

# Population and Land Use

## How has a growing world population affected food production?

World population is defined as the number of humans living on the earth at a given moment. The world's population is now estimated to be around 7.7 billion people. According to an article by Max Roser, "Future Population Growth," the rate of growth of the world's people reached its peak in the late 1960s, when the number was increasing about 2 percent each year. Since then, it has slowed to just 1 percent. Nevertheless, by the year 2060, one estimate made by the United Nations is that the Earth's population will reach 10 billion people.

### Iowan Norman Borlaug

Iowa has a special place in the story of world population growth. In the 1960s, agricultural scientists increased efforts to boost food production in developing countries that were experiencing rapid population increases that threatened to lead to food shortages and starvation. Iowa-born agronomist Norman Borlaug was an acknowledged leader of this effort that became known as The Green Revolution. Borlaug developed improved crop varieties adapted to the climates where they were grown that proved to be tremendously successful. He also persuaded government and the farmers themselves to promote the new seed. A Borlaug biography claims that the increases in food production that resulted saved an estimated one billion people from starvation. Borlaug was awarded the Nobel Peace Prize in 1970 for his efforts, the first time the award was given to someone in agriculture. Later, Borlaug helped to create the World Food Prize with headquarters in Des Moines to continue to recognize those who are helping to feed a hungry world.

### Factors of World Population Growth

Two key factors in population growth are mortality and fertility. Mortality refers to the ages at which people die. As people live longer, the population increases. Improvements in education, medicine, food and living conditions have extended life expectancy, boosting the world population. Developing countries benefitted during the last half of the 20th century from expanded medical services which led to longer and healthier lives for their people. It also helped to increase the number of people who need to be fed.

Fertility measures the average number of births per woman of child-bearing years. A critical factor here is not just the worldwide fertility rate but the rates in different parts of the world. Women in highly developed countries like the United States and Europe are having fewer children than they did fifty years ago. In contrast, the rates in some of the poorer countries of Africa and the Middle East continue to have more children. Droughts, wars and migrations have created emergency conditions when these countries cannot feed themselves but must rely on international assistance to prevent widespread starvation. Some developed countries now face a critical shortage of younger workers while other areas struggle to feed and educate increases in children.

### Iowa's Role in Addressing a Rising World Population

Iowa enters into the global conversation in other ways as well. The demand for ethanol made from corn diverts a sizable portion of the crop each year from food to fuel. While it helps to raise prices for producers, it makes it more expensive for poorer countries to buy the corn they need for food. Scientists are now able to genetically modify crops to make them more productive and disease resistant. However, there are concerns about introducing some genetically modified crops when their long-term impacts are unknown.

Food production is an issue of vital concern to everyone. Iowa as a food producer is and will continue to be an important player in the discussions and implementation.

## Supporting Questions

How has world population changed over time?

- [S.J.Res.158 - A joint resolution designating October 21 through 27, 1990, as "World Population Awareness Week," June 16, 1989 \(Document\)](#)
- [NPR's "7 Billion: How Did We Get So Big So Fast?" October 31, 2011 \(Video\)](#)
- ["World Population" Growth Animation, March 26, 2015 \(Video\)](#)
- [United Nations' World Population Prospects Report, 2017 \(Document\)](#)

How has food production changed over time to accommodate a growing population?

- [Letter Correspondence between Mahatma Gandhi and George Washington Carver, February 24, 1929 to July 27, 1935 \(Document\)](#)
- ["Checking the Corn in Hills" in Jasper County, Iowa, May 1940 \(Image\)](#)
- ["GMOs Are Safe, But Don't Always Deliver On Promises, Top Scientists Say," May 17, 2016 \(Audio\)](#)
- ["Seeds Of Change: Mini Gardens Help Drive The Growth Of Food At Home," May 31, 2017 \(Document\)](#)
- ["Amid GMO Strife, Food Industry Vies For Public Trust In CRISPR Technology," October 25, 2017 \(Audio\)](#)

How has a changing world population affected how land is used?

- ["The Crop Outlook" Newspaper Article, June 30, 1906 \(Document\)](#)
- [Family Working on the Farm, between 1915 and 1923 \(Image\)](#)
- ["Recognize Iowa as Agricultural State" Manzanar Free Press Article, November 10, 1943 \(Document\)](#)
- [Kaestner Family at their Century Farm near Luzerne in Benton County, Iowa, August 8, 2016 \(Image\)](#)
- [Lush Soybean Field on Dean and Julie Folkmann's Hog Farm in Newhall, Iowa, August 8, 2016 \(Image\)](#)

## \*Printable Image and Document Guide

### Additional Resources

**Food Empowerment Project:** This website is for the Food Empowerment Project, a vegan food justice organization that focuses on world issues related to food justice. Their work spotlights the abuse of animals on farms, the depletion of natural resources, unfair working conditions for produce workers and the unavailability of healthy foods in low-income areas.

**Population Education:** This website is part of "Population Education," a national program with a strong emphasis on curriculum and professional development for K-12 educators that focuses on human population issues.

**Living History Farms:** This online resource is a guide to Iowa's Living History Farms, an interactive outdoor history museum which educates, entertains and connects people of all ages to Midwestern rural life experiences.

**Globalization 101:** Globalization101.org is an Internet resource offered by the Levin Institute to promote a greater understanding of globalization.

**World Food Prize:** This website focuses on multiple aspects surrounding the World Food Prize and a number of its related events and programs. The World Food Prize is the foremost international honor recognizing the achievements of individuals who have advanced human development by improving the quality, quantity or availability of food in the world.

## S.J.Res.158 - A joint resolution designating October 21 through 27, 1990, as "World Population Awareness Week," June 16, 1989

--S.J.Res.158--  
S.J.Res.158  
One Hundred First Congress of the United States of America  
AT THE SECOND SESSION  
Begun and held at the City of Washington on Tuesday, the twenty-third day  
of January,  
one thousand nine hundred and ninety  
Joint Resolution  
Designating October 21 through October 27, 1990, as 'World Population  
Awareness Week'.  
Whereas the population of the world today exceeds five billion and is growing  
at an unprecedented rate of approximately ninety million per year;  
Whereas virtually all of this growth is occurring in the poorest countries,  
those countries least able to provide even basic services for their current  
citizens;  
Whereas the demands of growing populations have contributed substantially  
to enormous environmental devastation and pose threats of even greater harm  
to the world;  
Whereas one-half of the ten million infant deaths and one-quarter of the five  
hundred thousand maternal deaths that occur each year in the developing world  
could be prevented if voluntary child spacing and maternal health programs  
could be substantially expanded;  
Whereas research reveals that one-half of the women of reproductive age in  
the developing world want to limit the size of their families but lack the  
means or ability to gain access to family planning;  
Whereas the global community has for more than twenty years recognized that  
it is a fundamental human right for people to voluntarily and responsibly  
determine the number and spacing of their children and the United States  
has been a leading advocate of this right;  
Whereas the demands of growing populations force many countries to borrow  
heavily and sell off their natural resources to cover the interest on  
their debt;  
Whereas selling off natural resources in such circumstances often causes  
irretrievable losses, such as the destruction of the tropical rain forests  
at a rate of forty thousand acres per day;  
Whereas the reliance of a rapidly growing world population on burning fuels is  
a critical factor in the emission of carbon dioxide into the atmosphere, which  
many scientists believe has already catalyzed a warming of the Earth's climate;  
Whereas pollution is damaging the ozone layer to such an extent that within  
forty years the ultraviolet light reaching our planet is expected to be up  
to 20 percent greater than it is today; and  
Whereas in 1988, forty State Governors proclaimed 'World Population Awareness  
Week' in their States to call attention to the consequences of rapid population  
growth and the House of Representatives also passed a resolution to that  
effect; Now, therefore, be it  
Resolved by the Senate and House of Representatives of the United States of  
America in Congress assembled, That October 21 through October 27, 1990,  
is designated as 'World Population Awareness Week', and the President is  
authorized and requested to issue a proclamation calling upon the people of  
the United States to observe such week with appropriate programs, ceremonies,  
and activities.  
Speaker of the House of Representatives.  
Vice President of the United States and  
President of the Senate.

Courtesy of U.S. Congress, "S.J.Res.158 - A joint resolution designating October 22 through 28, 1989, as 'World Population Awareness Week'," U.S. Congress, 16 June 1989

### Description

This U.S. Senate joint resolution was introduced June 16, 1989, to designate Oct. 21-27, 1990, as World Population Awareness Week. The sponsor of this resolution was former Sen. John Kerry, a Democrat from Massachusetts. The legislation became a law October 25, 1990.

### [Transcript of S.J.Res. 158](#)

### Text-Dependent Questions

- Where is most of the growth in the world occurring? What impact does this have on those communities?
- Using evidence from the document, explain how the bill discusses the issues of natural resources?
- According to the bill, what is the role of world population on non-renewable resources and the environment?
- What are other possible problems the world might face as world population continues to grow?

### Citation Information

"S.J.Res.158 - A joint resolution designating October 21 through 27, 1990, as 'World Population Awareness Week'," U.S. Congress, 16 June 1989. [Courtesy of U.S. Congress](#)

## NPR's "7 Billion: How Did We Get So Big So Fast?" October 31, 2011



Courtesy of National Public Radio, Cole, Adam and Starbard, Maggie, "7 Billion: How Did We Get So Big So Fast?" National Public Radio, 31 October 2011

### Description

This report from *National Public Radio* shows that just over two centuries ago that the global population was 1 billion, but better medicine and improved agriculture has dramatically increased the world population. The United Nations is reported as predicting the world population could hit a peak of 10.1 billion by 2100 before beginning to decline.

### [Transcript of NPR's "7 Billion: How Did We Get So Big So Fast" Article and Video](#)

### Text-Dependent Questions

- According to the [text](#):
  - + What is the predicted balance of sub-Saharan Africans to Europeans by 2100?
  - + Why is the population in sub-Saharan Africa growing so quickly?
  - + What is the predicted peak of population by 2100? How will this impact the world?
- According to the video:
  - + In what year did the world reach one billion people? How long did it take world population to grow from one billion to seven billion?
  - + According to the U.N., when will world population level off? What is the predicted number?
  - + What two things are starting to "slow the leak from the bottom of the glass"? Why are these two items so important for humans?
  - + What three things need to be managed in order to support over ten billion people? Why are these items so important to a world population?

### Citation Information

Cole, Adam and Starbard, Maggie, "7 Billion: How Did We Get So Big So Fast?" *National Public Radio*, 31 October 2011.  
[Courtesy of National Public Radio](#)

## “World Population” Growth Animation, March 26, 2015



Courtesy of Population Connection, “World Population,” Population Connection, 26 March 2015

### Description

This animated video shows human population grow from 1 C.E. to the present day. The video also shows the projected growth of the world’s population — all in a matter of six minutes. Each dot represents 1 million people.

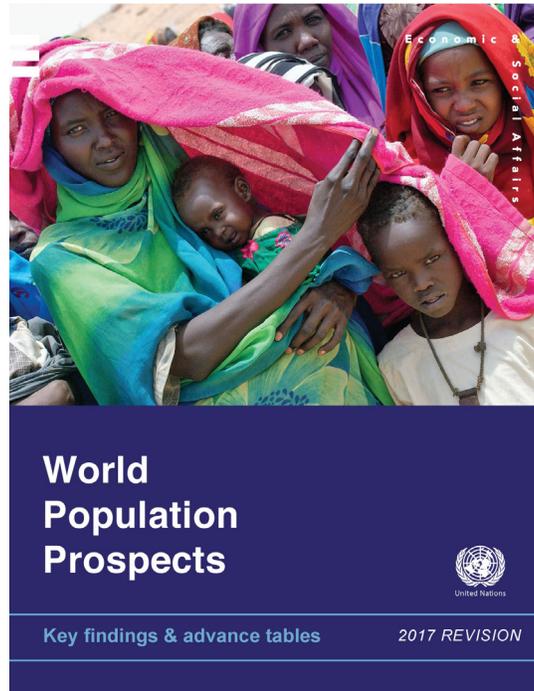
### Text-Dependent Questions

- On what percentage of the Earth do humans live? What percentage of the Earth can humans currently grow crops? How could this ratio impact humans in the future?
- What is the time span of the video? What does each dot represent?
- As you watch the video, what observations can you make?
- What conclusions can you draw based on the video?

### Citation Information

“World Population,” Population Connection, 26 March 2015. [Courtesy of Population Connection](#)

## United Nations' World Population Prospects Report, 2017



Courtesy of United Nations, "World Population Prospects: The 2017 Revision, Key Findings and Advance Tables," United Nations Department of Economic and Social Affairs, pp. 1-2, 2017

### Description

This report from the Department of Economic and Social Affairs at the United Nations analyzes world population projects from 2017 to 2100. The first two pages of the report featured in this source focus on the summary and key findings by the UN department.

### [Transcript of UN World Population Prospects](#)

### Text-Dependent Questions

- When was the first World Population Prospects report filed? What data is factored into the report? Why would those factors be included?
- How fast is world population growing today? How does that compare to ten years ago?
- What was the world population by mid-2017? What is the expected population for 2100? What is the percentage increase between those two time periods?
- What are the two most populated countries on Earth? Why might the population be high in both of those areas?
- What challenges might there be with a world population over 11 billion people?

### Citation Information

"World Population Prospects: The 2017 Revision, Key Findings and Advance Tables," United Nations Department of Economic and Social Affairs, pp. 1-2, 2017. [Courtesy of United Nations](#)

## Letter Correspondence between Mahatma Gandhi and George Washington Carver, February 24, 1929 to July 27, 1935

February 24, 1929

My dear Mr. Andrews:

Our various, previous conversations, marvelous lectures, followed by our conference this morning, all convince me that a new day is dawning for India.

I believe Mr. Gandhi's physical strength can be greatly improved, by following out the ideas we discussed in the matter of foods.

With the whole wheat flour, grits, hominy, graham flour, etc., etc, which can be made on the little mill shown you, and with the splendid native fruits and vegetables you have, properly compounded, will give you a splendid nourishing and palatable food stuff.

You can use it in your school, they will in turn carry the message into the various communities from whence they came, bringing to my mind greater health, strength and economic independence to India.

A peanut omission can be made in the same way as that recommended for the soy bean, and is a little richer in food nutrients.

I am,

Yours very truly

G. W. Carver  
Department of Agricultural  
Research and Experiment Station

/s/

Courtesy of World Food Prize, Carver, George W., and Gandhi, M.K., 24 February 1929 - 27 July 27 1935

### Description

The first letter is from George Washington Carver, notable American botanist, and Charlie Andrews, a close personal friend to Mahatma Gandhi. Gandhi had Andrews assist him in reaching out to Carver to inquire about the health of eating a vegan diet. Gandhi was working on the independence movement for India, and wanted to change diets so as not to support British foods and companies. In the letter, Carver informs Gandhi that he can thrive on an essentially plant-based diet. The second letter was from Richard Gregg, on Gandhi's behalf, to Carver. In it, he asks Carver to send "articles or circulars" detailing his work to assist Indian production to reduce poverty among its population. The third letter is from Carver to Gandhi in response to Gregg's letter, and Carver states he did send some bulletins but would send more as the other ones seem to not have made it to their destination. Carver also called it "a great pleasure and privilege" to keep in touch with Gandhi and he commended him on his work for all Indians.

### [Transcript of Letters Exchanged Between Mahatma Gandhi and George Washington Carver](#)

### Text-Dependent Questions

- Mahatma Gandhi was working on the independence movement for India, and wanted to change diets so as not to support British foods and companies. Based on the first letter, what questions do you think Mahatma Gandhi had for George Washington Carver? What advice did Carver give to Gandhi regarding a diet plan?
- Can the foods Carver recommended to Gandhi and his followers be homegrown? Why is that important?
- Do you think Carver believes that people can thrive on a plant-based diet? Use evidence from the letters to explain.
- Why would Gandhi, who was living in India, be interested in the work of Carver, who was working and living in the United State?

### Citation Information

Carver, George W., and Gandhi, M.K., 24 February 1929 - 27 July 27 1935. Courtesy of World Food Prize

## “Checking the Corn in Hills” in Jasper County, Iowa, May 1940



Courtesy of Library of Congress, Vachon, John, “Checking the corn in hills, Jasper County, Iowa,” May 1940

### Description

The photograph, taken by John Vachon, shows a farmer behind a team of horses pulling a small planter behind them in May 1940. The farmer appears to be checking the corn to make sure it is correctly planting.

### Text-Dependent Questions

- How did this farmer power his corn planter? Why would farmers use tractors today, as opposed to horse-drawn machinery?
- Compare this photo to the [Kaestner Family Farm](#). What is similar? What is different? How do these two photos indicate how food production has changed over time?

### Citation Information

Vachon, John, “Checking the corn in hills, Jasper County, Iowa,” May 1940. [Courtesy of Library of Congress](#)

## “GMOs Are Safe, But Don’t Always Deliver On Promises, Top Scientists Say,” May 17, 2016



Courtesy of National Public Radio, Charles, Dan, “GMOs Are Safe, But Don’t Always Deliver On Promises, Top Scientists Say,” National Public Radio, 17 May 2016

### Description

This National Public Radio report, which was featured on “All Things Considered,” focuses on the National Academy of Sciences’ judgment that GMOs (genetically modified organisms) are safe to eat. But the group’s latest report also brought up numerous economic and social concerns generated by the use of GMOs.

### [Transcript of NPR’s “GMOs Are Safe, But Don’t Always Deliver On Promises, Top Scientists Say”](#)

### Text-Dependent Questions

- How long have farmers been using GMO crops? What is the relationship between the use of GMOs and increasing yield?
- What were the first soybeans genetically modified to withstand? Why would this be beneficial for farmers?
- What was the “most basic conclusion” of the report?
- An expert in the report stated, “The expectation from some of the [GMO] proponents was that we need genetic engineering to feed the world ... We saw no evidence of that.” Refer back to [George Washington Carver’s letter](#), what did Carver recommend as food sources to feed India? Why did Carver recommend native fruits, grains and vegetables?

### Citation Information

Charles, Dan, “GMOs Are Safe, But Don’t Always Deliver On Promises, Top Scientists Say,” *National Public Radio*, 17 May 2016. [Courtesy of National Public Radio](#)

## “Seeds Of Change: Mini Gardens Help Drive The Growth Of Food At Home,” May 31, 2017



Courtesy of National Public Radio, Cole, Adam and Starbard, Maggie, “7 Billion: How Did We Get So Big So Fast?” 31 October 2011 Hartke, Kristen, “Seeds Of Change: Mini Gardens Help Drive The Growth Of Food At Home,” National Public Radio, 31 May 2017

### Description

This National Public Radio article focuses on the rising trend of the garden kit startup, Seedsheet. This company, based in Vermont, is a kind of “farm delivery” service that encourages growing a lot of food in a small amount of space.

### [Transcript of NPR’s Article “Seeds Of Change: Mini Gardens Help Drive The Growth Of Food At Home”](#)

### Text-Dependent Questions

- According to the National Gardening Association as of 2014, 35 percent of households in America grow some type of edible food. Why do you think that is? What role does a company like Seedsheet play in the growth of this market?
- Why are more and more people interested in growing their own food? How would growing your own food impact the world, particularly with a growing population?
- Do you think growing some food at home could be an effective way to address feeding a growing world population? Why or why not?

### Citation Information

Hartke, Kristen, “Seeds Of Change: Mini Gardens Help Drive The Growth Of Food At Home,” *National Public Radio*, 31 May 2017. [Courtesy of National Public Radio](#)

## “Amid GMO Strife, Food Industry Vies For Public Trust In CRISPR Technology,” October 25, 2017



Courtesy of National Public Radio, Husted, Kristofor, “Amid GMO Strife, Food Industry Vies For Public Trust In CRISPR Technology,” National Public Radio 25 October 2017

### Description

This National Public Radio report focused on new gene-editing technology called Clustered Regularly Interspaced Short Palindromic Repeats, or CRISPR. Dozens of crops and livestock are expected to be developed with CRISPR, which is an emerging technique to genetically engineer food.

[Transcript of NPR’s “Amid GMO Strife, Food Industry Vies For Public Trust In CRISPR Technology”](#)

### Text-Dependent Questions

- How is CRISPR different from GMO? How is it similar?
- How can this technology be useful in improving food production?
- The U.S. Department of Agriculture has stated it will not regulate CRISPR-developed products. Do you agree with the USDA? Use examples from this source and other to explain your answer.

### Citation Information

Husted, Kristofor, “Amid GMO Strife, Food Industry Vies For Public Trust In CRISPR Technology,” *National Public Radio*, 25 October 2017. [Courtesy of National Public Radio](#)

## “The Crop Outlook” Newspaper Article, June 30, 1906



Courtesy of Library of Congress, “The Crop Outlook,” Ottumwa Tri-Weekly Courier, pp. 2, 30 June 1906

### Description

This article is from the *Ottumwa Tri-Weekly Courier* and was published June 30, 1906. It is about a report filed by the director of Agriculture in Iowa, J.R. Sage. The report speaks of the welcomed rain all of Iowa received the previous week, and gives an update on the condition of crops across the state.

### [Full Transcript of “The Crop Outlook” Newspaper Article](#)

### [Printable Image of “The Crop Outlook” Article](#)

### Text-Dependent Questions

- What weather event happened the week before this article was written? How did it impact farmers?
- According to the U.S. Department of Agriculture, currently the top five crops planted and harvested in Iowa are corn, soybeans, hay, oats and wheat. How does this list compare to the crops that were grown in Iowa when this article was written. How does it differ? How has land use changed in Iowa?

### Citation Information

“The Crop Outlook,” *Ottumwa Tri-Weekly Courier*, pp. 2, 30 June 1906. [Courtesy of Library of Congress](#)

## Family Working on the Farm, between 1915 and 1923



Courtesy of Library of Congress, Harris & Ewing, "[Farm]," between 1915 and 1923

### Description

This photograph shows a farm family tending to their crops on their farm between 1915 and 1923. There are several different crops being grown, as shown in this photo.

### Text-Dependent Questions

- Look closely this photo. How many different types of crops do you see growing on this farm? Why would a farm elect to grow different types of crops?
- Notice the people tending the crops. What does that indicate about farming?
- Compare this photo to "[Checking the Corn in Hill](#)." What is similar? What is different?

### Citation Information

Harris & Ewing, "[Farm]," between 1915 and 1923. [Courtesy of Library of Congress](#)

# “Recognize Iowa as Agricultural State” Manzanar Free Press Article, November 10, 1943



Courtesy of Library of Congress “Recognize Iowa as Agricultural State,” Manzanar Free Press, 10 November 1943

## Description

This article about Iowa’s state of agriculture was published in the *Manzanar Free Press* on November 10, 1943. According to the article, the average Iowa cash income per farm was \$6,025 in 1942, while the national average was \$2,685.

[Transcript of Manzanar Free Press Article “Recognize Iowa as Agricultural State”](#)

[Printable Excerpt of Manzanar Free Press Article “Recognize Iowa as Agricultural State”](#)

## Text-Dependent Questions

- How many farms were there in Iowa in 1942? The 2012 Census of Agriculture found that there were 88,631 farms in Iowa. What is the percentage difference?
- What does that indicate about farming in Iowa?
- Why would livestock play such a large roll in Iowa agriculture?

## Citation Information

“Recognize Iowa as Agricultural State,” *Manzanar Free Press*, 10 November 1943. [Courtesy of Library of Congress](#)

## Kaestner Family at their Century Farm near Luzerne in Benton County, Iowa, August 8, 2016



Courtesy of Library of Congress, Highsmith, Carol M., "The Kaestner family gathers on their Century Farm near Luzerne in Benton County, Iowa," 8 August 2016

### Description

This photograph by Carol Highsmith shows the Kaestner family at their Century Farm near Luzerne in Benton County. Their farm, located in eastern Iowa and dates back to 1915, now grows prize corn and soybeans and includes a thriving seed business.

### Text-Dependent Questions

- This farm has been in the Kaestner family for a 100 years or more, which is known as a Century Farm. Why would families hand down farmland from generation to generation? What does that indicate about farming?
- Look at the signs in the photo near the corn: Wyffels Hybrids W7456 RIB. Hybrids are created by cross-pollinating two different, but related plants. Refer to the [GMOs Are Safe](#) article. How do hybrids and GMO compare? Which would you prefer to eat and why?

### Citation Information

Highsmith, Carol M., "The Kaestner family gathers on their Century Farm near Luzerne in Benton County, Iowa," 8 August 2016. [Courtesy of Library of Congress](#)

## Lush Soybean Field on Dean and Julie Folkmann's Hog Farm in Newhall, Iowa, August 8, 2016



Courtesy of Library of Congress, Highsmith, Carol M., "Lush soybean field on Dean and Julie Folkmann's hog farm in Benton County, near Newhall, Iowa," 8 August 2016

### Description

This photograph shows the farmstead of the Folkmann family in Benton County, Iowa. As of 2016, the Folkmann hog farm has been in the family for 162 years. At any time, approximately 50 million hogs are being raised in the state with just over 3 million people. That is about one-third of all the pigs raised in the United States. The soybean fields, which are shown in the foreground, are used to create hog food for the farm.

### Text-Dependent Questions

- The soybeans shown in this photo are grown to feed hogs. Refer to the [Recognize Iowa as Agriculture State](#) article. Why would this crop be important to grow?
- Refer to [The Crop Outlook](#) article written in 1906. Are soybeans mentioned as a crop? What does this indicate about the changing nature of farming?
- Compare this photo to [Checking the Corn in Hills](#). How is the land use similar? How is it different? How does this demonstrate how farms and farming have changed over time?

### Citation Information

Highsmith, Carol M., "Lush soybean field on Dean and Julie Folkmann's hog farm in Benton County, near Newhall, Iowa," 8 August 2016. [Courtesy of Library of Congress](#)