

The Text: Pollan, Michael

The Omnivore's Dilemma: The Secrets Behind What You Eat

Chapter 3: From Farm to Factory

Turning Bombs into Fertilizer

1
2 It may seem that I've given corn too much credit. After all, corn is just a plant.
3 How could a plant take over our food chain and push out almost every other
4 species? Well, it had some help-from the U.S. Government.
5 At the heart of the industrial food chain are huge businesses, **agri-businesses**. The
6 same businesses that create new seeds provide farmers with the tools and fertilizer
7 they need to grow lots of corn. Agribusinesses also need cheap corn from which they
8 make processed food and hundreds of other products. To get the corn flowing and
9 keep it flowing, agribusiness depends on government regulations and taxpayer money.
10 The government started seriously helping corn back in 1947. That was when a
11 huge weapons plant Muscle Shoals, Alabama, switched over to making chemical
12 fertilizer. How can a weapons plant make fertilizer? Because **ammonium nitrate**, the
13 main ingredient in explosives, happens to be an excellent source of **nitrogen**. And
14 nitrogen is one of the main ingredients in fertilizer.
15 After World War II, the government found itself with a tremendous surplus of
16 ammonium nitrate. There was a debate about what the government should do with the
17 leftover bomb material. One idea was to spray it on forests to help out the timber
18 industry. But the scientists in the Department of Agriculture had a better idea: Spread
19 the ammonium nitrate on farmland as fertilizer. And so the government helped launch
20 the chemical fertilizer industry. (It also helped start the pesticide industry, since insect
21 killers are based on poison gases developed for the war.)
22 Chemical fertilizer was needed to grow hybrid corn because it is a very hungry crop.
23 The richest acre of Iowa soil could never feed thirty thousand hungry corn plants year
24 after year without added fertilizer. Though hybrids were introduced in the thirties, it
25 wasn't until farmers started using chemical fertilizers in the 1950s that corn yields really
26 exploded.

rule or order

material added to soil to supply one or more plant nutrients essential to the growth of plants

*a substance that kills insects
corn grown from seeds with different traits*

Plants and Nitrogen

27
28 Plants and other living organisms need the element nitrogen. Without nitrogen,
29 cells cannot make proteins or DNA.
30 For thousands of years, farmers added nitrogen to their soil, even before they
31 knew what nitrogen was. They fertilized their crops with manure from their animals.
32 They also rotated crops. That means they never grew corn in a field more than two
33 years in a row. Then they would switch that field to soybeans or some other **legume**.
34 Legumes such as beans add nitrogen to the soil with the help of friendly bacteria that
35 live on their roots.
36 Then in 1909 a chemist discovered a way to take nitrogen out of the air. This
37 nitrogen could be used for fertilizer. However, making nitrogen this way takes enormous
38 amounts of energy, energy that we mainly get from **fossil fuels**. Not only that, it uses a
39 lot of **hydrogen** that also comes from gas and oil. With chemical fertilizer, farming went
40 from being solar powered to being powered by oil, coal, and gas.

*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*

coal, fuel oil or natural gas, formed from the remains of dead plants and animals and burned for human energy needs relating to energy from the sun

41 **There Goes the Sun**

42 When George Naylor’s father [a farmer who owned a big farm in Greene County,
43 Iowa] spread his first load of ammonium nitrate fertilizer, the ecology of his farm
44 underwent a **quiet revolution**. Until then, the farm’s nitrogen had been recycled in a
45 natural loop. Legumes used the sun’s energy to fix nitrogen in the soil. Other plants
46 used the nitrogen to grow. Animals ate the plants and the farmer recycled the
47 nitrogen by spreading the animals’ manure on the soil.

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

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

57 And like most factories, the industrial farm, is powered with fossil fuels. There’s
58 natural gas in the fertilizer and the fossil fuel energy it takes to make the pesticides, the
59 diesel used by the tractors, and the fuel needed to harvest, dry, and transport the corn.
60 Add it all up and you find that every bushel of corn from an industrial farm requires
61 about half a gallon of oil to grow. That’s around seventy-five gallons of oil per acre of
62 corn (Some estimates are much higher.)

63 Here’s another way to look at it. **Calories**, like the calories in food, are units of
64 energy. On the industrial farm, it takes about ten calories of fossil fuel energy to
65 produce one calorie of food energy. That means the industrial farm is using up more
66 energy than it is producing. This is the opposite of what happened before chemical
67 fertilizers. Back then, the Naylor farm produced more than two calories of food energy
68 for every calorie of fossil fuel energy invested. In terms of energy, the modern farm is a
69 losing proposition. It’s too bad we can’t simply drink the petroleum directly—it would
70 be more efficient.

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

*the branch of science
concerned with
relationship between
living things and their
environment*

*grassy fields where
animals can graze*

*a substance meant to kill
pests
a basket
a unit of area*

*a plan of action; oil
more productive and less
wasteful*