexico	Lemons - Mexico, Argentina
Bananas - Guatemala, Costa Rica	Lumber - US (Alaska, Oregon)
Beans - US (Michigan)	Mango - Mexico, Peru
Beef - US (Texas, Nebraska, Kansas)	Mushrooms - US (Pennsylvania)
Blueberries - US (Michigan)	Oats - US (South Dakota, North Dakota)
Broccoli - US (California)	Onion - US (Washington)
Cabbage - US (New York, Texas, California, Florida)	Oranges - US (Florida, California)
Carrots - US (California)	Peaches - US (California)
Cheese - US (Wisconsin)	Peanuts - US (Georgia)
Cherries - US (Washington)	Pecans - US (Georgia)
Chicken - US (Southeast)	Peppers - US (California)
Chocolate - Top processors are Germany, Belgium, Netherlands, US. Cocoa beans come from West Africa	Pineapples - Costa Rica, US (Hawaii)
Coconut - Indonesia, Philippines	Pistachios - US (California)
Coffee - Brazil, Canada, Mexico, or Hawaii	Pork - US (Iowa)
Field Corn - Corn used for snack foods, breads and cereals - US (Iowa, Illinois, Nebraska)	Potatoes - US (Idaho, Washington)
Cotton - US (Texas, Georgia)	Rice - US (Arkansas, Louisiana, Texas, Mississippi)
Cranberries - US (Wisconsin)	Soybeans - US (Illinois, Iowa)
Cucumbers - Mexico	Sugar - US (Louisiana, Texas, Florida, Hawaii)
Eggs - US (Iowa)	Syrup (Maple) - US (Vermont)
Fish - US (Alaska)	Tea - China, India
Flowers - US (California)	Tomatoes - US (Florida, California)
Grapes - US (California)	Turkeys - US (Minnesota, North Carolina)
Green House Vegetables -US (California)	Walnuts - US (California)
	Watermelon - US (Texas, Florida)
	Wheat - US (Kansas, North Dakota)
	Yogurt - US (New York)

# How Large is Your Ecosystem?

Plot or color the countries of origin of your favorite foods, clothing, and consumer goods. Then find the two farthest points on the map and write down the distance in miles. You may need to conduct research. This distance represents the size of your ecosystem.





Hunger was mentioned in the story more than once, as Billy was concerned about a school friend and kids across the world not having enough to eat. In this land of agriculture abundance, it is hard to imagine that anyone could go hungry.

Unfortunately, it is a lack of money resources in the U.S. that keep many Americans hungry.

Individuals and families must make careful decisions about their needs and wants when spending money. Accessing consumer information, comparing and evaluating products and services, provides the basis for making effective consumer decisions. Consumer decisions influence the use of resources and the impact they have on the community and environment.

#### **Kentucky Academic Standards**

##### Practical Living/Vocational Studies

2.30 Students evaluate consumer products and services and make effective consumer decisions.

2.33 Students demonstrate the skills to evaluate and use services and resources available in their community.

5.4 Students use a decision-making process to make informed decisions among options.

##### Social Studies

Economics - 2.18 Students understand economic principles and are able to make economic decisions that have consequences in daily living.

# The Game of Life

**Grade Level:** K-5

### **Purpose**

Students will:

- Understand basic economic concepts are important for consumer decision-making.
- Learn consumer decisions are influenced by economic and social factors.
- Learn values have a role in making consumer decisions.

### **Material Suggestions**

- Consumer magazines with ads
- Needs vs. Wants Activity Sheet

### **Procedures**

1. Ask students to begin to consider the “**goods**” that they would like to have or “**want**.” Let them begin to consider items and start to build “laundry list” of those things. Also, ask the children to make sure they include the items that they “**need**.” Distribute a variety of old magazines and allow students to dream. Ask them to cut out pictures of both what they “need” and what they “want”.
2. Share with the children that they are going to learn about the true value of agriculture, money and living in America.
3. Ask the students to define **agriculture**. Farming is the production of plants and animals for food, fiber and fuel. Question: Do we “need” Agriculture?
4. Ask the students to define “**Needs**” vs. “**Wants**”.  
A “**need**” is something that is required to sustain life. What are examples of needs? Ask them to list the major “needs” for life:
  - a. Oxygen – Farmers and Foresters (Tree Farmers) grow plants and trees which convert carbon dioxide into life giving oxygen.
  - b. Water- Farm land and forests offer great areas for recharging ground water, lakes and streams.
  - c. Shelter – Tree Farmers produce wood for use in home and building construction.
  - d. Clothing – Farmers produce cotton, wool and other fiber from sheep and plants which are used for clothing.
  - e. Food – Primary function of the farmer.

Describe how these needs are met through agriculture.

A “**want**” is something that a person desires, but is not required to sustain life. Ask them to list examples of “wants.”

- Cars
- Toys
- Video Games
- Bicycles
- Movies
- Vacations
- Air-Condition
- Hot Water
- Modern Appliances & Furniture
- Elaborate Finishings (Homes, Clothing and etc..)
- TVs and Electronics

5. Ask the students to categorize each item they cut out of the magazines as a “need” or a “want”—based on the above information—on the **Needs vs Wants Activity Sheet**.
6. Then ask students how we purchase or meet our needs and wants here in the United States. Show a dollar bill. Ask which category, needs or wants, we should meet first if we have limited money (**capital resources**). When it comes to buying these items, however, most consumers are willing to pay more for the things they want than the things they need. **The Law of Scarcity: People must make choices between different items, because the resources necessary to fulfill their wants are limited. These decisions are made by giving up (trading off) one want to satisfy another.**
7. Another term to introduce is **opportunity cost, the value of the next best option that was not chosen**. When people pay for food, very little of our food dollar pays for the production of the food (farm share). In fact it is just under 16 cents of every dollar. As a visual, you could show students 15 cents and 85 cents, and ask them which is the farmer’s share, and which is the marketer’s (labor, energy, packaging, transportation, retail space, advertising, etc.) share. The answer may surprise them. Processing and packaging food in a more ready to eat form saves consumers time. Time is also valuable, so they are willing to pay more for an item so they can spend their time doing something else.
8. To help students understand how processing and packaging affects the cost of foods (and they may be able to help mom and dad make more economical food choices if they offer to help in the kitchen) give students the **More or Less Activity Sheet**. Students are asked to choose which products of the same amounts will be lower in cost based on the amount of processing or service provided, how it is packaged (bulk or single serve), or how it is preserved. Here are a few notes to help your students:
  - a. When a product undergoes more processing (cutting, mixing, packaging, cooking), it will typically cost more than the unprocessed product because a business had to provide the labor and energy. Their costs to provide the service must be met.
  - b. Buying larger amounts of a product with less packaging will cost less per serving. If you buy more than you can use however, money may be wasted on buying in bulk.
  - c. One scenario in which a processed food may cost less than a fresh food is when it is frozen and bagged. A retail store purchases an amount of fresh food they believe their customers will buy, but much of that food will be thrown away because of spoilage (there is a short period of time meat, dairy, and produce can be eaten). The customer will pay for a portion of the food loss (what is thrown away). When a food is frozen, it reduces food waste because it is preserved. The cost of keeping a food frozen is less than what is lost in throwing the food away.**You may also bring in examples from the grocery store and have Grade 5+ students calculate prices per unit to determine which is the better deal.**
9. To tie this exercise to hunger, discuss with students how we can help people with fewer resources get more for their food dollar or receive assistance. There are several articles at <http://www.kyfoodandfarm.com> about how organizations in Kentucky are helping solve hunger here at home. Type “hunger” in the search bar to review the articles.
10. Additional information: According to the United States Department of Agriculture, the average American only spends about 6.4 percent of their income on food. That means we spend less than 7 cents out of every dollar on food. That is much less than many other countries. (See this article from the World Economic Forum: <https://www.weforum.org/agenda/2016/12/this-map-shows-how-much-each-country-spends-on-food/> ). That does not mean we pay less for food necessarily. It means we have more income to spend on other things. Unfortunately, the poorest Americans will direct more of their money toward food, between 20 and 40% of their incomes.



# Needs vs Wants

Draw, place pictures, or write in different needs and wants in the chart below.

NEEDS	WANTS

# More or Less?

Look at the different options below and place a circle around the food choice that costs less because of the way it is processed, packaged, or prepared.  
We will say we have the same amount of each.



**Whole Carrot OR Baby Carrots**



**Plain Oatmeal OR Oatmeal Squares Cereal**



**Raw Chicken OR Bucket of Fried Chicken**



**Breakfast at Home OR Breakfast at a Restaurant**



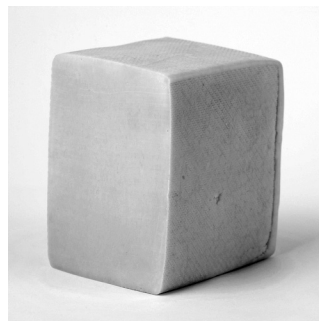
**1 Cup of Milk from a Gallon OR Carton of Milk**



**Fresh Broccoli OR Frozen Broccoli**



**Potato OR French Fries**



**Block of Cheese OR Cheese Slices**



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