Chapter 10
Agriculture

Key Issues

1. Where did agriculture originate?
2. Where are agricultural regions in LDCs?
3. Where are agricultural regions in MDCs?
4. Why do farmers face economic difficulties?

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The previous chapter divided economic activities into primary, secondary, and tertiary sectors. This chapter is concerned with the principal form of primary-sector economic activity — agriculture. The next two chapters look at the secondary and tertiary sectors. In less developed ***regions***, the farm products are most often consumed on or near the farm, whereas in MDCs farmers sell what they produce. The reason ***why*** farming varies around the world relates to the distribution across ***space*** of cultural and environmental factors. Despite increased knowledge of alternatives, farmers practice distinctive agriculture in different regions and on neighboring farms. Broad climate patterns influence the crops planted in a region, and local soil conditions influence the crops planted on an individual farm. Farmers choose from a variety of agricultural practices, based on their perception of the value of each alternative. These values are partly economic and partly cultural. How farmers deal with their physical environment varies according to dietary preferences, availability of technology, and other cultural traditions. Although individual farmers may make specific decisions on a very local ***scale***, agriculture is as caught up in the ***globalization*** of the economy as other industries. After examining the origins and diffusion of agriculture, we will consider the agricultural practices used in LDCs and MDCs.

Key Issue 1. Where Did Agriculture Originate?

- **Origins of agriculture**
- **Subsistence and commercial agriculture**

The origins of agriculture cannot be documented with certainty, because it began before recorded history. Scholars try to reconstruct a logical sequence of events based on fragments. Improvements in cultivating plants and domesticating animals evolved over thousands of years.

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Origins of Agriculture

Agriculture is deliberate modification of Earth's surface through cultivation of plants and rearing of animals to obtain sustenance or economic gain. Agriculture originated when humans domesticated plants and animals for their use. A **crop** is any plant cultivated by people.

Hunters and Gatherers

Before the invention of agriculture, all humans probably obtained the food they needed for survival through hunting for animals, fishing, or gathering plants. Hunters and gatherers lived in small groups. The men hunted game or fished, and the women collected berries, nuts, and roots. This division of labor sounds like a stereotype but is based on evidence from archaeology and anthropology. The group traveled frequently, establishing new home bases or camps. The direction and frequency of migration depended on the movement of game and the seasonal growth of plants at various locations. Today perhaps a quarter-million people, or less than 0.005 percent of the world's population, still survive by hunting and gathering. Contemporary hunting and gathering societies are isolated groups living on the periphery of world settlement, but they provide insight into human customs that prevailed in prehistoric times, before the invention of agriculture.

Invention of Agriculture

Why did nomadic groups convert from hunting, gathering, and fishing to agriculture? Geographers and other scientists agree that agriculture originated in multiple hearths around the world but do not agree on when and why. Southwest Asia was an early center of crop domestication; barley and wheat are thought to have been domesticated around 10,000 years ago, lentils and olives were also early domesticates from Southwest Asia. Rice is thought to have been domesticated in East Asia more than 10,000 years ago, and millet was domesticated at an early date as well. Sorghum was domesticated in central Africa around 8,000 years ago, and yams may have been domesticated even earlier. Millet and rice may have been domesticated in sub-Saharan Africa independently of the hearth in East Asia. In Latin America, two important hearths are thought to have emerged in Peru and Mexico around 4,000 to 5,000 years ago. Mexico is considered a hearth for beans and cotton, and Peru for the potato. Squashes may have been domesticated in the southeastern U.S. as well as Mexico. The most important contribution of the Americas, maize (corn) may have emerged in the two hearths around the same time.

Animals were also domesticated in multiple hearths at various dates. Southwest Asia is thought to have been the hearth for cattle, goats, pigs and sheep between 8,000 and 9,000 years ago. Domestication of the dog is thought to date from around 12,000 years ago, also in southwest Asia. The horse is considered to have been domesticated in Central Asia, and its diffusion is thought to be associated with that of the Indo-European language. Scientists do not agree on whether agriculture originated primarily because of environmental factors or cultural factors; probably a combination of both factors contributed. Those favoring environmental reasons point to the coinciding of domestication with the end of the last ice age, which resulted in a massive redistribution of humans, other animals, and plants.

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Alternatively, human behavior may be primarily responsible for the origin of agriculture. A preference for living in a fixed place may have led hunters and gatherers to build permanent settlements. Over thousands of years, plant cultivation evolved from a combination of accident and deliberate experiment. That agriculture had multiple origins means that, from earliest times, people have produced food in distinctive ways in different regions.

Subsistence and Commercial Agriculture

The most fundamental differences in agricultural practices are between those in LDCs and those in MDCs. Farmers in LDCs practice subsistence agriculture, whereas farmers in MDCs practice commercial agriculture. **Subsistence agriculture** is the production of food primarily for consumption by the farmer's family. **Commercial agriculture** is the production of food primarily for sale off the farm.

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Similarities between agriculture and climate maps are striking. Because of the problems involved with the concept of environmental determinism, geographers are wary of placing too much emphasis on the role of climate. Cultural preferences also explain agricultural differences in areas of similar climate, such as the lack of hog or wine production in areas where the climate is favorable for them. Five principal features distinguish commercial from subsistence agriculture: 1. purpose of farming; 2. percentage of farmers in the labor force; 3. use of machinery; 4. farm size; and 5. relationship of farming to other businesses.

Purpose of Farming. In LDCs, most people produce food for their own consumption. Some surplus may be sold but may not even exist some years. In commercial farming, farmers grow crops and raise animals primarily for sale. Agricultural products are sold to food-processing companies.

Shifting Cultivation

Shifting cultivation is practiced in much of the world's Humid Low-Latitude, or A, climate regions, which have relatively high temperatures and abundant rainfall. It is practiced by roughly 250 million people across 36 million square kilometers (14 million square miles), especially in the tropical rainforests of South America, Central and West Africa, and Southeast Asia.

Characteristics of Shifting Cultivation

There are two distinctive features of **shifting cultivation**:

- Farmers clear land for planting by slashing vegetation and burning the debris (shifting cultivation is sometimes called **slash-and-burn agriculture**).
- Farmers grow crops on a cleared field for only a few years.

People who practice shifting cultivation generally live in small villages and grow food on the surrounding land, which the village controls.

The Process of Shifting Cultivation. Each year villagers designate an area for planting. They must remove the dense vegetation that typically covers tropical land. The debris is burned under carefully controlled conditions. Rains wash the fresh ashes into the soil, providing needed nutrients. Before planting, the cleared area, known by a variety of names in different regions, including **swidden**, *ladang*, *milpa*, *chena*, and *kaingin*, is prepared by hand. The cleared land can support crops only briefly, usually three years or fewer. Villagers leave the old site uncropped for many years. The villagers will return to the site, perhaps as few as 6 years or as many as 20 years later, to begin the process of clearing the land again. In the meantime, they may still care for fruit-bearing trees on the site.

Crops of Shifting Cultivation. The crops grown by each village vary by local custom and taste. The predominant crops include upland rice in Southeast Asia, maize (corn) and manioc (cassava) in South America, and millet and sorghum in Africa. Yams, sugarcane, plantain, and vegetables also are grown in some regions. The Kayapo people of Brazil's Amazon tropical rain forest plant in concentric rings. Plants that require more nutrients are located in the outer ring. (316) It is here that the leafy crowns of cut trees fall when the field is cleared. Most families grow only for their own needs, so one swidden may contain a large variety of intermingled crops. Families may specialize in a few crops and trade with villagers who have a surplus of others.

Ownership and Use of Land in Shifting Cultivation. Traditionally, land is owned by the village as a whole rather than separately by each resident. Today, private individuals now own the land in some communities, especially in Latin America. (317) Shifting cultivation occupies approximately one fourth of the world's land area, a higher percentage than any other type of agriculture. However, only 5 percent of the world's population engages in shifting cultivation.

Future of Shifting Cultivation

Land devoted to shifting cultivation is declining in the tropics at the rate of about 75,000 square kilometers (30,000 square miles), or 0.2 percent per year. The amount of Earth's surface allocated to tropical rain forests has already been reduced to less than half of its original area. Shifting cultivation is being replaced by logging, cattle ranching, and cultivation of cash crops.

To its critics, shifting cultivation is at best a preliminary step in economic development, and should be replaced by more sophisticated agriculture that yields more per land area.

Defenders of shifting cultivation consider it the most environmentally sound approach for the tropics. Practices used in other forms of agriculture may damage the soil, cause severe erosion, and upset balanced ecosystems. Large-scale destruction of the rain forests also may contribute to global warming. When large numbers of trees are cut, their burning and decay release large volumes of carbon dioxide. Elimination of shifting cultivation could also upset the traditional local

Percentage of Farmers in the Labor Force. In MDCs, around 5 percent of the workers are engaged directly in farming, compared to around 50 percent in LDCs. The percentage of farmers is even lower in the United States and Canada, at only around 2 percent. The number of farmers has declined dramatically in MDCs during the twentieth century. Both push and pull migration factors have been responsible.

Use of Machinery. In MDCs, a small number of farmers in more developed societies can feed many people because they rely on machinery to perform work. Traditionally, the farmer or local craftspeople made equipment from wood, but beginning in the late eighteenth century, factories produced farm machinery. The first all-iron plow was made in the 1770s. Factory-made farm machines have replaced or supplemented manual labor.

Transportation improvements also aid commercial farmers. Railroads in the nineteenth century, and highways and trucks in the twentieth century, have enabled farmers to transport crops and livestock farther and faster. Commercial farmers use scientific advances to increase productivity.

Some farmers conduct their own on-farm research. Electronics also aid commercial farmers. Global positioning systems (GPS) units determine precise coordinates for spreading different types and amounts of fertilizers. Both satellite imagery and yield monitors attached to combines monitor production outputs.

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Farm Size. The average farm size is relatively large in commercial agriculture, especially in the United States and Canada. Commercial agriculture is increasingly dominated by a handful of large farms. In the United States, the largest 5 percent of farms produced 75 percent of the country's total agriculture. Large size is partly a consequence of mechanization. As a result of the large size and the high level of mechanization, commercial agriculture is an expensive business. This money is frequently borrowed from a bank and repaid after the output is sold. Although the United States currently has fewer farms and farmers than in 1900, the amount of land devoted to agriculture has increased. However, the amount of U.S. farmland has declined from its all-time peak in 1960. A serious problem in the United States has been the loss of the most productive farmland, known as **prime agricultural land**, as urban areas sprawl into the surrounding countryside.

Relationship of Farming to Other Businesses. Commercial farming is closely tied to other businesses. Commercial farming in MDCs has been called **agribusiness**, because the farm is integrated into a large food-production industry.

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Although farmers are less than 2 percent of the U.S. labor force, more than 20 percent of U.S. labor works in food production related to agribusiness: food processing, packaging, storing, distributing, and retailing.

Key Issue 2. Where Are Agricultural Regions in Less Developed Countries?

- **Shifting cultivation**
- **Pastoral nomadism**
- **Intensive subsistence agriculture**
- **Plantation farming**

This section considers four agricultural types characteristic of LDCs: shifting cultivation, pastoral nomadism, intensive subsistence, and plantation farming. Intensive subsistence agriculture is divided into two regions, depending on the choice of crop.

diversity of cultures in the tropics. The activities of shifting cultivation are intertwined with other social, religious, political, and various folk customs.

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As the importance of tropical rain forests to the global environment has become recognized, LDCs have been pressured to restrict further destruction of them. Bolivia agreed to set aside 1.5 million hectares (3.7 million acres) in a forest reserve in exchange for cancellation of 650 million dollars of its debt. In Brazil's Amazon rain forest, however, deforestation has increased 2.7 million hectares (7 million acres) per year during the 1990s to 3.1 million hectares (8 million acres) since 2000.

Pastoral Nomadism

Pastoral nomadism is a form of subsistence agriculture based on the herding of domesticated animals. The word *pastoral* refers to sheep herding. It is adapted to dry climates, where planting crops is impossible. Only about 15 million people are pastoral nomads, but they sparsely occupy about 20 percent of Earth's land area.

Characteristics of Pastoral Nomadism

Pastoral nomads depend primarily on animals rather than crops for survival. The animals provide milk, and their skins and hair are used for clothing and tents. Like other subsistence farmers, though, pastoral nomads consume mostly grain rather than meat. Some pastoral nomads obtain grain from sedentary subsistence farmers in exchange for animal products. More often, part of a nomadic group — perhaps the women and children — may plant crops at a fixed location while the rest of the group wanders with the herd. Other nomads might sow grain in recently flooded areas and return later in the year to harvest the crop.

Choice of Animals. Nomads select the type and number of animals for the herd according to local cultural and physical characteristics. The choice depends on the relative prestige of animals and the ability of species to adapt to a particular climate and vegetation.

Movements of Pastoral Nomads. Pastoral nomads do not wander randomly across the landscape but have a strong sense of territoriality. Every group controls a piece of territory and will invade another group's territory only in an emergency or if war is declared. (319) The precise migration patterns evolve from intimate knowledge of the area's physical and cultural characteristics. The selection of routes varies in unusually wet or dry years and is influenced by the condition of their animals and the area's political stability. Some pastoral nomads practice **transhumance**, which is seasonal migration of livestock between mountains and lowland **pasture** areas.

The Future of Pastoral Nomadism

Agricultural experts once regarded pastoral nomadism as a stage in the evolution of agriculture. Pastoral nomadism is now generally recognized as an offshoot of sedentary agriculture, not as a primitive precursor of it. Today pastoral nomadism is a declining form of agriculture, partly a victim of modern technology. Nomads used to be the most powerful inhabitants of the dry lands, but now, with modern weapons, national governments can control the nomadic population more effectively. Government efforts to resettle nomads have been particularly vigorous in China, Kazakhstan, and several Southwest Asia countries, including Egypt, Israel, Saudi Arabia, and Syria. Governments force groups to give up pastoral nomadism because they want the land for other uses. In the future, pastoral nomadism will be increasingly confined to areas that cannot be irrigated or that lack valuable raw materials.

Intensive Subsistence Agriculture

Shifting cultivation and pastoral nomadism are found in regions of low (population) density. But three-fourths of the world's people live in LDCs, and another form of subsistence agriculture is needed to feed most of them: **intensive subsistence agriculture**. In densely populated East, South, and Southeast Asia, most farmers practice intensive subsistence agriculture. The typical farm is much smaller than elsewhere in the world. Because the agricultural density is so high in parts of

East and South Asia, families must produce enough food for their survival from a very small area of land. They do this through careful agricultural practices, refined over thousands of years in response to local environmental and cultural patterns. Intensive subsistence farmers waste virtually no land. Paths and roads are kept as narrow as possible to minimize the loss of arable land. Little grain is grown to feed the animals.

Intensive Subsistence with Wet Rice Dominant

Wet rice occupies a relatively small percentage of Asia's agricultural land but is the region's most important source of food. Intensive wet-rice farming is the dominant type of agriculture in Southeast China, East India, and much of Southeast Asia.

Successful production of large yields of rice is an elaborate, time-consuming process that is done mostly by hand. Growing rice involves several steps: First, a farmer prepares the field for planting, using a plow drawn by water buffalo or oxen. The use of a plow and animal power is one characteristic that distinguishes subsistence agriculture from shifting cultivation. (320) Then the plowed land is flooded with water from rainfall, river overflow, or irrigation. The flooded field is called a **sawah** in the Austronesian language widely spoken in Indonesia, including Java. Europeans and North Americans frequently, but incorrectly, call it a **paddy**, the Malay word for wet rice. The customary way to grow rice is to grow seedlings on dry land in a nursery and then transplant the seedlings into the flooded field.

Wet rice is most easily grown on flat land, because the plants are submerged in water much of the time. One method of developing additional land suitable for growing rice is to terrace the hillsides of river valleys. Land is used even more intensively in parts of Asia by obtaining two harvests per year from one field, a process known as **double cropping**. Double cropping is common in places having warm winters but is relatively rare in India, where most areas have dry winters. Normally, double cropping involves alternating between wet rice and wheat, barley, or another dry crop, grown in the drier winter season.

Intensive Subsistence with Wet Rice Not Dominant

Climate prevents growing wet rice in portions of Asia, especially where summer precipitation levels are too low and winters are too harsh. Wheat is the most important crop, followed by barley. Other grains and legumes are grown for household consumption and some crops sold for cash, such as cotton, flax, hemp, and tobacco.

In milder parts of the region, more than one harvest can be obtained some years through skilled use of **crop rotation**.

Since the Chinese Communist Revolution in 1949, the government organized agricultural producer communes. By combining several small fields into a single large unit, the government hoped to promote agricultural efficiency, but people worked less efficiently for the commune than when working for themselves, and China has dismantled them. The communes still hold legal title to agricultural land as private individuals. Reorganization has been difficult because infrastructure was developed to serve large communal farms rather than small, individually managed ones, but production has increased greatly.

Plantation Farming

The plantation is a form of commercial agriculture found in the tropics and subtropics, especially in Latin America, Africa, and Asia. Plantations are often owned or operated by Europeans or North Americans and grow crops for sale primarily in MDCs. (322) A **plantation** is a large farm that specializes in one or two crops. Among the most important crops are cotton, sugarcane, coffee, rubber, tobacco, cocoa, jute, bananas, tea, coconuts, and palm oil. Crops such as tobacco, cotton,

and sugarcane, which can be planted only once a year, are less likely to be grown on large plantations today than in the past.

Because plantations are usually situated in sparsely settled locations, they must import workers. Managers try to spread the work throughout the year to make full use of the large labor force. Until the Civil War, plantations were important in the U.S. South, where the principal crop was cotton, followed by tobacco and sugarcane. Slaves brought from Africa performed most of the labor until the defeat of the South in the Civil War. Thereafter, plantations were subdivided and either sold to individual farmers or worked by tenant farmers.

Key Issue 3. Where Are Agricultural Regions in More Developed Countries?

- **Mixed crop and livestock farming**
- **Dairy farming**
- **Grain farming**
- **Livestock ranching**
- **Mediterranean agriculture**
- **Commercial gardening and fruit farming**
- **Importance of access to markets**

Commercial agriculture in MDCs can be divided into six main types. Each type is predominant in distinctive regions within MDCs, depending largely on climate.

Mixed Crop and Livestock Farming

Mixed crop and livestock farming is the most common form of commercial agriculture in the United States west of the Appalachians and east of 98° west longitude and in much of Europe from France to Russia.

Characteristics of Mixed Crop and Livestock Farming

The most distinctive characteristic of mixed crop and livestock farming is its integration of crops and livestock. Most of the crops are fed to animals rather than consumed directly by humans. Mixing crop and livestock farming permits farmers to distribute the workload more evenly through the year and reduces seasonal variations in income. In the U.S., corn is the crop most frequently planted in the mixed crop and livestock region because it generates a higher yield than other crops. Some is consumed by people as oil, margarine and other products, but most is fed to pigs and cattle. Soybeans have become the second most important crop in the region.

Crop Rotation

Mixed crop and livestock farming typically involves crop rotation. Crop rotation contrasts with shifting cultivation, in which nutrients depleted from a field are restored only by leaving the field fallow (uncropped) for many years. (323) A two-field crop-rotation system was developed in Northern Europe as early as the fifth century. Beginning in the eighth century, a three-field system was introduced. Each field yielded four harvests every six years, compared to three every six years under the two-field system. A four-field system was introduced in Europe during the eighteenth century. Each field thus passed through a cycle of four crops: root, cereal, rest crop, and another cereal. **Cereal grain**, such as oats, wheat, rye or barley, were sold for flour and beer production, and straw was retained for animal bedding. Root crops were fed to the animals during the winter. Clover and other "rest" crops were used for cattle grazing and restoration of nitrogen to the soil.

Dairy Farming

Dairy farming is the most important type of commercial agriculture practiced on farms near the large urban areas of the Northeast United States, Southeast Canada, and Northwest Europe. Dairying has also become important in South and East Asia.

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Traditionally, fresh milk was rarely consumed except directly on the farm or in nearby villages. During the nineteenth century, demand for the sale of milk to urban residents increased. Rising incomes permitted urban residents to buy milk products, which were once considered luxuries.

Regional Distribution of Dairying
Dairying has become the most important type of commercial agriculture in the first ring outside large cities because of transportation factors. The ring surrounding a city from which milk can be supplied without spoiling is known as the **milkshed**. Improvements in transportation have permitted dairying to be undertaken farther from the market. As a result, nearly every farm in the U.S. Northeast and Northwest Europe is within the milkshed of at least one urban area.

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Dairy farmers, like other commercial farmers, usually do not sell their products directly to consumers. The choice of product varies within the U.S. dairy region, depending on whether the farms are within the milkshed of a large urban area. Farms located farther from consumers are more likely to sell their output to processors. In the East, virtually all milk is sold to consumers living in large urban areas. Farther west, most milk is processed into cheese and butter. Countries likewise tend to specialize in certain products. New Zealand, the world's largest producer of dairy products, devotes about 5 percent to liquid milk, compared to over 50 percent in the United Kingdom.

Challenges for Dairy Farmers
Like other commercial farmers, dairy farmers face economic problems because of declining revenues and rising costs. Distinctive features of dairy farming have exacerbated the economic difficulties:

- **Labor-intensive.** Dairy farming requires constant attention throughout the year.
- **Winter Feed.** Dairy farmers also face the expense of feeding the cows in the winter, when they may be unable to graze on grass.

Grain Farming
Commercial **grain** agriculture is distinguished from mixed crop and livestock farming because crops on a grain farm are grown primarily for consumption by humans rather than by livestock. Wheat generally can be sold for a higher price than other grains such as rye, oats, and barley, and it has more uses as human food. Because wheat has a relatively high value per unit weight, it can be shipped profitably from remote farms to markets. Wheat is grown to a considerable extent for international trade and is the world's leading export crop. The ability to provide food for many people elsewhere in the world is a major source of economic and political strength for the United States and Canada.

The United States is by far the largest commercial producer of grain. Large-scale commercial grain production is found in only a few other countries, including Canada, Argentina, Australia, France, and the United Kingdom. Commercial grain farms are generally located in regions that are too dry for mixed crop and livestock agriculture.

Within North America, large-scale grain production is concentrated in three areas:

- The **winter wheat** belt extends through Kansas, Colorado, and Oklahoma.
- The **spring wheat** belt of the Dakotas, Montana, and southern Saskatchewan in Canada.
- The Palouse region of Washington State.

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Large-scale grain production, like other commercial farming ventures in more developed countries, is heavily mechanized, conducted on large farms, and oriented to consumer preferences. The

McCormick **reaper** (a machine that cuts grain standing in the field) invented in the 1830s, first permitted large-scale wheat production. Today, the **combine** machine performs in one operation the three tasks of reaping, threshing, and cleaning. Unlike work on a mixed crop and livestock farm, the effort required to grow wheat is not uniform throughout the year. Some individuals or firms may therefore have two sets of fields — one in the spring-wheat belt and one in the winter-wheat belt.

Livestock Ranching

Ranching is the commercial grazing of livestock over an extensive area, practiced in more developed countries, where the vegetation is too sparse and the soil too poor to support crops.

The importance of ranching in the United States extends beyond the number of people who choose this form of commercial farming because of its prominence in popular culture. Cattle ranching in Texas, though, as glamorized in popular culture, actually dominated commercial agriculture for a short period — from 1867 to 1885.

Cattle ranching in the United States expanded because of demand for beef in the East Coast cities during the 1860s. Ranchers who could get their cattle to Chicago were paid $30 to $40 per head, compared to only $3 or $4 per head in Texas.

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To reach Chicago, cattle were driven on hoof by cowboys over trails from Texas to the nearest railhead. The western terminus of the rail line reached Abilene, Kansas in 1867. The most famous route from Texas northward to the rail line was the Chisholm Trail.

Cattle ranching declined in importance during the 1880s after it came in conflict with sedentary agriculture. The early cattle ranchers in the West owned little land, only cattle.

The U.S. government, which owned most of the land used for open grazing, began to sell it to farmers to grow crops. For a few years, the ranchers tried to drive out the farmers. The farmers' most potent weapon proved to be barbed wire, first commercially produced in 1873. Ranchers were compelled to buy or lease land to accommodate their cattle. Sixty percent of cattle grazing today takes place on land leased from the U.S. government.

With the spread of irrigation techniques and hardier crops, land in the United States has been converted from ranching to crop growing. Cattle are still raised on ranches but are frequently sent for fattening to farms or to local feed lots.

Commercial ranching is conducted in several other MDCs. In Australia sheep are more common than cattle.

Ranching is rare in Europe, except in Spain and Portugal. In South America, a large portion of the pampas of Argentina, Southern Brazil, and Uruguay are devoted to grazing cattle and sheep.

Ranching has followed similar stages around the world: first, herding over open ranges, then ranching transformed into fixed farming by dividing the open land. Many of the farms converted to growing crops, and ranching was confined to the drier lands. Ranching has become part of the meat-processing industry rather than an economic activity carried out on isolated farms.

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Mediterranean Agriculture

Mediterranean agriculture exists primarily in the lands that border the Mediterranean Sea. Farmers in California, central Chile, the southwestern part of South Africa, and southwestern Australia practice Mediterranean agriculture as well. Every Mediterranean area borders a sea. Prevailing sea winds provide moisture and moderate the winter temperatures. Summers are hot and dry. The

land is very hilly. Farmers derive a smaller percentage of income from animal products in the Mediterranean region than in the mixed crop and livestock region. Some farmers living along the Mediterranean Sea traditionally used transhumance to raise animals, although the practice is now less common.

Most crops in Mediterranean lands are grown for human consumption rather than for animal feed. **Horticulture** — which is the growing of fruits, vegetables, and flowers — and tree crops form the commercial base of the Mediterranean farming. A combination of local physical and cultural characteristics determines which crops are grown in each area. In the lands bordering the Mediterranean Sea, the two most important cash crops are olives and grapes, although approximately half of the land is devoted to growing cereals, especially wheat for pasta and bread.

Cereals occupy a much lower percentage of the cultivated land in California than in other Mediterranean climates. Instead, much of California farmland is devoted to fruit and vegetable horticulture. The rapid growth of urban areas in California, especially Los Angeles, has converted high-quality agricultural land into housing developments. The loss of farmland has been offset by expansion of agriculture into arid lands. However, farming in dry lands requires massive irrigation to provide water.

Commercial Gardening and Fruit Farming

Commercial gardening and fruit farming is the predominant type of agriculture in the U.S. Southeast, frequently called **truck farming**, because "truck" was a Middle English word meaning bartering or the exchange of commodities. Truck farms grow fruits and vegetables. Some of these fruits and vegetables are sold fresh to consumers, but most are sold to large processors. (329) Truck farms are highly efficient large-scale operations that take full advantage of machines at every stage of the growing process. Labor costs are kept down by hiring migrant farm workers, some of whom are undocumented immigrants from Mexico. A handful of farms may dominate national output of some fruits and vegetables. A form of truck farming called *specialty farming* has spread to New England, growing crops that have limited but increasing demand among affluent consumers.

Key Issue 4. Why Do Farmers Face Economic Difficulties?

- **Issues for commercial farmers**
- **Issues for subsistence farmers**
- **Strategies to increase food supply**

Commercial and subsistence farmers both have difficulty generating enough income to continue farming. The underlying reasons are, however, different. Commercial farmers are producing a surplus of food, whereas many subsistence farmers are barely able to produce enough food to survive.

Challenges for Commercial Farmers

Commercial farmers produce large quantities of food and therefore face low prices for their output. Government subsidies help prop up farm income. Many believe that the future health of commercial farming rests with more sustainable practices.

Importance of Access to Markets

Because the purpose of commercial farming is to sell produce off the farm, the distance from the farm to the market influences the farmer's choice of crop to plant. Geographers use the von Thünen model to help explain the importance of proximity to market in the choice of crops on commercial farms. The model was first proposed in 1826 by Johann Heinrich von Thünen, a farmer in northern Germany. According to the model, in choosing an enterprise, a commercial farmer compares two costs: the cost of the land versus the cost of transporting products to market.

Von Thünen based his general model of the spatial arrangement of different crops on his experiences as owner of a large estate in northern Germany during the early nineteenth century. He found that specific crops were grown in different rings around the cities in the area.

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The model assumed that all land in a study area had similar site characteristics and was of uniform quality, although von Thünen recognized that the model could vary according to topography and other distinctive physical conditions. The model also failed to understand that social customs and government policies influence the attractiveness of plants and animals for a commercial farmer. Although von Thünen developed the model for a small region with a single market center, it is also applicable on a national or global scale.

Overproduction in Commercial Farming
Commercial farmers suffer from low incomes because they produce too much food rather than too little. A surplus of food has been produced in part because of widespread adoption of efficient agricultural practices. Commercial farmers obtain greatly increased yields per area of land. Dairy farming also demonstrates the growth in productivity. Yield per cow nearly doubled in the period from 1980 to 2008.

Although the food supply has increased in MDCs, demand has remained constant, because the market for most products is already saturated. Demand is also stagnant for most agricultural products in more developed countries because of low population growth.

The U.S. government has three policies to attack the problem of excess productive capacity:

1. **Farmers are encouraged to avoid producing crops that are in excess supply.** The government encourages planting fallow crops.
2. **The government pays farmers when certain commodity prices are low.** The government sets a target price for the commodity and pays the farmers the difference between that price and what they receive in the market.
3. **The government buys surplus production and sells it or donates it to foreign governments.** In addition, low-income Americans receive food stamps in part to stimulate their purchase of additional food.

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The United States has averaged about $16 billion a year on farm subsidies. Annual spending varies considerably from one year to the next. Farming in Europe is subsidized even more than in the United States. Supporters point to the preservation of rural village life in parts of Europe, while critics charge that Europeans pay needlessly high prices for food as a result of the subsidies.

Government policies in MDCs point out a fundamental irony in worldwide agricultural patterns. In an MDC such as the United States, farmers are encouraged to grow less food, whereas LDCs struggle to increase food production to match the rate of the growth in population.

Sustainable Agriculture
Some commercial farmers are converting their operations to sustainable agriculture, an agricultural practice that preserves and enhances environmental quality. Farmers practicing sustainable agriculture typically generate lower revenues than do conventional farmers, but they also have lower costs.

An increasingly popular form of sustainable agriculture is organic farming. However, some organic farms, especially the larger ones, may rely in part on nonsustainable practices. Worldwide, 0.24 percent of farmland was classified as organic in 2007. Australia was the leader, with 37 percent of the worldwide total.

Three principal practices distinguish sustainable agriculture (and at its best, organic farming) from conventional agriculture:

- Sensitive land management
- Limited use of chemicals
- Better integration of crops and livestock

Sensitive Land Management. Sustainable agriculture protects soil in part through ridge tillage and limited use of chemicals. **Ridge tillage** is a system of planting crops on 4-to 8-inch ridges that are formed during cultivation or after harvest. Ridge tillage is attractive for two main reasons: lower production costs and greater soil conservation. Production costs are lower with ridge tillage in part because it requires less investment in tractors and other machinery than conventional planting. Ridge tillage features a minimum of soil disturbance from harvest to the next planting. Over several years the soil will tend to have increased organic matter, greater water holding capacity and more earthworms. The channels left by earthworms and decaying roots enhance drainage. Under sustainable agriculture, farmers control weeds with cultivation and minimal use of herbicides. Ridge tillage compares favorably with conventional farming for yields while lowering the cost of production.

Limited Use of Chemicals. In conventional agriculture, seeds are often genetically modified to survive when herbicides and insecticides are sprayed on the fields. (332) Widespread use of herbicides is artificially selecting for weeds resistant to the herbicide. Sustainable agriculture controls weeds with cultivation and minimal use of herbicides. (333) Researchers have found that combining mechanical weed control with some chemicals yields higher returns per acre than relying solely on one of the two methods. Ridge tillage also promotes decreased use of chemicals, which can be applied only to the ridges.

Integrated Crop and Livestock. Sustainable agriculture attempts to integrate the growing of crops and the raising of livestock as much as possible at the level of the individual farm. Animals consume crops grown on the farm and are not confined to small pens. Mixed crop and livestock is a common form of farming in many MDCs, including the Corn Belt in the United States. In conventional farming, many farmers choose to grow only crops or raise more animals than their crops can feed. Integration of crops and livestock is a return to the historical practice of mixed crop and livestock.

Sustainable agriculture is sensitive to the following complexities of biological and economic interdependencies between crops and livestock:

1. Number of livestock
2. Animal confinement
3. Management of extreme weather conditions
4. Flexible feeding and marketing

Challenges for Subsistence Farmers

Two economic issues discussed in earlier chapters influence the choice of crops planted by subsistence farmers:

- Subsistence farmers must feed an increasing number of people because of rapid population growth.
- Subsistence farmers must grow food for export instead of for direct consumption due to the adoption of the international trade approach to development.