Michael Pollan, *The Omnivore's Dilemma: The Secrets Behind What You Eat (Young Reader's Edition)* - Grade 7

Originally published in New York: Dial Books, 2009.

Learning Objective: The goal of this two day exemplar is to give students the opportunity to use the reading and writing habits they've been practicing on a regular basis to unpack Pollan's investigative journalism of industrial farms. By reading and rereading the passage closely combined with classroom discussion about it, students will identify why and how farming practices have changed, as well as identify Pollan's point of view on the subject. When combined with writing about the passage and teacher feedback, students will begin to appreciate investigative journalism, as well as question from where their food is coming.

Reading Task*: Students will silently read the passage in question on a given day—first independently and then following along with the text as the teacher and/or skillful students read aloud. Depending on the difficulties of a given text and the teacher's knowledge of the fluency abilities of students, the order of the student silent read and the teacher reading aloud with students following might be reversed. What is important is to allow all students to interact with challenging text on their own as frequently and independently as possible. Students will then reread specific passages in response to a set of concise, text- dependent questions that compel them to examine the meaning and structure of Pollan's reporting. Therefore, rereading is deliberately built into the instructional unit.*

Vocabulary Task: *Most of the meanings of words in the exemplar text can be discovered by students from careful reading of the context in which they appear. Teachers can use discussions to model and reinforce how to learn vocabulary from contextual clues, and students must be held accountable for engaging in this practice. Where it is judged this is not possible, <u>underlined</u> words are defined briefly for students to the right of the text in a separate column whenever the original text is reproduced. At times, this is all the support these defined words need. At other times, particularly with abstract words, teachers will need to spend more time explaining and discussing them. In addition, in subsequent close readings of passages of the text, high value academic ('Tier Two') words have been **bolded** to draw attention to them. Given how crucial vocabulary knowledge is for academic and career success, it is essential that these high value words be discussed and lingered over during the instructional sequence.*

Sentence Syntax Task: *On occasion, students will encounter particularly difficult sentences to decode. Teachers should engage in a close examination of such sentences to help students discover how they are built and how they convey meaning. While many questions addressing important aspects of the text double as questions about syntax, students should receive regular supported practice in deciphering complex sentences. It is crucial that the help they receive in unpacking text complexity focuses both on the precise meaning of what the author is saying and why the author might have constructed the sentence in this particular fashion. That practice will in turn support students' ability to unpack meaning from syntactically complex sentences they encounter in future reading.*

Discussion Task*: Students will discuss the passage in depth with their teacher and their classmates, performing activities that result in a close reading of Pollan's text. The goal is to foster student confidence when encountering complex text and to reinforce the skills they have acquired regarding how to build and extend their understanding of a text. A general principle is to always reread the passage that provides evidence for the question under discussion. This gives students another encounter with the text, helping them develop fluency and reinforcing their use of text evidence.*

Writing Task*: Students will paraphrase different sentences and paragraphs of Pollan's text and then write either a compare and contrast essay illustrating the differences between the traditional farm and the factory farm or an argument against the factory farm. Students might be afforded the opportunity to rewrite their essays or revise their in-class paraphrases after participating in classroom discussion, allowing them to refashion both their understanding of the text and their expression of that understanding.*

Text Selection: This selection, taken from the young readers edition of Pollan's bestseller, *The Omnivore's Dilemma*, asks students to consider how their food is grown today and why and how that has changed. This brief history and science of United States farm ecology offers students diverse opportunities for exploration and close reading.

Outline of Lesson Plan: This lesson can be divided by the teacher into two days of instruction and reflection on the part of students and their teachers, with the option of a written homework assignment after Day 1 and the possibility of adding an additional day devoted to peer review and revision of the culminating writing assignment.

Standards Addressed: The following Common Core State Standards are the focus of this exemplar: RI.7.1, RI.7.2, RI.7.3, RI.7.4, RI.7.5; W.7.1, W.7.2, W.7.4; SL.7.1; L.7.4, L.7.5

The Text: Pollan, Michael. *The Omnivore's Dilemma: The Secrets Behind What You Eat*

(Chapter 3: From Farm to Factory)

Rule or order

A substance that kills insects

Corn grown from seeds with different traits

DNA is the chemical name for genes. Genes give all organisms their

traits such as how fast they grow

Animal dung used for fertilizing land

Relating to energy from the sun

Branch of science concerned with the relationships between living things and their environment

Grassy fields where animals can graze

A basket

Exemplar Text	Vocabulary
That's around seventy-five gallons of oil per acre of corn (Some estimates are much higher.) Here's another way to look at it. **Calories**, like the calories in food, are units of energy. On the industrial farm, it takes about ten calories of fossil fuel energy to produce one calorie of food energy. That means the industrial farm is using up more energy than it is producing. This is the opposite of what happened before chemical fertilizers. Back then, the Naylor farm produced more than two calories of food energy for every calorie of fossil fuel energy invested. In terms of energy, the modern farm is a losing proposition. It's too bad we can't simply drink the petroleum directly—it would be more efficient. The factory farm produces more food much faster than the old solar-based farm. But the system only works as long as fossil fuel energy is cheap.	*A plan of action* *oil; more productive and less wasteful*

Day One: Instructional Exemplar for Pollan's *The Omnivore's Dilemma (Young Reader's Edition)*

Summary of Activities

1. Teacher introduces the day's passage with minimal commentary and students read it independently (5 minutes)
2. Teacher or a skillful reader then reads the passage out loud to the class as students follow along in the text (5 minutes)
3. Teacher asks the class to discuss the first set of text-dependent questions and perform targeted tasks about the passage, with answers in the form of notes, annotations to the text, or more formal responses as appropriate (40 minutes)

Text Under Discussion	Directions for Teachers/Guiding Questions For Students

It may seem that I've given corn too much credit. After all, corn is just a plant. How could a plant take over our food chain and push out almost every other species? Well, it had some help-from the U.S. Government.

[read the intervening paragraphs]

Then in 1909 a chemist discovered a way to take nitrogen out of the air. This nitrogen could be used for fertilizer. However, making nitrogen this way takes enormous amounts of energy, energy that we mainly get from **fossil fuels**. Not only that, it uses a lot of **hydrogen** that also comes from gas and oil. With chemical fertilizer, farming went from being solar powered to being powered by oil, coal, and gas.

1. Introduce the text and ask students to read independently

Other than giving an initial gloss to words students would likely not be able to define from context (underlined in the text), teachers should avoid giving any background context or instructional guidance at the outset of the lesson while students are reading the text silently. This close reading approach forces students to rely exclusively on the text instead of privileging background knowledge and levels the playing field for all students as they seek to comprehend Pollan's words. It is critical to cultivating independence and creating a culture of close reading that students initially grapple with rich texts like Pollan's without the aid of prefatory material, extensive notes, or even teacher explanations.

2. Read the passage out loud as students follow along

Asking students to listen to Pollan's text exposes students a second time to the rhythms and meaning of his language before they begin their own close reading of the passage. Speaking clearly and carefully will allow students to follow Pollan's narrative, and reading out loud with students following along improves fluency while offering all students access to this complex text. Accurate and skillful modeling of the reading provides students who may be dysfluent with accurate pronunciations and syntactic patterns of English.

Text Under Discussion	Directions for Teachers/Guiding Questions For Students

It may seem that I've given corn too much credit. After all, corn is just a plant. How could a plant take over our food chain and push out almost every other species? Well, it had some help-from the U.S. Government.

At the heart of the industrial food chain are huge businesses, ***agri*-businesses**. The same businesses that create new seeds provide farmers with the tools and fertilizer they need to grow lots of corn. Agribusinesses also need cheap corn from which they make **processed food** and hundreds of other products. To get the corn flowing and keep it flowing, agribusiness depends on government regulations and taxpayer money.

Rule or order

The government started seriously helping corn back in 1947. That was when a huge weapons plant Muscle Shoals, Alabama, switched over to making chemical fertilizer. How can a weapons plant make fertilizer? Because **ammonium nitrate**, the main ingredient in explosives, happens to be an excellent source of **nitrogen**. And nitrogen is one of the main ingredients in fertilizer.

After World War II, the government found itself with a tremendous surplus of ammonium nitrate. There was a debate about what the government should do with the leftover bomb material. One idea was to spray it on forests to help out the timber industry. But the scientists in the Department of Agriculture had a better idea: Spread the ammonium nitrate on farmland as fertilizer. And so the government helped launch the chemical fertilizer industry. (It also helped start the pesticide industry, since insect killers are based on poison gases developed for the war.)

Substance that kills insects

3. Guide discussion of the first half of the essay with a series of specific text-dependent questions and tasks.

As students move through these questions, be sure to check for and reinforce their understanding of academic vocabulary in the corresponding text (which will be **boldfaced** the first time it appears in the text). At times, the questions provided here may focus on academic vocabulary.

(Q1) Ask students to define "agribusiness."

It is important for students to understand that agribusinesses are not farmers. Some students might need clarification here. Teachers should discuss the following sentence: "Agribusinesses also need cheap corn from which they make processed food and hundreds of other products." Agribusinesses are large companies that manufacture farming equipment, seeds, fertilizers, pesticides, processed foods as well as provide services to farmers.

Sidebar: Website listing many different types of products made from corn.

If students are intrigued to learn all the different types of products made from corn, have them view the graphic web on pages 68-69 of Pollan's *The Omnivore's Dilemma (Young Reader's Edition)* or examine the following website: **http://www.ontariocorn.org/classroom/products.html#Products%20that%20use%20Corn**

(Q2) How did the U.S. government help launch the chemical fertilizer industry?

The U.S. government sprayed their WWII surplus of ammonium nitrate on farmland. Ammonium nitrate was manufactured for weapons during the war. After the war, the U.S. government needed to do something with the remaining bomb material. It must have worked well as a fertilizer because after that the chemical fertilizer business took off, and many farms began using it to grow crops.

Text Under Discussion	Directions for Teachers/Guiding Questions For Students

Chemical fertilizer was needed to grow hybrid corn because it is a very hungry crop. The richest acre of Iowa soil could never feed thirty thousand hungry corn plants year after year without added fertilizer. Though hybrids were introduced in the thirties, it wasn't until farmers started using chemical fertilizers in the 1950s that corn yields really exploded.

Corn grown from seeds with different traits

(Q3) Why are chemical fertilizers so important and necessary to agribusinesses?

Students should remember from (Q1) that agribusinesses rely on corn to produce many of their products. The type of corn being grown, hybrid corn, needs very fertile soil. Chemical fertilizers are necessary to create this fertile soil especially because of the quantity (*thirty thousand hungry corn plants)* being planted.

Plants and Nitrogen

Plants and all living thing organisms need the element **nitrogen**. Without nitrogen, cells cannot make proteins or DNA.

DNA is the chemical name for genes. Genes give all organisms their traits such as how fast they grow

(Q4) Ask students to describe in writing one cause and effect relationship they have read about thus far.

Possible answers should include the U.S. government's surplus caused the chemical fertilizer industry to take off or that corn farming exploded as a result of the chemical fertilizers.

For thousands of years, farmers added nitrogen to their soil, even before they knew what nitrogen was. They fertilized their crops with manure from their animals. They also rotated crops. That means they never grew corn in a field more than two years in a row. Then they would switch that field to soybeans or some other **legume**. Legumes such as beans add nitrogen to the soil with the help of friendly bacteria that live on their roots.

Animal dung used for fertilizing land

(Q5) What is the natural way to fertilize crops?

The natural way to fertilize crops is by planting different crops every couple of years in addition to spreading animal manure on the fields.

Then in 1909 a chemist discovered a way to take nitrogen out of the air. This nitrogen could be used for fertilizer. However, making nitrogen this way takes enormous amounts of energy, energy that we mainly get from **fossil fuels**. Not only that, it uses a lot of **hydrogen** that also comes from gas and oil. With chemical fertilizer, farming went from being solar powered to being powered by oil, coal, and gas.

Relating to energy from the sun

(Q6) What are fossil fuels? What might be some problems with using fossil fuels to produce chemical fertilizers?

Fossil fuels are natural sources of energy such as oil, coal, and gas. Teachers should point out why "fossil" appears with "fuel" (because these types of fuels are derived from the organic remains of prehistoric plants and animals). Students might recognize that "making nitrogen…takes enormous amounts of energy" and fossil fuels are not free, thus raising the cost of chemical fertilizer. Students might also cite the environmental costs (using their own prior knowledge) of using fossil fuels.

Day Two: Instructional Exemplar for Pollan's *The Omnivore's Dilemma (Young Reader's Edition)*

Summary of Activities

1. Teacher introduces the day's passage with minimal commentary and students read it independently (5 minutes)
2. Teacher or a skillful reader then reads the passage out loud to the class as students follow along in the text (5 minutes)
3. Teacher asks the class to discuss the first set of text-dependent questions and perform targeted tasks about the passage, with answers in the form of notes, annotations to the text, or more formal responses as appropriate (40 minutes)

Text Under Discussion	Directions for Teachers/Guiding Questions For Students

Then in 1909 a chemist discovered a way to take nitrogen out of the air. This nitrogen could be used for fertilizer. However, making nitrogen this way takes enormous amounts of energy, energy that we mainly get from **fossil fuels**. Not only that, it uses a lot of **hydrogen** that also comes from gas and oil. With chemical fertilizer, farming went from being solar powered to being powered by oil, coal, and gas.

[read the intervening paragraphs]

The factory farm produces more food much faster than the old solar-based farm. But the system only works as long as fossil fuel energy is cheap.

1. Introduce the text and ask students to read independently

Other than giving an initial gloss to words students would likely not be able to define from context (underlined in the text), teachers should avoid giving any background context or instructional guidance at the outset of the lesson while students are reading the text silently. This close reading approach forces students to rely exclusively on the text instead of privileging background knowledge and levels the playing field for all students as they seek to comprehend Pollan's words. It is critical to cultivating independence and creating a culture of close reading that students initially grapple with rich texts like Pollan's without the aid of prefatory material, extensive notes, or even teacher explanations.

2. Read the passage out loud as students follow along

Asking students to listen to Pollan's text exposes students a second time to the rhythms and meaning of his language before they begin their own close reading of the passage. Speaking clearly and carefully will allow students to follow Pollan's narrative, and reading out loud with students following along improves fluency while offering all students access to this complex text. Accurate and skillful modeling of the reading provides students who may be dysfluent with accurate pronunciations and syntactic patterns of English.

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Then in 1909 a chemist discovered a way to take nitrogen out of the air. This nitrogen could be used for fertilizer. However, making nitrogen this way takes enormous amounts of energy, energy that we mainly get from **fossil fuels**. Not only that, it uses a lot of **hydrogen** that also comes from gas and oil. With chemical fertilizer, farming went from being solar powered to being powered by oil, coal, and gas.

Relating to energy from the sun

THERE GOES THE SUN

When George Naylor's father spread his first load of ammonium nitrate fertilizer, the ecology of his farm underwent a **quiet revolution**. Until then, the farm's nitrogen had been recycled in a **natural loop**. Legumes used the sun's energy to fix nitrogen in the soil. Other plants used the nitrogen to grow. Animals ate the plants and the farmer recycled the nitrogen by spreading the animals' manure on the soil.

A branch of science concerned with the relationships between living things and their environment

But now the Naylors didn't need to produce their own nitrogen—they went out and bought it. The nitrogen for the fields would no longer be made with the sun's energy but with fossil fuels. Farming was no longer an **ecological loop—it was more like a factory**. The farmer bought raw materials (seed and fertilizer) and turned it into a finished product—corn.

Since there was no need for legumes to fix nitrogen, farmers could plant corn in every field, every year. Animals and their pastures could be eliminated. Farming became much simpler. Like a factory, the industrial farm produces just one product (or at most, two.)

Grassy fields where animals can graze

Ask students to write a paragraph explaining the last sentence of the text box ("With chemical fertilizer, farming went from being solar powered to being powered by oil, coal, and gas.")

Answers might sound like this: The traditional farm fertilizes its soil with animal dung and by rotating its crops. The crops such as corn and beans grow from the sun's energy. Crop rotation allows the soil chemistry to change and become more fertile. Alternatively, chemical fertilizers treat the soil without the use of the sun. Chemical fertilizers are manufactured in a factory and transported to farms by machines powered by fossil fuels.

(Q7) What does the author mean when he wrote, the "ecology of his farm underwent a quiet revolution"?

Students should recognize that the natural order of fertilization described in the first paragraph was dramatically altered when Naylor's father began using chemical fertilizer. It was a "quiet" revolution because nothing in this natural world protested the change.

(Q8) Cite textual evidence for the claim, "Farming was no longer an ecological loop—it was more like a factory."

Teachers should highlight the connection in meaning to "loop" and "revolve/revolution." Students will cite textual evidence such as:

"The farmer bought raw materials (seed and fertilizer) and turned it into a finished product—corn."
"…farmers could plant corn in every field, every year."
"…the industrial farm produces just one product (or at most, two.)"
"…the industrial farm, is powered with fossil fuels."

Text Under Discussion	Directions for Teachers/Guiding Questions For Students

And like most factories, the industrial farm, is powered with fossil fuels. There's natural gas in the fertilizer and the fossil fuel energy it takes to make the pesticides, the diesel used by the tractors, and the fuel needed to harvest, dry, and transport the corn. Add it all up and you find that every bushel of corn from an industrial farm requires about half a gallon of oil to grow. That's around seventy-five gallons of oil per acre of corn (Some estimates are much higher.) Here's another way to look at it. **Calories**, like the calories in food, are units of energy. On the industrial farm, it takes about ten calories of fossil fuel energy to produce one calorie of food energy. That means the industrial farm is using up more energy than it is producing. This is the opposite of what happened before chemical fertilizers. Back then, the Naylor farm produced more than two calories of food energy for every calorie of fossil fuel energy invested. In terms of energy, the modern farm is a losing proposition. It's too bad we can't simply drink the petroleum directly—it would be more efficient. The factory farm produces more food much faster than the old solar-based farm. But the system only works as long as fossil fuel energy is cheap.	*A basket* *Suggested plan of action; oil; more productive and less wasteful*	**(Q9) What fossil fuels are needed to power the industrial farm?** Students should highlight phrases such as: "natural gas in the fertilizer" and "the diesel used by the tractors, and the fuel needed to harvest, dry, and transport the corn." **(Q10) What does Pollan mean when he writes, "…the modern farm is a losing proposition"?** This question will determine if the students understand the author's purpose in writing this passage. It asks students to determine the importance of certain phrases and identify the central theme of this section. Students might cite the following phrases in their answers: "the industrial farm is using up more energy than it is producing" and "the system only works as long as fossil fuel energy is cheap." Students should recognize the traditional farming methods produced more with less fossil fuel energy than the industrial farm. Students can also extract information from the bar graph found in the exemplar.

Explanatory Writing Assignment: Directions for Teachers and Students / Guidance for Teachers

Choose one of the following writing assignments based on the excerpt from Michael Pollan's *The Omnivore's Dilemma (Young Reader's Edition):*

- Write an essay comparing and contrasting traditional farming methods with those of an industrial/factory farm.
  •Write an argument against the industrial/factory farm. Support your argument with textual evidence.
- Reread the last three paragraphs of the exemplar and examine the bar graph. In your own words, describe the author's opinion of the industrial farm. Support your ideas with particular words or phrases that highlight the author's opinion.

Supporting details for a compare and contrast essay might include:

Traditional Farm	Factory Farm
fertilizes soil with manure (needs animals) rotates crops every couple of years solar powered produces more food energy than it uses to grow crops exists as a cycle	"The farmer bought raw materials (seed and fertilizer) and turned it into a finished product—corn." "…farmers could plant corn in every field, every year." "…the industrial farm produces just one product (or at most, two.)" "…the industrial farm is powered with fossil fuels." "industrial farm is using up more energy than it is producing" Not a cycle

Textual evidence for an argument against the factory farm might include:

"factory farm produces more food much faster than the old solar-based farm. But the system only works as long as fossil fuel energy is cheap"
"the industrial farm is using up more energy than it is producing"
"...the industrial farm, is powered with fossil fuels. There's natural gas in the fertilizer and the fossil fuel energy it takes to make the pesticides, the diesel used by the tractors, and the fuel needed to harvest, dry, and transport the corn."
Factory farms need chemical fertilizers to grow hybrid corn

Guidance regarding an essay about the author's point of view:

Asking students to identify the author's opinion or point of view ("the modern farm is a losing proposition") forces them to synthesize the whole text. Students might notice the author's ironic tone in the sentence, "It's too bad we can't simply drink the petroleum directly—it would be more efficient." Teachers should point out that this type of emotional language often signifies an author's point of view.

Additional Reading Passages from *The Omnivore's Dilemma: The Secrets Behind What You Eat* (Young Reader's Edition) 2009; pp. 48-52

CAFO-Concentrated Animal Feeding Operation

The old-fashioned way of raising cattle, like the old-fashioned way of growing corn, was on the small family farm. Cattle were raised in pastures, eating grass and hay—the food they naturally eat. But as corn took over the family farm, cows and other animals were pushed out.

Cattle are now raised in densely packed animal cities like Poky's. These places are called CAFOs—Concentrated Animal Feeding Operations. Farmers gave up raising cattle because, as strange as it might seem, it costs a farmer more to grow feed corn than it costs a CAFO to buy it. (Thanks to those government subsidies.) Eating meat used to be a special occasion in most American homes. Thanks to CAFOs, meat is now so cheap that many of us eat it three times a day. Of course, the American taxpayers have already paid part of the cost by subsidizing corn.

But there are other costs involved in raising cattle this way, costs that shoppers don't see when they buy a steak at the supermarket. On the old-fashioned farm, there is really no such thing as waste. Animal manure goes back into the fields as fertilizer. But the waste from CAFOs is a huge source of very toxic pollution. Tons of animal manure are produced with no good way of disposing of it. The feedlots are also breeding grounds for new and deadly bacteria. Some of these bacteria are finding their way into our food.

And there is another cost to raising cattle on CAFOs, one that's even harder to see. These animals have evolved to eat grass. But in a CAFO they are forced to eat corn—at considerable cost to their health, to the health of the land, and ultimately to the health of us, their eaters.

(…)

Cows and Grass—A Partnership

Cows have evolved over millions of years to eat grass. It's not a one-sided deal. At the same time, grasses have evolved over millions of years to be eaten by cows. This partnership is one of nature's wonders.

When a cow eats grass, it doesn't kill the plant. Grasses have evolved so that they can survive being eaten very well. (As long as the cows give them a chance to recover.) In return for being chewed on, the plants get help from the cows. The cow protects the grass habitat by eating young trees and shrubs that might compete with grasses. The animal also spreads grass seed, plants it with his hooves, and then fertilizes it with his manure.

Only certain animals, including cows, sheep, goats, and bison, can make a meal out of grass. They can do this because they have a specialized second stomach called a rumen. (That's why these animals are called ruminants.) The rumen is like a twenty-five-gallon fermentation tank. Here is where the cow gets some help. Inside the tank lives a type of bacteria that dines on grass. The bacteria break down the cell walls of the grass and allow the cows to get at the protein and carbohydrates within.

On the plains of the American west, where steer 534 was born, bison and the prairie grasses lived together in partnership for thousands of years. (I guess we should include the bacteria in that partnership, also.) It was a natural, solar-powered loop. The plants used the sun's energy to make food. The bison (with the help of bacteria) ate the grass and in return planted it, fertilized it, and defended its territory. It was a successful ecological system.

A rumen has evolved into the perfect organ for digesting grass. But it is not good at digesting corn. So then why is steer number 534 forced to eat corn instead of grass? The answer is one word: speed. Cattle raised on grass simply take longer to grow than cattle raised on corn. "In my grandfather's time, cows were four or five years old at slaughter," Rich Blair explained to me. "In the fifties, when my father was ranching, it was two or three years old. Now we get there at fourteen to sixteen months." What gets a steer from 80 to 1,100 pounds in fourteen months is tremendous amounts of corn, food supplements, and drugs. Fast food indeed.

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