



A *Food, Inc.* Intro to Modern Food Production

HIGH SCHOOL

INTRODUCTION

The Academy Award nominated documentary *Food, Inc.* provides an outstanding overview of many of the issues associated with modern industrial food production. These materials help focus viewing of the film on potential environmental impacts, and include both short and long answer questions that can be used with specific short segments of the film.

ESSENTIAL QUESTIONS

- How have food production practices changed over the past 100 years?
- What are the impacts of these changes on the health of consumers, farmers, farm animals and ecosystems?

OBJECTIVES

- Use the movie *Food, Inc.* to illuminate how the factory model of food production has become dominant.
- Use the movie *Food, Inc.* to illuminate impacts on the health of consumers, farmers, farm laborers, farm animals and the environment.
- Learn about innovations and alternatives to the current factory model of food production that can benefit the health of consumers, farmers, farm laborers, farm animals and the environment.

TEACHER NOTES

The Academy Award®-nominated documentary film *Food, Inc.* was released in 2009. The film documents modern methods of industrial farming which now dominate food production in the United States. The film features interviews with Michael Pollan, the author of *The Omnivore's Dilemma*, and Eric Schlosser the author of *Fast Food Nation*. Also featured in the film are Joel Salatin, a notable leader in promoting new farming methods and Gary Hirshberg, the founder of Stonyfield yogurt, one of the largest organic corporations in the United States.

For some time, the factory model of food production appeared to offer benefits such as increased volumes of food production. However, recently, some of this model's hidden costs and unintended consequences have come to light. Some of these costs may be unfamiliar to the average consumer. The continued use of some of these practices has and will continue to have negative impacts on the health of farmers, consumers, animals and our ecosystems. Some of these practices negatively impact aquatic ecosystems. For example, excess fertilizer and manure may run off fields and feedlots directly into rivers and ultimately to the ocean. This load of nutrients can cause hypoxic dead zones in our oceans.

This set of film questions is intended to help students think about the hidden impacts and costs of modern day food production presented in the film, and to help students consider solutions to these unintended consequences.

The running time of the film is 94 minutes. It can be shown in it's entirely during a couple of class periods. The *Food, Inc.* web site (www.foodincmovie.com) contains background information and a detailed classroom discussion section for educators.



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Another possibility is to show only sections of the film related to your curricular goals. Some of the film's 12 chapters contain material which may not relate to a specific class. This activity guide breaks *Food, Inc.* into thematic sections which contain material that aligns with the What's On Your Fork Action Guide.

The film has been divided into five sections around a related theme. Each film section lasts for 7-12 minutes and this guide contains a series of questions based on ideas presented in that section of film. It is recommended the teacher show the film in sections and discuss the student answers to the accompanying questions.

Each section contains two different question sets. The first question set is a series of short answer questions which students can answer based on an idea discussed in the film. The second question set contains extended response questions which could form the basis of a class discussion or a more substantial writing assignment. These questions can also be used in a class discussion. The teacher can conduct a short discussion based on the questions before showing the next section. Showing all five sections, with discussion, should take two full periods.

CONNECTIONS TO NATIONAL SCIENCE CONTENT STANDARDS GRADES 9-12

Life Science Content Standard C

The Interdependence of Organisms: Students will understand through example the interrelationships and interdependencies of organisms in ecosystems and destruction that can ensue when humans also interact with these ecosystems.

Matter, Energy, and Organization in Living Systems: Energy for ecosystems is derived from the sun's radiant energy. Living plant systems then convert this radiant energy into chemical energy in the form of covalent bonds. This chemical energy is either stored or moved about the ecosystem to other organisms where it undergoes further chemical energy transformations. Populations in the ecosystem are limited by the availability of these molecular building blocks and their associated energy.

Environmental Quality in Personal and Social Perspectives Content Standard F

Personal and Community Health: Balanced nutrition has a direct effect on growth and development. One factor to consider in the personal choice we have meeting in our nutritional needs is the biological consequences to ourselves and the environment.

Population and Growth: The capacity of agricultural and natural systems that we use for our benefit, have limits. These natural systems can be altered in negative ways when our use exceeds their limit.

Natural Resources: Organisms may not be able to adapt at a rate that keeps pace with these changes.

Environmental Quality: Ecosystems provide services for humans in the form of clean oxygenated air, nutrient rich soils and clean water. Students will have opportunities to study agricultural practices that are detrimental to ecosystems as well as practices that enhance the natural systems. They will appreciate the many factors that can be impacted positively or negatively.

Science and Technology in Local, National and Global Challenges: Students will understand the importance of knowing the science behind the technology before it is employed to serve humans and also appreciate the interplay that policies and ethics also have on the implementation. The ever expanding factory models of agriculture are having negative impacts on the land, air and oceans. Recently, farmers have been able to employ their understanding of the science behind their crops and livestock to mitigate the negative effects/impacts of farming.



A Food, Inc. Intro to Modern Food Production

WORKSHEET, SECTION I

SECTION I: INTRODUCTION AND A HISTORY OF THE INDUSTRIAL FOOD MODEL

FILM CLIPS: CHAPTER 1 INTRODUCTION SECTION (0:00 to 4:00) CHAPTER 2 FAST FOOD TO ALL FOOD SECTION (4:00 to 9:00, and 12:00 to 14:30) Total film time: 11.5 minutes.

The process of growing, marketing and purchasing food has changed dramatically in the past 50 years. One of the driving factors was the growth of the fast food industry. This section examines the history of fast food and the ways it changed food production and farming practices.

Short Answer Questions

- How many products are in the average supermarket today?
- McDonalds is one of the largest purchasers of which food items? Name three.
- 80% of the beef market in the United States is controlled by how many corporations?
- Chickens have been bred to produce more white meat. What is the cost or consequence for the chicken?
- Antibiotics are commonly included in chicken feed at low doses. Name a potential negative consequence for chicken health described in the film.

Extended Response Questions

- Describe the revolutionary idea which McDonalds and other fast food corporations initiated.
- "There are no seasons in the North American food market anymore." Describe what this statement means and give examples.
- Describe how the use of the phrase "farm fresh" to describe food might be misleading.
- Explain why you think the chicken farmer had to remove so many dead chickens each day.
- The title of this chapter is "Fast Food to All Food." Explain what you think is meant by the title.
- Elaborate on environmental hazards to the chicken farmer. Cite two examples from the film.



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WORKSHEET, SECTION 2

SECTION 2: DEPENDENCE ON CORN

FILM CLIPS: CHAPTER 2 CORNICOPIA OF CHOICES (17:00 to 24:30) Total film time: 7.5 minutes.

This section discusses the industrial farming of corn and soybeans. Specifically, it addresses how corn is used to manufacture a number of artificial products like high fructose corn syrup and how corn replaced grass as food for most livestock raised in the US.

Short Answer Questions

- What percentage of the land in the United States is used to grow corn?
- What percentage of products on the supermarket shelves is estimated to contain a corn or soy bean product?
- List three ingredients found in processed foods that are manufactured from corn. Also, list three non-food items made from corn.
- How much meat does the average American eat in a year?
- What is the main component of food fed to animals in the United States?
- Cows have evolved to eat grass. List two reasons why we feed corn to cows in a feedlot rather than grass.
- Where did the scientist put his hand?
- What specific organism, harmful to humans, is found in the food in the cow's stomach?
- CAFO is the acronym for Concentrated Animal Feeding Operation. What factors in the CAFO feedlot may contribute to the spread of harmful bacteria?



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Extended Response Questions

- Explain what it means when the film states that most food starts in a corn field in Iowa. Give at least two examples.
- In the last generation, there has been a dramatic shift in meat production in the United States. Instead of pasture, most of our meat now comes from large industrial feedlots. Discuss one reason presented in the film which caused this shift in agriculture to occur.
- A single crop like corn, grown in large fields, is an example of monoculture. This type of agriculture may require large amounts of pesticides. Explain why you think monoculture is so pesticide dependent compared to a small field with a great diversity of crops.
- CAFO stands for Concentrated Animal Feeding Operation. In a CAFO, thousands of animals may be concentrated for a few months before they are slaughtered. In terms of pollution, describe three potential environmental problems posed by CAFO operations.



SECTION 3: OTHER FARMING METHODS "THE POLYFACE FARM MODEL"

FILM CLIPS: CHAPTER 6 IN THE GRASS SECTION (44:20 to 47:00), SPECIAL FEATURES HONORING THE PIGNESS OF PIGS, (4:00 minutes) and IT'S IN THE GRASS (2:40 Minutes) Total film time: 9.5 minutes.

Joel Salatin is one of a breed of new meat producers who are not comfortable with industrial farming practices. Salatin's Polyface Farm is based on minimizing the social and environmental problems associated with industrial farming and processing methods. Consequently, the meat produced on his farm is a little more expensive to the consumer.

Short Answer Questions

- At Polyface Farm, is meat production based on grass or corn?
- Describe two ways grazing cows in a pasture benefits the farm/farmer.
- How is a pasture like a salad bowl?
- 50 years ago, Polyface Farm would have supported how many cows?
Now it supports how many cows?
- Why is a pasture better than a plowed field in terms of global warming?

Extended Response Questions

- On Polyface Farm, everything is grass based. Describe what that means.
- Describe some of the costs associated with feed-lot beef which Salatin does not have to pay for as a result of grazing his animals on a pasture.
- Describe two environmental problems associated with corn-fed beef raised in a feedlot and describe how the grass-fed beef on Salatin's farm avoid these problems.
- Give an example of how Polyface farms practices symbiosis.
- Describe the function of pigs in the cow barns. How does this help the environment?
- Clover is a legume and it has a relationship with soil bacteria that fix nitrogen. Describe how allowing clover to grow amongst the grass on Polyface Farm helps the environment.
- Significant costs associated with feedlot beef is based on oil while Salatin uses the concept of "solar dollars" to describe his farm. Explain what he means by this.
- Salatin says that industrial food is not cheap but really is expensive. Explain what he means. Use examples from the video to elaborate.



SECTION 5: SHOCKS TO THE SYSTEM AND THE BEGINNING OF CHANGE

FILM CLIPS: CHAPTER 10 SHOCKS TO THE SYSTEM (1:24:00 to 1:26:00) and SPECIAL FEATURE THERE IS NO PLACE CALLED AWAY (5:30 minutes) Total film time: 7.5 minutes.

This section discusses how the industrial farming system could reach a point of collapse and how organic farming methods are beginning to become mainstreamed.

Short Answer Questions

- Modern agriculture is heavily dependent on what substance?
- How many gallons of oil are needed to bring a steer to market?
- What happened to the river where Gary Hirshberg grew up?
- In the last 30 years we have increased pesticide use by a factor of 10 yet during this time the loss of food crops due to pests has _____.
- What causes hypoxia in the Gulf of Mexico off the coast of New Orleans?
- What is missing in a hypoxic area that results in the death of marine life?
- Describe Gary Hirshberg's method of making organic food less expensive.

Extended Response Questions

- Describe the connection between oil and food production.
- Describe how the price of oil can shock the world's agricultural system.
- Explain how a farmer in Iowa, in the middle of the country, can impact an ocean.



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ANSWER KEY, SECTION I

SECTION I: INTRODUCTION AND A HISTORY OF THE INDUSTRIAL FOOD MODEL

Short Answer Questions

- How many products are in the average supermarket today? **47,000**
- McDonalds is one of the largest purchaser of which food items? Name three.
Ground beef, potatoes, pork, chicken, apples, lettuce, tomatoes
- 80% of the beef market in the United States is controlled by how many corporations? **4**
- Chickens have been bred to produce more white meat. What is the cost or consequence for the chicken? **They have large breasts; bones and organs can no longer keep up with the overall growth of the chicken. In some cases the chickens can no longer walk.**
- Antibiotics are commonly included in chicken feed at low doses. Name a potential negative consequence for chicken health described in the film. **Antibiotic resistance.**

Extended Response Questions

- Describe the revolutionary idea which McDonalds and other fast food corporations initiated. **A factory-like system of food production based on uniformity and conformity. As in a factory, each worker performed a limited number of specialized tasks.**
- "There are no seasons in the North American food market anymore." Describe what this statement means and give examples. **Traditionally, we used to buy food which was grown in the local area and only when it was ripe. Now food is transported from all over the world to our markets, so that we can buy products from warm areas when it's cold in our own area Food is also picked unripe and later artificially ripen. You can buy almost any produce product throughout the year, so foods never go "out of season."**
- Describe how the use of the phrase "farm fresh" to describe food might be misleading. **This phrase is not regulated and can be used by anyone who chooses to use it, regardless of how the food was produced.**
- Explain why you think the chicken farmer had to remove so many dead chickens each day. **Chickens may be dying from disease, over-crowding, heat and/or inability to survive due to the physical limitations of their own bodies.**
- The title of this chapter is "Fast Food to All Food." Explain what you think is meant by the title. **The fast food model developed in the 1950s and 1960s has now been adapted to much of the food that is now produced in the United States**
- Elaborate on environmental hazards to the chicken farmer. Cite 2 examples from the film. **Allergies to antibiotics, exposure to antibiotic-resistant bacteria, exposure to dust contaminated with feces.**



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ANSWER KEY, SECTION 2

SECTION 2: DEPENDENCE ON CORN

Short Answer Questions

- What percent of the land in the United States is used to grow corn? **30%**
- What percentage of products on the supermarket shelves is estimated to contain a corn or soy bean product? **90%**
- List three ingredients found in processed foods that are manufactured from corn. Also, list three non-food items made from corn. **High fructose corn syrup, maltodextrin, sorbic acid, xanthan gum and others. Non food items include batteries, charcoal, diapers, Motrin.**
- How much meat does the average American eat in a year? **Over 200 pounds per person**
- What is the main component of food fed to animals in the United States? **Corn**
- Cows have evolved to eat grass. List two reasons why we feed corn to cows in a feedlot rather than grass. **This is an inexpensive process that makes the cattle put on fat quickly.**
- Where did the scientist put his hand? **In one of the cow's stomachs.**
- What specific organism, harmful to humans, is found in the cow's stomach? **E coli bacteria**
- CAFO is the acronym for Concentrated Animal Feeding Operation. What factors in the CAFO feedlot contribute to the spread of harmful bacteria? **Standing in manure, a diet of corn, animals crowded together**

Extended Response Questions

- Explain what it means when the film states that most food starts in a corn field in Iowa. Give at least 2 examples. **Most of our food either contains corn in various forms or corn is fed to most of the livestock animals we eat. See question #2 above for examples.**
- In the last generation, there has been a dramatic shift in meat production in the United States. Instead of pasture, most of our meat now comes from large industrial feedlots. Discuss one reason presented in the film which caused this shift in agriculture to occur. **Cheapness, the drive to increase productivity, higher demand for meat, increased demand for fast food**
- A single crop like corn, grown in large fields, is an example of monoculture. This type of agriculture usually consumes large amount of pesticides. Explain why you think monoculture is so pesticide dependent compared to a small field with a great diversity of crops. **Lots of food for specific pests. Therefore, pest populations grow rapidly and the farmer responds to rapid growth with pesticides. Also, monoculture usually has cloned or genetically similar individuals, so once a pest finds a particular organism easy to invade, they are able to infest all organisms in a field.**
- CAFO stands for Concentrated Animal Feeding Operation. In a CAFO, thousands of animals may be concentrated for a few months before they are slaughtered. In terms of pollution, describe three potential environmental problems posed by CAFO operations. **Excess manure causes water pollution, greenhouse gases, odor pollution, and aquatic Dead Zones.**



SECTION 3: OTHER FARMING METHODS "THE POLYFACE FARM MODEL"

Short Answer Questions

- At Polyface Farm, is meat production based on grass or corn? **Grass**
- Describe two ways cows in a pasture benefit the farm/farmer. **They don't require purchased feed, their manure fertilizes the next crop of grasses, insects for chickens to eat "grow" in the manure.**
- How is a pasture like a salad bowl? **It contains a lot of different types of grasses, much as a salad contains lots of different vegetables.**
- 50 years ago, Polyface Farm would have supported how many cows? **20**
Now it supports how many cows? **100**
- Why is a pasture better than a plowed field in terms of global warming? **A plowed field requires machines to plow it which burn oil and create greenhouse gas emissions, whereas a pasture does not.**

Extended Response Questions

- On Polyface Farm, everything is grass-based. Describe what that means. **Beef animals eat grass rather than corn, which they're commonly fed in a feedlot.**
- Describe some of the costs associated with feed-lot beef which Salatin does not have to pay for as a result of grazing his animals on a pasture. **Purchasing feed or antibiotics, disposing of manure**
- Describe two environmental problems associated with corn-fed beef raised in a feedlot and describe how the grass-fed beef on Salatin's farm avoid these problems. **Two environmental problems from feedlots are water pollution from manure runoff, and the pollution from the pesticides, herbicides and fertilizers used on the fields growing feed corn; these inputs can run off from fields and create water pollution problems downstream. Polyface Farm uses no artificially produced inputs, relying instead on natural symbiotic relationships between animals and land.**
- Give an example of how Polyface farms practices symbiosis. **Cow manure provides food for insects which are a food source for chickens. By eating fly larvae growing in the cow's manure, the chickens help keep the fly population down naturally.**
- Describe the function of pigs in the cow barns. How does this help the environment? **The pigs help speed up the decomposition of cow manure.**
- Clover is a legume and it has a relationship with soil bacteria that fix nitrogen. Describe how allowing clover to grow amongst the grass on Polyface Farm helps the environment. **More nitrogen in the soil naturally helps the grasses grow faster and Salatin does not need to use fertilizer which might cause eutrophication and/or green house gas emissions.**
- Significant costs associated with feedlot beef is based on oil while Salatin uses the concept of "solar dollars" to describe his farm. Explain what he means by this. **Industrial farming uses lots of oil. Salatin does not use the same amount of oil; rather than oil, photosynthesis is the basis of his farming operation.**
- Salatin says that the industrial food is not cheap but really is expensive. Explain what he means. Use examples from the video to elaborate. **The negative impacts to the environment and human health include such things as eutrophication, Dead Zones, and food-borne illness that are not reflected in the sale price of our food. We pay for these things in other ways.**



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ANSWER KEY, SECTIONS 4 & 5

SECTION 4: CHALLENGES TO CHANGING THE CURRENT SYSTEM

Short Answer Questions

- What are 3 examples of labels that the food industry has fought? **Calorie information, removal of Trans fat content, labeling of genetically modified foods, country of origin labeling**
- Which celebrity was sued by the beef industry and for what reason? **Oprah Winfrey was sued for publicly criticizing beef.**
- What can happen in Colorado if you publicly criticize beef? **It is a felony. You could go to prison.**

Extended Response Questions

- Describe why you think the food industry is resistant to extra food labeling. **Labeling might cause consumers to alter their food-buying choices.**
- In some cases it is against the law to criticize some food items. What is your opinion of this type of law? Support your ideas. **Student answers will vary.**

SECTION 5: SHOCKS TO THE SYSTEM AND THE BEGINNING OF CHANGE

Short Answer Questions

- Modern agriculture is heavily dependent on what substance? **Petroleum (oil)**
- How many gallons of oil are needed to bring a steer to market? **75**
- What happened to the river where Gary Hirshberg grew up? **It caught on fire.**
- In the last 30 years we have increased pesticide use by a factor of 10 yet during this time the loss of food crops due to pests has _____. **Doubled**
- What causes hypoxia in the Gulf of Mexico off the coast of New Orleans? **Agricultural run-off**
- What is missing in a hypoxic area that results in the death of marine life? **Oxygen**
- Describe Gary Hirshberg's method of making organic food less expensive. **Making organic food less expensive by selling large amounts at places like Wal-Mart.**

Extended Response Questions

- Describe the connection between oil and food production. **Making fertilizer, pesticides and other synthetic agricultural chemicals are made from oil; planting and harvesting food using machines requires fuel oil.**
- Describe how the price of oil can shock the world's agricultural system. **Industrial farming is reliant on oil, so if the cost of oil increases, then the price of food would increase. This could impact the ability of poor people to get food.**
- Explain how a farmer in Iowa, in the middle of the country, can impact an ocean. **The use of fertilizer and poor manure handling will enable both products to get into the Mississippi River watershed.**