**The relationship between agriculture and food, fiber, and energy**

**Pillar 2 G. Identify the number of people each American farmer feeds**

 (9th – 12th Grade)

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| **Introduction**: Today's American farmer feeds about 155 people worldwide. In 1960, that number was 25.8.**Website**: <http://www.farmersfeedus.org/fun-farm-facts/> **Hands on**: <http://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=396&grade=9&author_state=0>  |

FARMLAND: Farm Size

### Purpose

Students will explore farm size in the U.S. comparing the differences and similarities of large and small farms identifying how farmers are able to feed a growing population. This lesson uses a video clip from the documentary, FARMLAND.

### Materials

* FARMLAND video clip: 3:30-5:45
	+ This documentary is available for online streaming from Amazon Prime, iTunes, Netflix, YouTube, and more. The film is available in the full documentary format (77 minutes) or the short, education version lasting 44 minutes. The time stamp indicated for the lesson corresponds to the 44-minute educational version.

### Vocabulary

**Agriculture sustainable intensification:** producing more of a product with fewer inputs while maintaining a healthy environment

**Family farm:** according to the USDA, a family farm is “any farm organized as a sole proprietorship, partnership or family corporation.”

**Sustainability:** able to be used without being completely used up or destroyed, involving methods that do not completely use up or destroy natural resources, or able to last or continue for a long time

### Did you know? (Ag Facts)

* 97% of farms in the U.S. are owned by families.1
* The average U.S. farmer feeds 155 people today. In 1960, a farmer only fed 25.2

### Background Agricultural Connections

According to the American Farm Bureau Federation, about 97% of U.S. farms are family owned and operated.1 Farms are becoming larger to accommodate more family member involvement and to remain profitable and competitive. The costs of farming continue to increase and so fewer people are able to go into farming. At the same time, farming practices are becoming more efficient, allowing farms to grow in size. This equates to more labor being mechanized and less need for manual labor on farms. The U.S. maintains one of the safest food supplies in the world, and Americans spend the smallest percentage of their disposable income on food. Much of this can be attributed to new technologies in agriculture and very efficient farming operations.

With a population expected to reach 9 billion by 2050 and fewer farmers than ever before, providing nutritious food for a growing world is a challenge. In 1982, there were 2.48 million farms in the United States. In 2012, there were 2.11 million farms. A farmer in 1960 fed 25 people, and a farmer today feeds 155. Most farms are larger than they ever, though most are still family owned. Family owned farms might incorporate their business as a management strategy to better protect themselves. These larger family farm businesses can purchase larger machinery that works efficiently, such as larger planters, mechanical harvesters and safe and effective crop protectants. They are able to maximize the production per acre, allow a single farm family to farm more acres, and protect the safety and yield of crops.

### Interest Approach – Engagement

1. Ask the students to describe to you what a stereotype is. As a class, give some examples of stereotypes you may find in your school or community.
2. Have students list the characteristics that define their stereotype of a farmer. To them, what are farmers like? How do they envision farmers to dress? Describe what they think a typical day is like for a farmer.
3. Play the FARMLAND documentary clip outlined in the Materials section of this lesson. Afterward, identify if the stereotype your class defined was accurate to the movie. Identify any similarities your students may have in common with a farmer.
4. Explain to your students that agriculture has changed drastically through the years. Historically, farms were only as large as the amount of land a farmer could plow with a team of horses. Farmers only raised enough milk, meat, or eggs to provide a fresh supply to their own family and perhaps town because they didn't have refrigeration or transportation. Today, technological advances have both allowed and necessitated farms to grow significantly in size. As a result, their stereotype of farms and farmers may and may not be accurate. In this lesson students will learn about farm size and about the pros and cons to small-scale farming as well as large-scale farming.

### Procedures

1. Have the class discuss their home or school garden and keep track of responses on a white board for all students to see.
	1. How would students describe the garden?
	2. What kinds of food are grown?
	3. How big is the garden?
	4. Where does the food go?
	5. How much human labor is required?
	6. How many meals can the garden provide a day? For how long?
	7. How efficient is the garden?
2. Tell students that the average farm in America is 441 acres in size. An acre of land is 43,560 square feet, or just smaller than a football field without the end zones. Some farmers have much larger farms and others have much smaller farms. Play the [DeGroot Farms](https://www.youtube.com/watch?v=g7ge-35hB2s" \t "_blank)YouTube video to give students an idea of what a larger farm would look like. Then, have them compare and contrast the farm and the garden in a Venn diagram either on the white board as a class or individually on their own sheet of paper. Some key points are:
	1. Farms today are larger than gardens. In fact, they are larger, on average, than ever before. Farms had to increase in size to remain productive in hard economic times, compete with other farms, and allow multiple generations of the farm family to live and work off of the farm. Larger farms often have the ability to incorporate incredible technology that improves efficiency and protects the environment. One example of this is Fair Oaks Dairy in Indiana that was able to install digesters to turn manure into fuel for their milk trucks. Even large farms are still typically owned by families. They produce safe and healthy food.
	2. 97% of farms in the U.S. are still owned by families that are dedicated to producing safe and healthy food.
	3. Both farms and gardens require land and natural resources such as water, soil, and sun to be productive. They also require soil nutrients such as nitrogen, potassium and phosphorus.
	4. Many farms in the United States only grow a few crops. A typical Midwestern farmer only grows corn and soybeans, maybe some alfalfa for hay, and possibly hogs or chickens. Most farms today are not as diversified as they used to be, and are certainly not as diversified as gardens, which typically grow many different types of produce.
	5. Many acres can be managed by just a few people because of the machinery now used in agriculture. Combines, tractors, milking machines, and other technologically advanced machinery allow farmers to work more efficiently.
	6. The average farmer today feeds 155 people.
	7. Food from many farms is sold to companies that further process or package the food items. Some items, like milk, are typically sold locally, while other products, like corn, are shipped all over the world to be used in food and for ethanol fuel.
	8. Farms today are extremely efficient. Farmers know the best spacing between plants in their fields to maximize the land they have and how to care for their animals with welfare and productivity in mind.
	9. Mechanization allows farmers to produce more food per farm with less labor. Play either the *[Green Bean Harvesting/Packing](https://www.youtube.com/watch?v=V-LMT2dN-h8" \t "_blank)* video or the *[Robots Speed Up Lettuce Harvest Process](https://www.youtube.com/watch?v=_i62juq8Euk&feature=youtu.be" \t "_blank)* video. Explain how mechanization and an increase in farm size allows multiple families to be supported off of one farm, although additional help is often needed for a short time during harvest. Play the *[Migrant workers make Maine’s blueberry harvest possible](https://www.youtube.com/watch?v=-qwR0OXZriA" \t "_blank)* video for students.
3. Introduce to students the idea of population growth. We live on a hungry planet, and with the world’s population predicted to reach 9 billion by the year 2050, producing enough food, especially protein, is a challenge for agriculture. A garden is an example of small-scale agriculture production; perhaps not the most efficient way of producing food. How do we scale that up to feed a world population? How do we ensure that that population’s nutritional needs are being met?
	1. There is no easy answer to this, but farmers today are working to increase production while caring for the Earth. The average farmer today is working with far more efficient techniques than their parents were, and this efficiency is helping to produce more food on a shrinking amount of arable land.
	2. As the population grows, the middle class in many foreign countries will grow as well. Those people are expected to adopt a diet that is higher in animal proteins and follows more closely with the Western diet. It’s important for a developing nation to have access to healthy, high quality food.
4. Discuss with students the importance of addressing nutritional needs. Food is one of the three basic necessities for humans (the others are shelter and clothing), and one of the benefits of having a school or home garden is a supply of fresh, healthy food options.
	1. Why are the food choices coming from a school garden some of the healthiest choices for snacks and meals?
	2. What food groups do the majority of foods grown in a garden fit into?
	3. Many people in the world live in cities where gardens in their backyard are very difficult to find. Eating enough fruits and vegetables is very important, so affordable fruits and vegetables have to be available for purchase at stores and farmers markets. This is where large, efficient farms and technology have to come into play to produce enough food for the growing population.

**Concept Elaboration and Evaluation**

After conducting these activities, review and summarize the following key concepts:

* Farm size has increased over the years. One advantages of larger farms includes allowing for the implementation of technology, which decreases human labor. In addition, the farmer can also obtain greater knowledge and specialization in the growth of specific crops or animals as they focus on a small number of crops rather than a large variety.
* Small farms offer food that could be grown closer to the consumer and allow more people to take part in the growing process. For example home and community gardens, farmer's markets, etc.
* Due to the ability to transport food from farms to consumer, we have a larger variety of food available to purchase in our local grocery stores. This food is provided by large and small farms alike

### Enriching Activities

* Have students debate the benefits of small-scale production and the benefits of large-scale production.
* Have students research a single commodity (crop). Have them research the cost of operation, how much of that commodity could be harvested per acre, prices for sale of that commodity. o Considering the current price of the crop that the farmers would receive, how many acres would they have to produce to cover all of their costs and earn a minimum wage salary (roughly $15,000)? o How many acres would they have to produce to cover costs and earn a middle income salary (for example, $40,000)? o How many acres would they have to produce to cover all their costs and earn a middle income salary for themselves and a middle income salary for the two other people that the farm supports?

### Sources/Credits

1. [http://www.fb.org/newsroom/fastfacts/](http://www.fb.org/newsroom/fastfacts/%22%20%5Ct%20%22_blank)
2. [http://www.usda.gov/documents/Briefing\_on\_the\_Status\_of\_Rural\_America\_Low\_Res\_Cover\_update\_map.pdf](http://www.usda.gov/documents/Briefing_on_the_Status_of_Rural_America_Low_Res_Cover_update_map.pdf%22%20%5Ct%20%22_blank)