Chapter 12: Consumerism and Sustainability: From Farm to Table
Objectives for Chapter 12

- Describe how food advertising and marketing affect your food choices.
- Recognize where your food comes from.
- Describe what factors contribute to a sustainable food system.
- Describe the benefits and risks of using hormones, antibiotics, and pesticides in food production.
- Describe the benefits and risks of using biotechnology, including genetic engineering, in agriculture.
- Explain how food policy affects the foods that are available to you to buy and consume.
- Recognize how label terms can help you know how food was produced.
How Do Advertising and Marketing Influence Your Food Choices?

• As food consumers, we have influence over food industry, but advertising and marketing control many of our choices

• Food companies spend close to $10 billion annually to promote their products
  • Much promotion for nutritionally dubious products
  • Advertising for fruits, vegetables almost nonexistent

• College-aged and young adults are increasingly targets of advertisers
Where Does Your Food Come From?

- Much of your food comes from small, family-run American farms
  - To be a farm in the United States, must produce and sell at least $1,000 of agricultural products/year
  - Just over 2 million farms, most in Midwest, Great Plains, California
  - Fewer than 1 million American farmers produce food for population of 300 million
From Farm to Consumer

1. **Farm:** Trees, bushes, plants, and animals produce the raw materials that eventually end up on your plate.

2. **Food Processor:** Food processors clean and sort the raw food products. The food is then either ready for shipping (in the case of whole foods like fruits, vegetables, and grains), or processed with heat, salt, or sugar, or combined with other ingredients to convert it into a packaged food.

3. **Distributor:** Once processed, foods are transported via truck, ship, or train from the plant to a retail outlet, where consumers can buy them.

4. **Seller:** While people buy food from several sources, including family farms, restaurants, farmers’ markets, and convenience stores, most food shopping takes place at the grocery store.

5. **Consumer:** You, the consumer, are the final step in the process.
The Location and Number of Farms in the United States, 2012

Key

- 1 Dot = 200 Farms

United States Total
2,109,303

Figure 12.2
# Types of Farms in the United States

<table>
<thead>
<tr>
<th>Farm Type</th>
<th>Number of Farms</th>
<th>Percent of Total Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Family Farms</td>
<td>1,925,799</td>
<td>87.3</td>
</tr>
<tr>
<td>(annual sales less than $250,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Farms</td>
<td>278,993</td>
<td>12.7</td>
</tr>
<tr>
<td>(annual sales greater than $250,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-family</td>
<td>91,177</td>
<td>4.1</td>
</tr>
<tr>
<td>Family</td>
<td>187,816</td>
<td>8.6</td>
</tr>
<tr>
<td>Total Farms in the United States</td>
<td>2,204,792</td>
<td>100</td>
</tr>
</tbody>
</table>

Where Does Your Food Come From?, Continued

- Challenges of farming
  - High costs
  - Demand for low food prices
  - Competition
  - Dependence on nature's cooperation
- Technology, government support aid farmers
  - Computers, Internet allow for precision agriculture
  - Government subsidies for commodity crops (e.g. corn, soybean, and wheat)
Where Does Your Food Come From?, Continued-1

- The role of agribusiness
  - **Agribusiness**: blending of agricultural and business entities that affect how food, clothes, home goods are developed, processed, distributed, and purchased
    - Food portion includes food production, agricultural chemicals, finance and trade, management, environmental considerations, land development
  - Agriculture sector employs about 5 percent of U.S. population
    - Food processing companies comprise large share
The Location and Number of Food- and Beverage-Processing Facilities, 2007

Figure 12.3
• Crops grown for food
  • Top three food crops in United States: corn, soybeans, wheat
    • World's largest corn producer: 10 billion bushels from >400,000 farms in Corn Belt
    • 50 percent of world's soybeans from >290,000 U.S. farms
    • 10 percent of world's wheat from >160,000 farms in Great Plains
  • Most staple crops used for animal feed, not humans
## Major Agricultural Crops Produced in the United States, 2011

### Table 12.2 Major Agricultural Crops Produced in the United States. 2011

<table>
<thead>
<tr>
<th>Crop</th>
<th>Harvested Area (millions of acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn for grain</td>
<td>87.4</td>
</tr>
<tr>
<td>Soybeans</td>
<td>76.1</td>
</tr>
<tr>
<td>Hay</td>
<td>55.8</td>
</tr>
<tr>
<td>Wheat</td>
<td>46.9</td>
</tr>
<tr>
<td>Cotton</td>
<td>9.4</td>
</tr>
<tr>
<td>Sorghum for grain</td>
<td>5.1</td>
</tr>
<tr>
<td>Vegetables</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Major U.S. Centers of Cattle, Corn, Wheat, and Soybean Products

Figure 12.4
• Animals raised for food
  • Dominant food animals in United States: cows, pigs, chickens

• Exporting foods: the good and bad news
  • U.S. farmers help feed world
    • Estimated 30 percent of farm income from foreign trade
  • Also exporting unhealthy eating habits
    • Shift to high-calorie, high-fat, processed food diet
    • Globesity (growing incidence of obesity worldwide) becoming a global threat
• Food production outside the United States
  • Around 17 percent of food in United States is imported
    • Most fish and shellfish
    • About 39 percent of the fruit and nuts
      – $2 billion worth of bananas annually
  • In past few decades, vegetable imports have doubled; fruits, juices, nuts up by 20 percent
  • Most coffee comes from Colombia and Brazil
Where Does Your Food Come From?, Continued-5

• Importing foods: the good and bad news
  • Two primary reasons for U.S. food imports
    • Demand for variety of products year round
    • Demand for cheap food
  • Problems:
    • Environmental costs of long-distance shipping
    • Potential for food contamination overseas
      – Because of the tremendous volume of imports, the FDA only inspects less than 2 percent of all food products brought into the United States
Percent of Selected Foods and Beverages Consumed in the United States That Are Imported, by Volume
What Is a Sustainable Food System?

• A **sustainable food system** is one that addresses concerns regarding the health of individuals, the community, and the environment in a way that intends to provide healthy food for the world's population for generations to come.

• A sustainable food system must:
  • Be environmentally friendly
  • Economically viable
  • Socially equitable

• Many food systems degrade environment, reduce biodiversity, pollute air and water.
Sustainable Food Systems Model

Environmental Stewardship
- Conserves, protects and renews natural resources (soil, water, air, energy, biodiversity)
- Supports vibrant ecosystems
- Promotes a low-carbon footprint
- Mitigates climate change

Economic Vitality
- Builds community wealth
- Is economically viable and sustainable

Social, Cultural and Ethical Capital
- Promotes cultural diversity
- Empowers social responsibility and community engagement
- Advances ethical, humane, and fair treatment of individuals and animals

Nutrition and Health
- Assure dietary diversity
- Assures safety of food and water supplies
- Assures optimal access to food and water in order to meet nutritional requirements
What Is a Sustainable Food System?, Continued

• Concerns about:
  • Soil use: improper use degrades topsoil, endangers food soil web
  • Energy use: fossil fuels harm environment
    • Using alternatives aids sustainability
  • Water use: growing consumption
    • Conservation is necessary
• Being a more sustainable food consumer
  • Adopting "greener" habits can help
    • Examples: eating less meat
How Far Did Your Food Travel?

Figure 12.7

<table>
<thead>
<tr>
<th>Food</th>
<th>Average Distance in Miles by Truck to Chicago Terminal Market*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumpkins</td>
<td>233</td>
</tr>
<tr>
<td>Squash</td>
<td>781</td>
</tr>
<tr>
<td>Sweet corn</td>
<td>813</td>
</tr>
<tr>
<td>Apples</td>
<td>1,555</td>
</tr>
<tr>
<td>Asparagus</td>
<td>1,671</td>
</tr>
<tr>
<td>Broccoli</td>
<td>2,095</td>
</tr>
<tr>
<td>Grapes</td>
<td>2,143</td>
</tr>
</tbody>
</table>

(*Continental U.S. only)
What Is a Sustainable Food System?, Continued-1

• The most sustainable foods are locally grown and plant based
  • Plant based diets are also more health promoting
• Small farms often provide foods to people living in their communities through:
  • Community-supported agriculture (CSA)
  • Farmers' markets
  • Contracts through local grocery stores
• Buying food from local farms doesn't guarantee that foods were grown in a sustainable way, nor does being from a distant farm mean that those farmers didn't practice sustainable agriculture.
# Food Miles in a Meal

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Local Source</th>
<th>Distance Traveled from Local Source</th>
<th>Conventional Source</th>
<th>Distance Traveled through Conventional Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck roast</td>
<td>Local grass-fed beef farm</td>
<td>75 miles</td>
<td>Colorado</td>
<td>675 miles</td>
</tr>
<tr>
<td>Potatoes</td>
<td>Farmers’ market</td>
<td>10-15 miles</td>
<td>Idaho</td>
<td>1,300 miles</td>
</tr>
<tr>
<td>Carrots</td>
<td>Backyard garden</td>
<td>40 feet</td>
<td>California</td>
<td>1,700 miles</td>
</tr>
<tr>
<td>Green beans</td>
<td>Backyard garden</td>
<td>40 feet</td>
<td>California</td>
<td>1,700 miles</td>
</tr>
</tbody>
</table>
## Go Green: Tips for Making More Sustainable Food Choices

<table>
<thead>
<tr>
<th>Tip</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase locally grown, seasonal foods when possible</td>
<td>Visit the Natural Resources Defense Council for an interactive guide to the seasonal foods available in your area at <a href="http://www.nrdc.org">www.nrdc.org</a>.</td>
</tr>
<tr>
<td>Waste not, want not</td>
<td>Don’t buy excessive amounts of food at one time. If you can’t eat the food that you purchased before it goes bad, consider donating it to a food pantry and/or shelter. Your excess is someone else’s dinner.</td>
</tr>
<tr>
<td>Eat more plant protein</td>
<td>Go meatless at least one meal a week. For delicious meatless ideas, visit <a href="http://www.meatlessmonday.com">www.meatlessmonday.com</a>.</td>
</tr>
<tr>
<td>Plant your own garden</td>
<td>For the ultimate reduction in food miles, plant your produce in your backyard or in containers. To help you develop a green thumb, visit the National Gardening Association’s Food Gardening Guide, the ultimate source for information on growing your favorite vegetables, fruits, and herbs, at <a href="http://www.garden.org">www.garden.org</a>.</td>
</tr>
<tr>
<td>Buy from local farm stands, farmers’ markets, and community-supported agriculture (CSA) farms</td>
<td>Shop at local farmers’ markets and roadside farm stands to find just-picked fruits and veggies (which will be at their peak nutritional value) for minimal food miles. You can also join a CSA to enjoy weekly or monthly boxes of farm-fresh produce delivered to your doorstep or a local pick-up site.</td>
</tr>
</tbody>
</table>
You as a Sustainable Farmer: Growing Vegetables in a Container

• Almost anyone can be a home gardener
  • Requirements:
    • Container: ceramic pot, planter box, or other
    • Potting mixture: soil mix
    • Plant: various vegetables
    • Fertilizing: enrich soil with powdered fertilizer
    • Watering: avoid under- or overwatering
    • Harvesting: timing depends on plant type
### Vegetables: From Plant to Plate

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Minimum Container Size</th>
<th>Number of Plants</th>
<th>Amount of Sunlight</th>
<th>Approximate Number of Days to Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabbage</td>
<td>1 gallon</td>
<td>1 plant</td>
<td>Partial shade</td>
<td>48-53</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>1 gallon</td>
<td>2 plants</td>
<td>Full sun</td>
<td>46-66</td>
</tr>
<tr>
<td>Green beans</td>
<td>1 gallon</td>
<td>2-3 plants</td>
<td>Full sun</td>
<td>37-58</td>
</tr>
<tr>
<td>Lettuce</td>
<td>1 gallon</td>
<td>4-6 plants</td>
<td>Partial shade</td>
<td>41-56</td>
</tr>
<tr>
<td>Peppers</td>
<td>2 gallon</td>
<td>2 plants</td>
<td>Full sun</td>
<td>82-112</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>3 gallon</td>
<td>1 plant</td>
<td>Full sun</td>
<td>84-124</td>
</tr>
</tbody>
</table>

How Do We Balance the World Population's Demand for Food with Sustainability?

• Costs and Benefits of Using Hormones
  • Chemical compounds improve farm yields but also cause concern
• Hormones
  • In cows, bovine growth hormone and its synthetic version, recombinant bovine somatotropin (rbST), stimulate milk production
  • FDA has found no negative effects, but some consumer groups question safety
Milk Label Containing Information about the Use of rBGH

*By Law we must note: The FDA has stated that there is no significant difference between milk from rBST-treated and untreated cows.

Figure 12.8
How Do We Balance the World Population's Demand for Food with Sustainability?, Continued

• Costs and Benefits of Using Antibiotics
  • Whether injected or given via feed, antibiotics are used for three purposes:
    • To treat animals that are sick
    • To preventatively treat animals that may be at risk of being sick
    • To promote growth
  • Risks include growth of antibiotic-resistant bacteria, posing threat to humans when consumed
    – Government agencies try to prevent overuse
Costs and Benefits of Using Pesticides
- Control pests that threaten food supply

Types of pesticides
- Herbicides: kill weeds
- Antimicrobials: kill microorganisms (bacteria, viruses)
- Fungicides: kill fungi (mold)
- Biopesticides: derived from natural materials; include sex pheromones
- Organophosphates: affect nervous system of pests
How Do We Balance the World Population's Demand for Food with Sustainability?, Continued-2

- Risks and regulation of pesticides
  - When not used responsibly, can cause harm to animals, environment, humans
  - Use is heavily regulated in United States
  - Risk assessment (by EPA) is process to determine potential human health risks posed by exposure
- Alternatives to pesticides
  - Integrated pest management uses methods to control pests but limit harmful impact on humans, environment
    - Examples: crop rotation, pest-resistant crops, biopesticides, natural predators
Reducing Pesticides in Food

Wash: Thoroughly wash and scrub all fresh fruits and vegetables with a vegetable brush with sturdy surfaces under running water to dislodge bacteria and some of the pesticide residue. Running water is more effective for this purpose than soaking the fruit and vegetables.

Peel and trim: Peeling fruits and vegetables and tossing the outer leaves of leafy vegetables helps reduce pesticides. Trimming the visible fat from meat and the fatty skin from poultry and fish helps reduce some of the pesticide residue that remains in the fatty tissue of the animal.

Eat a variety of foods: Eating a variety of foods reduces your chances of being overexposed to any particular pesticide.
What Are the Risks and Benefits of Using Biotechnology in Agriculture?

- Humans have been manipulating genes of food products for generations.
  - **Biotechnology**: the application of biological techniques to living cells, which alters their genetic makeup
  - **Plant breeding**: a type of biotechnology in which two plants are crossbred to produce offspring with desired traits from both
• Genetic engineering
  • **Genetic engineering (GE):** the biological technique that isolates and manipulates the genes of organisms to produce a targeted, modified product
  • **Genetically modified organisms (GMOs):** organisms genetically engineered to contain both original and foreign genes
  • First GMO crops grown in early 1990s, designed to reduce pesticide, herbicide use
    • Later versions added nutrients, improved shelf life
  • Proponents believe GMOs are good for environment and food supply
Plant Breeding versus Genetic Engineering

**a** Traditional plant breeding involves crossing two plants of the same species to produce DNA with more desirable traits. The process is imprecise, however, and achieving the desired result could take years.

**b** Today, genetic engineering allows scientists to precisely manipulate the DNA from plants and impart desirable qualities from one plant to its offspring much more quickly.
What Are the Risks and Benefits of Using Biotechnology in Agriculture?, Continued

• Concerns and regulations associated with GE foods
  • Opponents fear creation of "frankenfoods," but industry is tightly regulated by FDA, USDA, EPA

• Many unanswered questions, including:
  • Effects on natural environment, ecological balance
  • Production of plant toxins
  • Introduction of new allergens into food
  • Changes in nutrient content
  • Unsafe animal feed
# Concerns and Regulations for GE Foods

## Table 12.5 Concerns and Regulations for GE Foods

<table>
<thead>
<tr>
<th>Concern</th>
<th>FDA Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undesirable genetic modification</td>
<td>To avoid the creation of undesirable products, genes used must not have prior evidence of encoding any harmful substances. The genes must also be stably inserted into the plant in order to avoid any rearranging of genetic information that would produce an undesirable substance.</td>
</tr>
<tr>
<td>Introduction of allergens</td>
<td>GE foods must be monitored for food allergens. Protein encoded from common allergen food sources (such as milk, eggs, fish, tree nuts, and legumes) should be presumed to be allergens and should be labeled as such on the GE food.</td>
</tr>
<tr>
<td>Excessive level of toxins</td>
<td>GE foods should not contain natural toxins at levels that are higher than those found naturally in plants.</td>
</tr>
<tr>
<td>Changes in nutrients</td>
<td>All GE foods should be monitored to assess unintentional changes in the nutrient levels in the plants and their ability to be utilized in the human body as compared with their conventional counterparts.</td>
</tr>
<tr>
<td>Creation of new substances</td>
<td>If the genes that are introduced into plants encode substances that are different in structure and function than those normally found in foods, these substances would have to be approved by the FDA, as would any other food additive. However, if these substances are GRAS (generally recognized as safe) or “substantially equivalent” to substances that already exist in foods, they do not require premarket approval from the FDA.</td>
</tr>
<tr>
<td>Unsafe animal feeds</td>
<td>Because a single plant type may be the predominant food source in an animal feed, all GE animal feeds must meet the same strict safety standards that are in place for food that is grown for humans.</td>
</tr>
</tbody>
</table>

How Does Food Policy Affect the Foods Available to You to Buy and Consume?

• Various government agencies regulate the food industry and set food and nutrition policy
• Food policy can help encourage food producers to create healthier products
  • Example: *Dietary Guidelines for Americans* caused shift toward whole grains, improved diet
• Food policy can lead to relabeling and reformulating without providing a healthier food product
  • Example: Food producers replaced *trans* fat with saturated fat, with no net positive effect
### Table 12.6 Who Oversees the Food Supply?

<table>
<thead>
<tr>
<th>Agency</th>
<th>Responsible for</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States Department of Agriculture (USDA)</td>
<td>Monitoring agriculture and food production and ensuring safe and accurately labeled meat, poultry, and eggs. The USDA enforces tolerances for pesticide residues in meat, poultry, and eggs set forth by the EPA.</td>
</tr>
<tr>
<td>Food and Drug Administration (FDA)</td>
<td>Overseeing domestic and imported foods except for meat and poultry products. Ensuring that these foods are safe, sanitary, nutritious, wholesome, and honestly and adequately labeled. Overseeing food-processing plants and approval and surveillance of food-animal drugs, feed additives, and all food additives. FDA enforces tolerances for pesticide residues that are set by the EPA.</td>
</tr>
<tr>
<td>Environmental Protection Agency (EPA)</td>
<td>Protecting you and the environment from harmful pesticides. EPA is responsible for the safe use of pesticides and fertilizers, as well as food-plant detergents and sanitizers on foods and in the environment. It establishes the safe tolerances for pesticide residues in or on food commodities and animal feed.</td>
</tr>
<tr>
<td>Animal and Plant Health Inspection Service (APHIS)</td>
<td>Protecting against plant and animal pests and disease</td>
</tr>
<tr>
<td>National Marine Fisheries Service (NMFS)</td>
<td>Overseeing a voluntary seafood inspection for quality and a grading program</td>
</tr>
<tr>
<td>Centers for Disease Control and Prevention (CDC)</td>
<td>Surveillance and investigation of human and animal diseases</td>
</tr>
<tr>
<td>Federal Trade Commission (FTC)</td>
<td>Regulating food advertising</td>
</tr>
<tr>
<td>Department of Health and Human Services (DHHS)</td>
<td>Protecting the health of and providing essential human services to Americans, including those who are less able</td>
</tr>
</tbody>
</table>

How Can Food Policy Affect the Foods Available to You to Buy and Consume?, Continued

• What are the politics of the food industry?
  • Government programs are food consumers
    • Federal government is nation's biggest food consumer
    • Examples: National School Lunch Program, Summer Food Service Program, Emergency Food Assistance Program, Child and Adult Care Food Program
  • Food lobbyists exert influence
    • Example: 2009 push to tax sugared beverages was blocked in Congress
How Do You Know How Foods Were Produced?

• Label terms provide information about how foods were produced
  • USDA defines labeling for animal food products
    • Prepackaged meat products:
      – Certified
      – Fresh poultry
      – Free range
      – Kosher
      – Natural
      – No hormones
      – No antibiotics
How Do You Know How Foods Were Produced?, Continued

- Understand the meaning of the term organic
  - Market for organics foods has grown rapidly
  - USDA developed National Organic Standards (NOS)
  - Organic farming means grown without some synthetic pesticides and fertilizers, bioengineering, irradiation
    - Some pesticides may be used
- No evidence that organic foods are nutritionally superior
  - Advantages: Fewer synthetic pesticides and antibiotics; may have environmental benefits
  - Disadvantages: Often more expensive than conventionally grown foods
The USDA Organic Seal

Figure 12.11
Practical Nutrition Tips Video: Organic Foods

Are Organic Foods Necessary? Or Just Expensive?

with Joan Salge Blake
Table 12.7 Various Levels of Organic

<table>
<thead>
<tr>
<th>If the label says</th>
<th>If the label says</th>
<th>If the label says</th>
<th>If the label says</th>
</tr>
</thead>
<tbody>
<tr>
<td>“100% Organic”</td>
<td>“Made with Organic Ingredients”</td>
<td>nothing about organic claims</td>
<td></td>
</tr>
<tr>
<td>Then: The food must be composed</td>
<td>Then: The food contains at least</td>
<td>Then: The food contains less than</td>
<td></td>
</tr>
<tr>
<td>entirely of organic ingredients.</td>
<td>70 percent organic ingredients.</td>
<td>70 percent organic ingredients.</td>
<td></td>
</tr>
<tr>
<td>Note: These foods cannot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>contain sulfites and must</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>declare the certifying agent.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The USDA Organic seal may be</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>displayed.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| If the label says “Organic”       | If the label says                   |                               |
| and/or displays the USDA Organic | nothing about organic claims        |                               |
| seal                               | Then: The food contains less than   |                               |
| Then: The food contains at least   | 70 percent organic ingredients.     |                               |
| 95 percent organic ingredients.    |                                   |                               |

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>> We're going to turn now to our Consumer Watchdog tonight.