### **Farmers and Factories**

**Lesson #4.2** 

#### **Lesson Description:**

We will explore how crops are grown, animals are raised, and aquatic animals are harvested from the wild and farmed (aquaculture) in industrial agriculture and how those practices impact human health and ecosystems. This lesson also covers the importance of soil, freshwater, and biodiversity in agriculture, as well as a look at ecological alternatives to industrial food animal production (IFAP).

## Crops and Ecology



Agriculture is built upon fertile soil, a favorable climate, ample freshwater, a diversity of plant and animal species, and the skills and labor of farmers and farm workers. These are the ecological foundations of our food system. They are also endangered by depletion, disruption, or disease. Finding ways to better preserve the health of agricultural ecosystems is key to the long-term sustainability of our food supply.

# Crops and Ecology

Most of the challenges described here relate most directly to crop production, but because crops are grown in large part to feed livestock, the production of meat, milk, and eggs is also heavily implicated. In North America, for example, only 40% of cropland is used to feed people directly; most of the remainder is used to grow feed for animals.

### <u>Soil</u>

- Almost everything we eat can be traced back to soil
- Fertile soil is teeming with organisms, including worms, arthropods, bacteria, fungi, and plant life. The decaying (and fully decayed) remains of these and other organisms, and their excrement, make up the part of soil called **organic matter.**
- The remaining mineral fraction of soil is composed of sand, silt, and clay
- Building and maintain healthy soil require care on the part of farmers



**Organic matter and the organisms** that inhabit it are a large part of what makes soil fertile. Organic matter soaks up water and nutrients like a sponge, helping plant roots to access them. Because soil organic matter helps capture and hold water, it is particularly important during droughts.

Organic matter also helps aerate soil, providing roots with oxygen, and it stores carbon that would otherwise contribute to climate change.

Throughout history, farmers have mismanaged this essential resource. Plowing soil and compacting it (e.g., by driving over it with heavy machinery), for example, can make soil more prone to **erosion**—the removal of soil by wind, rain, and other forces. Erosion is particularly damaging because the top layer of soil (topsoil) is richest in organic matter. Erosion can also contribute to water pollution by transporting pesticides and excess nutrients into nearby streams and rivers. On much of the world's agricultural land, fertile soil is still being eroded much faster than it can be restored by natural processes.





# Crops and Ecology

### **Freshwater**

- Growing crops and raising animals for food depend on a reliable supply
  of freshwater
- This resource is surprisingly scarce: of all the water on Earth, only 2.5% is freshwater; the rest is salty
- The vast majority (99 percent) of freshwater is locked in glaciers, icecaps, or below ground, and is mostly unavailable. The remaining amount — a tiny fraction of all the water on Earth — is responsible for serving most of our water needs
- Where rainfall is inadequate, farmers draw from rivers, lakes, reservoirs, wetlands, and groundwater to supply crop fields with freshwater
- In many parts of the world, freshwater supplies are being depleted much faster than natural processes can restore them. For example: new charts found the aquifers in the Upper Ganges area of India, southern Spain and Italy could be depleted between 2040 and 2060. As a result of such patterns, by 2050 as many as 1.8 billion people could live in areas where groundwater is fully or nearly depleted.

### Farm Worker Health



American agriculture depends on an estimated 2.5 million hired farm workers. Hired farm workers are distinct from farmers, who manage the farm and are usually self-employed. Farm workers are often hired for part of the season to help with labor-intensive tasks such as **harvesting**, **washing**, **and processing fruits and vegetables**.

Despite their crucial roles in the American food supply chain, farm workers are often poorly compensated and subjected to occupational hazards. Nearly two-thirds of seasonal farm workers involved in crop production live in poverty, half earn less than \$7,500 a year, and fewer than one in five has health insurance. Most seasonal farm workers are from Mexico or Central America, and at least half who migrate to America are undocumented. Poverty, lack of insurance, and language barriers may deter them from seeking medical assistance, and fears of deportation may deter them from advocating for safer working conditions. Farm workers face particularly high risks of toxic exposure to pesticides, particularly when pesticides drift (are blown by wind) away from where they are sprayed. Workers in crop production also suffer 80% more injuries compared to the national average for private industries. Only one in 10 seasonal farm workers claims the ability to read or speak English fluently, potentially increasing their risks of pesticide exposure and injury (e.g., if they are unable to read warning labels).

# Crops and Ecology

### **Agrobiodiversity**

**Agrobiodiversity** is the variety within and among species involved in food and agriculture.

There are roughly 10,000 known edible plant species in the world. From this vast diversity of food sources, only three — rice, maize, and wheat — provide nearly 60% of the calories and protein that people derive from plants.

Relying on such a narrow range of agrobiodiversity is like putting all our eggs in one basket—if one variety succumbs to a pest outbreak, or becomes unsuitable for a region's climate, food supplies suffer a major loss.

More than just the "spice of life," **diversity helps farmers adapt to changing conditions**. Some crop varieties, for example, are better than others at tolerating droughts or resisting certain pests. These and other traits are particularly important in the face of a rapidly changing climate.

### Crops and Ecology



### **Agrobiodiversity**

Each crop variety also offers unique flavors, textures, and nutritional properties. Many serve medicinal purposes, or have cultural significance to the people who grow and eat them. Over the past century, however, thousands of crop varieties and animal breeds have become rare or extinct. Farmers can preserve agrobiodiversity by continuing to cultivate traditional foods.

The countless "wild" organisms that play supporting roles in food production are also an integral part of agrobiodiversity. One coffee plantation in Mexico, for example, is home to as many as 180 different species of birds that help control insect pests and disperse seeds. Globally, an estimated 35 percent of the food supply depends on a variety of bees, birds, butterflies, and other pollinators. Even among organisms in soil, greater diversity can enhance the beneficial services they offer.

### Fossil Resources

Some resources, such as fertile soil and fresh water, have always been essential to agriculture. Fossil fuels, by contrast, have been widely used in agriculture only since the early 1900s, with the invention of mechanized tractors and synthetic nitrogen fertilizers (manufactured using natural gas). These resources are called **"fossil" fuels** because they are made from the decayed remains of prehistoric life.

Today, over half of the global energy use for commercial agriculture is attributable to manufacturing synthetic nitrogen fertilizers. Fossil fuels are also used in manufacturing pesticides and transporting goods to and from farms.

Global oil reserves are estimated to be near or beyond peak oil — the point at which their rate of **extraction begins to decline**. As oil becomes scarce, prices will inevitably rise, leading to higher food prices and more widespread hunger — unless agriculture and other industries swiftly transition to alternative energy sources.



### Food Stores

Many American families struggle with limited access to healthy food, while in many neighborhoods, candy, soda, and other nutrient - poor foods abound on every street corner. What do these patterns mean for the diets and health of people who live in those communities?

Researchers can measure the availability of healthy food in communities by surveying stores—checking whether they sell fresh produce. Compared to smaller stores, supermarkets tend to offer the widest variety of healthy options, at the lowest prices. Despite these advantages, research shows that simply having access to a supermarket does not necessarily improve diets. Other interventions, such as offering cooking demonstrations and promotional discounts on fruits and vegetables, might encourage people to shop and eat healthier.

Even if supermarkets are part of the solution, getting them into places where they are lacking — such as low-income urban areas — can be challenging. Supermarkets require a lot of land, and urban land is often scarce and expensive. Store owners have expressed security concerns, and may think they won't get enough business from lower-income shoppers.

### **Industrial Food Animal Production**

The average American consumes more meat, milk, and eggs than nearly any other citizen of the world. Where do most of these animal products come from, and why does it matter?

For most of agriculture's history, farm animals were raised on diversified farms, where they generally had access to the outdoors and ample space to move about.

Although conditions like these still exist, the industrialization of agriculture radically transformed how most animals are raised for food. In America the majority of swine, cattle, and other food-producing animals are raised in a system called **industrial food animal production, or IFAP.** 

### Industrial Food Animal Production

In IFAP, poultry and swine are confined in densely stocked indoor facilities. A single IFAP facility, for example, typically houses over 5,000 hogs, or over 100,000 laying hens.

IFAP facilities are designed to **maximize the amount of meat, milk, or eggs** from a particular breed of animal in the shortest amount of time and at the lowest cost.

They are also heavily dependent on specially formulated animal feeds, pharmaceutical drugs, fossil fuels, and other inputs to the production system.

IFAP produces an enormous amount of food with **minimal human labor**, and has been credited with lowering the price of meat, eggs, and milk. However, IFAP incurs heavy costs to public health and ecosystems that are not reflected in the sales price of these products.

### Waste Management

Confining thousands or millions of animals in a small amount of space poses a challenge: what to do with the enormous amounts of feces and urine they generate? A single IFAP facility may produce as much waste as a small city, concentrated over a small area of land.

To dispose of IFAP waste, producers typically spread or spray the manure onto nearby agricultural land. Unlike IFAP waste, human sewage is processed at treatment plants (see the picture below) to reduce levels of harmful bacteria and chemicals, making it safer for use as a fertilizer on fields.



When applied to crop fields, animal waste provides nutrients and organic matter that help crops grow, transforming waste into food. For this reason, farmers don't typically think of it as "waste" and instead call it "**manure**."

IFAP facilities generate such a large quantity of waste in one place, however, that it is often much more than nearby crops can use—becoming a pollution problem rather than a source of fertility.

Pollution from IFAP facilities is a public health and ecological problem because it may contain bacteria, viruses, parasites, veterinary drugs, hormones, heavy metals, excess nutrients, and other potentially harmful contaminants. People may be exposed to these hazards by drinking contaminated well water, for example, or by swimming and fishing in contaminated waters.



### Why Food is Wasted

- Restaurants tend to serve large portions; which consumers may not be able to finish in one sitting.
- Food stores and consumers regularly throw away food that has passed its "sell by," "best by," or "use by" date, including food that is perfectly edible. Contrary to what many consumers believe, expiration labels are manufacturers' recommendations for peak quality and generally have nothing to do with food safety. Some of these problems stem from the attitude that it is cheaper and more convenient to dispose of unwanted food than to try to find ways to use it.



the picture depicts liquid manure from a hog facility in America being pumped onto cropland

#### Worker Health, Worker Justice

Who is responsible for the health and ecological problems of IFAP? Blame is sometimes targeted at the people who raise the animals. In many cases, however, they are as much a victim of an industrial system as they are a part of the problem.

In industrial swine and poultry production, for example, farmers (or "growers") are often pressured into signing contracts with corporations that dictate how the animals must be raised. Signing a contract with these kinds of corporations often means taking out loans to build the required facilities. Debt can further pressure growers to accept the terms mandated by the corporation when it comes time to renew the contract. As one poultry grower said, "When you have that kind of debt load over you ... you're going to choose to sign the contract. You feel that there's no other option when you owe ... a million dollars."

#### Worker Health, Worker Justice

People who raise animals in IFAP operations also face numerous health risks. Crowded conditions in IFAP operations can...

- present frequent opportunities for the transmission of diseasecausing organisms between animals, and from animals to workers.
- IFAP workers responsible for handling animals, animal waste, and carcasses — all of which may harbor bacteria, viruses, and other pathogens. Once infected, workers may spread these pathogens into their homes and communities.
- IFAP workers may also be exposed to a range of airborne hazards, including harmful gases emitted from animal waste, particles of dried feces and urine, animal dander, fungal spores, and bacterial toxins

### **Animal Welfare**

To accommodate the industrial model, animals and their environments are engineered to maximize productivity. Raising animals indoors eliminates weather from the equation, giving producers greater control over temperature, lighting, and other factors that influence productivity.

As a result, most animals in IFAP rarely if ever see the outdoors, let alone feel sunshine, experience day or night, or walk on grass. The stress and crowding of confinement can cause animals to become aggressive toward one another and so bodily alterations are performed in order to prevent the animals from hurting others.





### **Changing Diets, Policies, and Farming Practices**

How can the harms of industrial food animal production (IFAP) be remedied? Changing diets, government policies, and the way animals are raised could all make a difference.

### **Changing diets**

- Each of our food purchases is a "vote with our fork" that sends a market signal affecting what, where, and how food is produced
- Compared to typical high-meat diets, eating a diet of mostly plants requires less agricultural land and produces less nitrogen pollution, and greenhouse gas emissions
- Reducing meat and dairy consumption, particularly among high meatconsuming countries like Canada and the U.S., is an urgent and necessary step toward achieving a sustainable future

### Changing policies

- IFAP is enabled by weak environmental regulations and economic incentives
- strengthening restrictions on antibiotic use, improving the enforcement of air- and water-quality standards, and raising animal welfare standards are just a few of the policy changes that could improve the lives of workers, communities, and animals

### **Changing farming practices**

- Ecological approaches to livestock production typically involve raising animals outdoors (weather permitting), at lower densities, without growth-promoting drugs, and on diverse farms that cultivate a variety of crop or animal species
- Well-managed pasture-based farms avoid many of the public health problems of IFAP, offer farmers greater autonomy, and allow animals freedom to express their natural behaviors





### **Activity: Reflecting on your eating habits**

#### Question: Think about any two meals you ate this week.

Write them down and include them in this response. Identify which food items contain animal products (meat, dairy, eggs, seafood).

### Respond in proper paragraph format (4-8 sentences) to the following inquiries:

1. How frequently do animal products show up in your diet?

2. What role, if any, do animal products play in your cultural food traditions or your family's food habits?

# Food Production: Seafood Seafood

Throughout history, people have relied on aquatic plants and animals for nourishment, particularly among island and coastal communities. For Samoan islanders, sea animals like eels, worms, turtles, and sharks were a central part of traditional diets. Samoan fisherfolk were deeply attuned to their environment, and if they determined a particular species was threatened by overfishing, a village council would put a halt to those activities until it was safe to resume.

Other cultures found ways to cultivate their own aquatic plants or animals for food—a practice called **aquaculture**. Ancient Egyptians, for example, built inland ponds and stocked them with fish and plants, while a system of elaborate canals supplied the ponds with fresh water.



The Food and Agriculture Organization of the United Nations recently reported that more than 140 countries now fish the world's oceans, and that 13 of the 17 major fisheries of the world are in trouble because the stocks have been overexploited. The World Wildlife Fund has asserted that the problem will worsen as fish harvesters move down the food chain to take less endangered species.

The collapse of traditional fisheries has devastated nations that rely heavily on that resource as a main industry and a major food source. The impacts range from loss of employment and poorer nutrition to the loss of entire economies and ways of life. And as fish quotas and territorial limits are set, conflicts arise between and within nations.

Today, environmental and scientific research organizations are raising public awareness of the threats to the world's fishery. However, if the world's fisheries are to be nurtured back to health and managed in a more sustainable manner in the future, today's young people — the future guardians of our ocean resources — must be aware of the complex puzzle of interrelated factors that have brought about this ecological and commercial disaster.

### **Case Study: Northwest Atlantic Cod Fishery**

One of the best case studies for learning what is happening to fish stocks around the world is the collapse of the cod fishery in the Northwest Atlantic Ocean around the island of Newfoundland, Canada.

For more than 500 years, Europeans have come to reap the ocean's rich harvest on the Grand Banks, an area of the continental shelf on the east coast of what is now Canada. The explorer John Cabot, sailing into these waters in 1497, reported a sea teaming with codfish.

Then, beginning in the late 1970s, people working in the Northwest Atlantic fishing industry noticed a decline in the cod stocks and a reduction in the average size of individual fish. By July 1992, the stocks were so depleted that the Canadian government declared them commercially extinct and called for a moratorium (i.e., stop) on fishing. When fisheries scientists, government officials, fish harvesters, and fish processors became aware that there were no longer "lots of fish in Bonavist' Harbour," or anywhere else in Atlantic Canada, they were forced to reflect on where the cod might have gone and how the stocks might be brought back to a sustainable level.

The government blamed overfishing, both foreign and domestic. Inshore fish harvesters blamed large companies, which allowed their huge trawlers to scrape the ocean floor during spawning season. Some fisheries scientists suggested that changes in the ocean environment could be a factor, while others pointed a finger at the burgeoning seal populations. It was apparent to most, however, that no single factor was responsible for the disaster. An intricate web of relationships maintains the balance of an ecosystem as diverse and dynamic as the ocean.

### 1. Foreign overfishing

Nations such as Spain, Portugal, and France have fished the Grand Banks for hundreds of years. By the late 1960s, the catches of cod reported by non-Canadian vessels amounted to more than 600,000 metric tons, compared to less than 200,000 metric tons caught from Canadian vessels.

In 1977, in accordance with the United Nations Law of the Sea Conference, Canada declared a 200-mile (320-kilometer) exclusive economic zone around its coastlines, thereby claiming the right to regulate fishing in those areas. Foreign fishing vessels are excluded from this zone, which includes most of the waters on the continental shelf off the Atlantic coast.

However, there are areas that lie outside of any one nation's jurisdiction and these are managed by the **North Atlantic Fisheries Organization** (NAFO) — a partnership of 17 countries whose mandate is to investigate, protect, and conserve the fishery resources of the Northwest Atlantic. NAFO also establishes a Total Allowable Catch regulation for each species of fish. The excessive catches in this area contributed to severe decline in the overall cod stocks and continues to affect their recovery

### 2. Domestic overfishing

The Newfoundland domestic cod fishery consists of an inshore fishery and an offshore fishery. Before the decline in the cod stocks, the inshore fishery was conducted during the summer using such traditional methods as hook and line, gill nets, or cod traps. The offshore fishery was conducted from large vessels called trawlers during the winter when cod migrated to their spawning grounds on the northern Grand Banks. Trawlers (net) could withstand the dangerous ice conditions and stay at sea for weeks at a time.

Improvements in fish-finding and navigation technology enabled ship captains to find the exact location of the spawning fish and then harvest them. At the same time, large fishing companies found it more economical to keep their processing plants open year-round, thereby requiring a constant supply of fish. The northern cod — easily accessible on its spawning grounds — was the perfect catch for this new high-tech, year-round fishery. The offshore fishery proved to be a very profitable, but an unsustainable practice that led to the decline of the spawning biomass of the cod.



#### 3. Poor Management

Fisheries and Oceans Canada is responsible for managing all marine species, including the Atlantic cod stocks. The goal of this federal department is to **allow for the maximum sustainable catch while maintaining the health of fish stocks**.

The department is also responsible for setting fishing quotas in Canadian waters, as well as the licensing of fish harvesters and vessels. Throughout the 1970s and 1980s, fish harvesters and processors in Newfoundland were concerned that the average size of the fish they were taking was getting smaller and that the amount of fish landed per unit of effort was declining.

Despite their repeated warnings to large companies, fishery scientists, and the federal government, no action was taken. This lack of effective resource management and communication also played a role in the decline of the stocks.



### 3. Poor Management

The closure of the Newfoundland cod fishery in July 1992 was the largest mass layoff in Canadian history, as 30,000 people were suddenly without work. Since that time, the fishing industry in Newfoundland has adjusted and recovered. The value of recorded landings is now greater than in years prior to the cod-fishing moratorium, mainly owing to an increased focus on shrimp, crab, and previously underutilized species.

Unfortunately, the cod stocks are not recovering as expected and there is no commercial cod fishery along the northeast coast of the island.

### Seafood in Diets

Most fish and shellfish are good sources of nutrients, including vitamins, minerals, protein, and the omega-3 fats EPA and DHA. These fats are crucial for brain and eye development, and studies suggest they may have cardiovascular health benefits.

There are also potential health risks associated with eating contaminated seafood. Much of the pollution from industrial activity — such as mercury from coal-fired power plants — winds up in our streams, rivers, and oceans, where it can accumulate in the tissues of aquatic plants and animals. Some toxic chemicals, such as the pesticide DDT, are still showing up in seafood long after the pesticides were banned.

Taken together, there are many important health, ecological, and economic considerations when making choices about seafood. For example, consumers may wish to limit their seafood consumption to sustainably-raised or sustainably-harvested species that are lower on the food chain.



# Our Food's Journey

The variety, abundance, and year-round availability of perishable foods are a modern marvel, made possible by the "cold chain" — an uninterrupted series of refrigerated vehicles and storage facilities that keep food within an ideal temperature range.

Even before distributors began using mechanical refrigeration in the late 1800s, rail cars, steamships, and warehouses were cooled with ice to keep food from spoiling over long journeys from producers to consumers. Today, the cold chain allows perishable food to be transported to and from all corners of the globe.

Today consumers are paying more attention to where their food comes from, partly out of concern over environmental impacts of long-distance transport. How far food travels, however, may not be as important as what people eat, how food is produced, and why it is transported long distances in the first place.

# Our Food's Journey

### Why is Food Transported Long Distances?

There are some valid reasons to transport food long distances, including:

- 1. Feeding densely populated areas: One adult eats roughly one ton of food per year. Where there are a lot of people in one place, there may not be enough local farmland to support them all.
- 2. Out-of-season variety: In northern latitudes, most food production is suspended through the cold season. If people in those regions ate only local food, their options would be very limited unless they preserve fruits and vegetables to last the winter. Some households are doing just that, but it requires effort and planning.
- **3.** Allowing regions to focus on their strengths: Some regions are better at producing certain foods than others. For instance, some have better soil and/or weather conditions to promote the growth of particular plant species for food production.

Other reasons have to do with the nature of the food distribution industry (see below).



### Food Distributors

Food distributors provide a bridge between the people who produce food and those who sell it. They gather products from farmers and food processors, store them in warehouses, and then transport them to retail and wholesale buyers.

A supermarket, for example, does not have time to purchase from hundreds of different farmers and processors to stock their shelves. One farmer, meanwhile, rarely produces enough food to make it worthwhile for a large business to purchase directly from them. A distributor brings together goods from many different producers and processors so they can be sold in bulk. Food distributors are also part of the reason foods are transported long distances. Larger, more competitive distributors may buy only from large farms that provide a steady supply of goods at the lowest prices—even if those farms are halfway across the globe.

Some smaller-scale farmers are getting around these problems by "cutting out the middleman" and selling directly to consumers (e.g., at farmers' markets). Farmers get a larger share of the profit this way, and they can build personal relationships with consumers who want to know and trust where their food comes from.

### Food Miles

The term "food miles" refers to the distance foods travel from where they are produced to where they are purchased or eaten. Food miles have come under scrutiny by conscientious consumers, often out of concern for public health and the environment. Fossil fuel– powered vehicles deplete dwindling oil reserves, impact air quality, and emit greenhouse gases (GHGs) that contribute to climate change. In some cases, purchasing locally produced foods may lessen these impacts by reducing transport distances.

Food routes, however, are rarely as simple as a straight line from farm to market. Processed food companies often source ingredients from multiple farms, and their products may be sold and re-sold through many distributors before arriving in stores. Meat, milk, and egg production usually involves shipping feed to animals and transporting animals between breeding, feeding, and slaughtering facilities.

Some transport vehicles are also more efficient than others. Trains, for example, are many times more energy-efficient than trucks and planes.

What people eat often matters more for climate change than how far food travels. The vast majority of GHG emissions are from food production, particularly livestock production. If Americans followed a plant-based diet one day per week, they could cut GHG emissions more than by following an entirely local diet.

The tricky truth about food miles – shrinkthatfootprint.com

# Food Processing

Farm to Factory

The development of different food processing techniques has sometimes improved and sometimes degraded the quality of food. Food processing offers important benefits to businesses and citizens, including a more varied food supply and foods with a longer shelf life. Certain aspects of food processing, however, raise concerns over nutritional quality, worker health, and food safety.

Businesses use food processing techniques to transform raw foods and ingredients into new products. These techniques can include milling grains into flour, crushing seeds to extract their oil, churning milk into butter, mixing ingredients to make batter, and baking cookies on an assembly line. Meat processing, meanwhile, can involve techniques like cutting, deboning, and removing guts from carcasses.

### **Preservation and Food Safety**

Over time, yeasts, molds, bacteria, and other forces cause food to spoil, making it foul-tasting, less nutritious, and potentially unsafe to eat. Many of the oldest food processing techniques, such as drying fruit, pickling vegetables, salting meat, and fermenting dairy (e.g., to make cheese or yogurt) remain important to this day because they **preserve food, delaying spoilage**. Preservation allows people to ship foods over greater distances, stock them in stores longer, and enjoy them for a greater part of the year with more nutrients intact.

Processing can also help to **inhibit or destroy pathogens** (disease-causing organisms) that may contaminate food. **Preservation** techniques such as refrigeration, fermentation, dehydration, and the use of salt, sugar, or chemical preservatives can slow or stop the growth of pathogens.

Although businesses use food processing techniques to reduce food safety risks, the facilities where foods are processed are sometimes part of the problem. Large processing plants, for example, often handle large volumes of products from many different sources. If a shipment of spinach from one farm is contaminated with E. coli and gets mixed together with greens from other farms, the entire batch may become contaminated before it is nationally distributed.

### Variety and Convenience

By modifying the flavors, textures, aromas, colors, and form of foods and raw ingredients, food processing can create greater variety in our food supply. A trip down the breakfast aisle of a supermarket reveals the tremendous variety of products derived from just a few different types of grain. Every year, roughly 20,000 new processed food products are introduced on retail shelves. Of these, only the most successful remain. Processing can also create products that require little or no preparation on the part of consumers. Today, fast food, canned food, baby food, frozen entrées, packaged snack foods, and bottled beverages offer ready-to-heat or ready-to-eat convenience for busy eaters (and parents).



### Animal Slaughter, Meat Processing, and Worker Health

Despite recent improvements, reported injury rates for workers in animal slaughtering and meat processing plants are over 40 percent higher than the average for the private American workforce. Plant workers may be required to use sharp tools and heavy machinery, at high speeds, under crowded conditions, for long hours, and on slippery floors—sometimes without adequate training.

Animal slaughtering and processing companies frequently hire immigrant workers, who may be less empowered to dispute hazardous working conditions. In some cases, undocumented immigrants are smuggled into the country by the companies that hire them, and face fears of deportation. These and other threats can deter workers from organizing to collectively bargain for better working conditions, and from reporting safety violations.

### Food Packaging

Whether they are canned, bottled, boxed, or shrink-wrapped, processed foods are generally sold in packages. Packaging plays important roles in preservation and food safety, serving as a barrier against bacterial contamination, pests, physical damage, the elements, and even curious tampering by people—damaged packaging alerts consumers that someone may have opened it previously. Packaging can also make food easier to transport, store, and serve; the spout on a carton of milk, for example, makes it easier to pour. Packaging also provides a surface for displaying labels.

For all its benefits, packaging can contribute to public health and environmental problems. Food packaging accounts for roughly two-thirds (by volume) of total packaging waste in America. Discarding packaging materials in landfills has the potential to pollute air and water, while burning them for energy can emit greenhouse gases. Recycling, composting, and reusing containers offer more environmentally sound alternatives.



# In Summary

- ✓ Potential ecological impacts of industrial crop production include soil erosion; decrease in bee populations; aquatic dead zones; and the depletion of groundwater
- ✓ while the retail prices of animal products may be lower than they were in the 1950s, many of the negative impacts of IFAP, such as pollution and disease, are not captured in the price tag
- Seafood contains many healthy nutrients, including vitamins, minerals, and protein. However, some types of seafood also contain high levels of harmful contaminants, such as mercury and industrial chemicals
- "Eating local" is often promoted as an important way to reduce the climate impact of our diet. What we eat and how food is produced, however, generally has a greater impact on the climate than how far food travels
- ✓ Food processing offers important benefits to businesses and consumers, including a more varied food supply and foods with a longer shelf life