

## DAIRY FARMING

### Learning Outcome 10.3.7

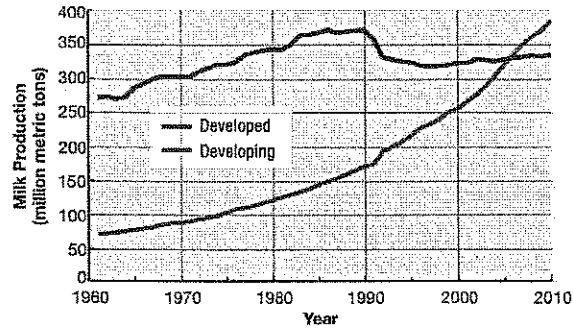
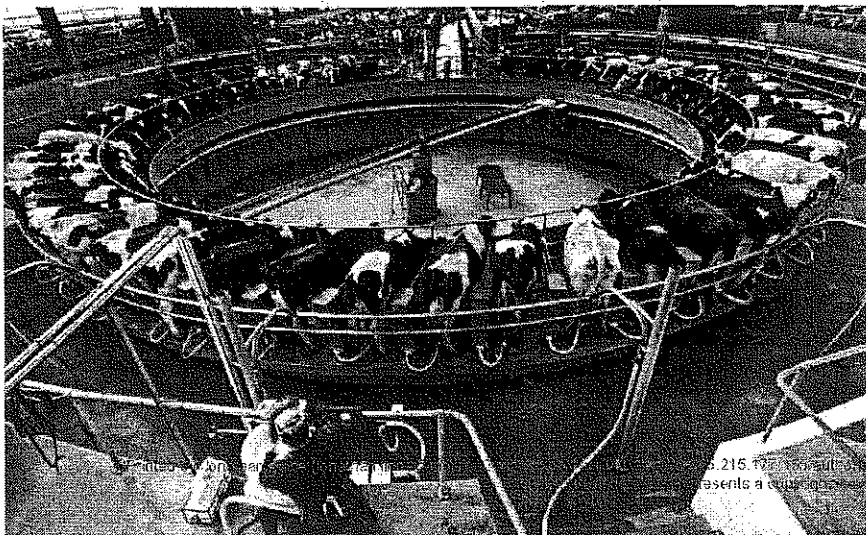
Describe how dairy farming and commercial gardening work.

Dairy farming is the most important commercial agriculture practiced on farms near the large urban areas of the northwestern United States, southeastern Canada, and northwestern Europe (Figure 10-36). Dairying has also become an important type of farming in South and East Asia. Traditionally, fresh milk was rarely consumed except directly on the farm or in nearby villages. With the rapid growth of cities in developed countries 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.** For most of the twentieth century, the world's milk production was clustered in a handful of developed countries. However, the share of the world's dairy farming conducted in developing countries has risen dramatically, from 26 percent in 1980 to 53 percent in 2010 (Figure 10-37). In the twenty-first century, India has become the world's largest milk producer, ahead of the United States, the traditional leader, and China and Pakistan are now third and fourth largest (Figure 10-38).

In developed countries, dairying is the most important type of commercial agriculture in the first ring outside large cities because of transportation factors. Dairy farms must be closer to their market than other types of farms because their products are highly perishable. 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. Until the 1840s, when railroads were first

▼ FIGURE 10-36 DAIRY FARM Many cows are milked simultaneously at this dairy farm in Wiltshire, England.



▲ FIGURE 10-37 CHANGING MILK PRODUCTION Developing countries now produce more milk than developed countries.

used for transporting dairy products, milksheds rarely had a radius beyond 50 kilometers (30 miles). Today, refrigerated railcars and trucks enable farmers to ship milk more than 500 kilometers (300 miles). As a result, nearly every farm in the northeastern United States and northwestern Europe is within the milkshed of at least one urban area.

Dairy farmers, like other commercial farmers, usually do not sell their products directly to consumers. Instead, they generally sell milk to wholesalers, who distribute it in turn to retailers. Retailers then sell milk to consumers in shops or at home. Farmers also sell milk to butter and cheese manufacturers.

In general, the farther the farm is from large urban concentrations, the smaller is the percentage of output devoted to fresh milk. Farms located farther from consumers are more likely to sell their output to processors that make butter, cheese, or dried, evaporated, and condensed milk. The reason is that these products keep fresh longer than milk does and therefore can be safely shipped from remote farms.

Countries likewise tend to specialize in certain products. New Zealand, the world's largest per capita producer of dairy products, devotes about 5 percent to liquid milk, compared to more than 50 percent in the United Kingdom.

New Zealand farmers do not sell much liquid milk because the country is too far from North America and northwestern Europe, the two largest relatively wealthy population concentrations.

**CHALLENGES FOR DAIRY FARMERS.** Like other commercial farmers, dairy farmers face economic difficulties because of declining revenues and rising costs. Dairy farmers who have quit farming most often cite lack of profitability and excessive workload as reasons for getting out of the business. Distinctive features of dairy farming have exacerbated the economic difficulties:

- **Labor intensive.** Cows must be milked twice a day, every day; although the actual milking can be done by machines, dairy farming nonetheless requires constant attention throughout the year.

- **Short fallow.** Fields are cleared and utilized for perhaps 2 years (Boserup was uncertain) and left fallow for up to 2 years, long enough for wild grasses to grow back.
- **Annual cropping.** Fields are used every year and rotated between legumes and roots.
- **Multi-cropping.** Fields are used several times a year and never left fallow.

Contrast shifting cultivation, practiced in regions of low population density, such as sub-Saharan Africa, with intensive subsistence agriculture, practiced in regions of high population density, such as East Asia. Under shifting cultivation, cleared fields are utilized for a couple years and then left fallow for 20 years or more. This type of agriculture supports a small population living at low density. As the number of people living in an area increases (that is, as the population density increases) and more food must be grown, fields will be left fallow for shorter periods of time. Eventually, farmers achieve the very intensive use of farmland characteristic of areas of high population density.

## SUBSISTENCE FARMING AND INTERNATIONAL TRADE

To expand production, subsistence farmers need higher-yield seeds, fertilizer, pesticides, and machinery. Some needed supplies can be secured by trading food with urban dwellers. For many African and Asian countries, though, the main way to obtain agricultural supplies is to import them from other countries. However, subsistence farmers lack the money to buy agricultural equipment and materials from developed countries.

To generate the funds they need to buy agricultural supplies, developing countries must produce something they can sell in developed countries. The developing countries sell some manufactured goods (see Chapter 11), but most raise funds through the sale of crops in developed countries. Consumers in developed countries are willing to pay high prices for fruits and vegetables that would otherwise be out of season or for crops such as coffee and tea that cannot be grown in developed countries because of the climate.

In a developing country such as Kenya, families may divide by gender between traditional subsistence agriculture and contributing to international trade. Women practice most of the subsistence agriculture—that is, growing food for their families to consume—in addition to the tasks of cooking, cleaning, and carrying water from wells. Men may work for wages, either growing crops for export or at jobs in distant cities. Because men in Kenya frequently do not share the wages with their families, many women try to generate income for the household by making clothes, jewelry, baked goods, and other objects for sale in local markets.

The sale of export crops brings a developing country foreign currency, a portion of which can be used to buy agricultural supplies. But governments in developing countries face a dilemma: The more land that is devoted to growing export crops, the less that is available to grow crops for domestic consumption. Rather than help to increase productivity, the funds generated through the sale of export crops may be needed to feed the people who switched from subsistence farming to growing export crops.

### Pause and Reflect 10.4.1

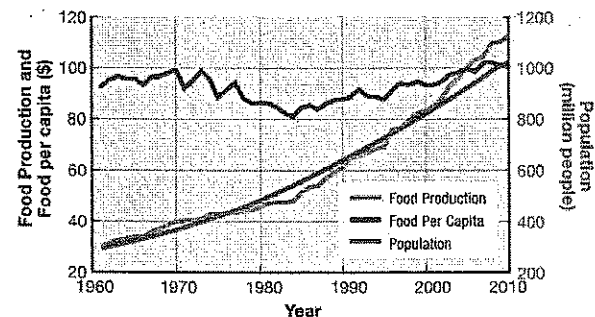
What is an example of a product available in supermarkets in the United States that was exported from a developing country?

Group 1 stop  
AFRICA'S FOOD-SUPPLY STRUGGLE — group 2

Sub-Saharan Africa is struggling to keep food production ahead of population growth. Since 1961, food production has increased substantially in sub-Saharan Africa, but so has population (Figure 10-46). As a result, food production per capita has changed little in a half-century.

The threat of famine is particularly severe in the Horn of Africa and the Sahel. Traditionally, this region supported limited agriculture. With rapid population growth, farmers overplanted, and herd size increased beyond the capacity of the land to support the animals. Animals overgrazed the limited vegetation and clustered at scarce water sources.

Government policies have aggravated the food-shortage crisis. To make food affordable for urban residents, governments keep agricultural prices low. Constrained by price controls, farmers are unable to sell their commodities at a profit and therefore have little incentive to increase production.



▲ FIGURE 10-46 POPULATION AND FOOD IN AFRICA Food production is increasing at about the same rate as population in Africa. As a result, food production per capita is staying about the same.

## DRUG CROPS

### Learning Outcome 10.4.2

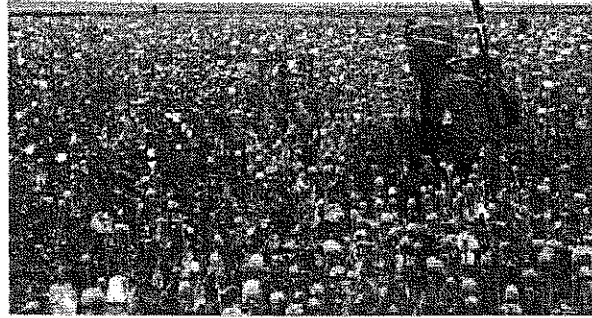
Understand distinctive challenges for developing countries to increase food supply.

The export crops grown in some developing countries, especially in Latin America and Asia, are those that can be converted to drugs. Cocaine and heroin, the two leading, especially dangerous drugs, are abused by 16 to 17 million people each, and marijuana, the most popular drug, is estimated to be used by 140 million worldwide:

- Cocaine is derived from coca leaf, most of which is grown in Colombia or the neighboring countries Peru and Bolivia. Most consumers are located in developed countries, especially in North America. The principal shipping route is from Colombia by sea to Mexico and then by land through Mexico to the United States (Figure 10-47).
- Heroin is derived from raw opium gum, which is produced by the opium poppy plant. Afghanistan is the source of nearly 90 percent of the world's opium; most of the remainder is grown in Myanmar (Burma) and Laos. Most traffic flows from Afghanistan through Iran, Turkey, and the Balkans to Western Europe, where the largest numbers of the world's users live. A second route goes through Central Asia to Russia (Figure 10-48).
- Marijuana, produced from the *Cannabis sativa* plant, is cultivated widely around the world. The overwhelming majority of the marijuana that reaches the United States is grown in Mexico. Cultivation of *C. sativa* is not thought to be expanding worldwide, whereas cultivation of opium poppies and coca leaf are.

### Pause and Reflect 10.4.2

Why does most consumption of cocaine and heroin occur in developed countries?



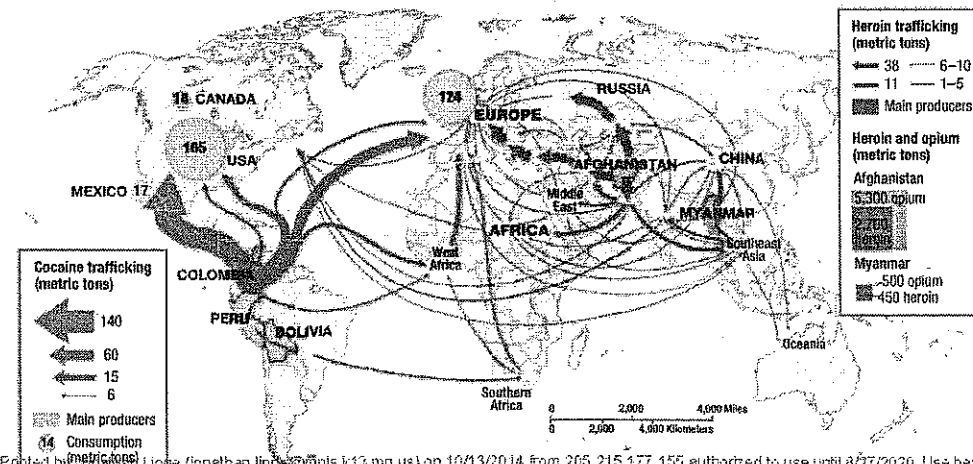
▲ FIGURE 10-47 POPPY FIELD Afghanistan is the leading producer of poppies, which are cultivated for opium production.

## FOOD PRICES

The greatest challenge to world food supply in the twenty-first century has been food prices rather than food supply. Food prices more than doubled between 2006 and 2008, and they have remained at record high levels since then (Figure 10-49). The UN attributes the record high food prices to four factors:

- Poor weather, especially in major crop-growing regions of the South Pacific and North America
- Higher demand, especially in China and India
- Smaller growth in productivity, especially without major new "miracle" breakthroughs
- Use of crops as biofuels instead of food, especially in Latin America

On the other side of the coin, record high food prices have stimulated record high prices for prime agricultural land. Adjusting for inflation, the price of farmland in Iowa doubled from around \$2,500 per acre in 2000 to \$5,000 in 2010.



◀ FIGURE 10-48 INTERNATIONAL DRUG TRAFFICKING The main routes for heroin are from Afghanistan through Southwest Asia to Europe and through Central Asia to Russia. The main routes for cocaine are from Colombia to North America through Mexico and to Europe by sea.