

---

## The Agricultural Revolutions

Around 10,000 years ago, some human groups began to meet their food needs by raising domesticated plants and animals.

Gradually over the next millennium, most people became food producers, although hunting and gathering continued in some places.

The term *Neolithic Revolution*, commonly given to the changeover from food gathering to food producing, can be misleading. *Neolithic* means “new stone,” but the new tool designs that accompanied the beginnings of agriculture did not define it. Nor was the “revolution” a single event. The changeover occurred at different times in different parts of the world. The term **Agricultural Revolutions** is more precise because it emphasizes the central role of food production and signals that the changeover occurred several times. The adoption of agriculture often included the domestication of animals for food (see Map 1.1).

Food gathering gave way to food production over hundreds of generations. The process may have begun when forager bands, returning year after year to the same seasonal camps, scattered seeds and cleared away weeds to encourage the growth of foods they liked. Such semicultivation could have supplemented food gathering without the permanent settlement of the group. Families choosing to concentrate their energies on food production, however, would have had to settle permanently near their fields.

Specialized stone tools first alerted archaeologists to new food-producing practices: polished or ground stone heads to work the soil, sharp stone chips embedded in bone or wooden handles to cut grasses, and stone mortars to pulverize grain. Early farmers used fire to clear fields of shrubs and trees and discovered that ashes were a natural fertilizer. After the burn-off, farmers used blades and axes to keep the land clear.

Selection of the highest-yielding strains of wild plants led to the development of domesticated varieties over time. As the principal gatherers of wild plant foods, women probably played a major role in this transition to plant cultivation, but the task of clearing fields probably fell to the men.

In the Middle East, the region with the earliest evidence of agriculture, human selection had transformed certain wild grasses into higher-yielding domesticated grains, now known as emmer wheat and barley, by 8000 B.C.E. Farmers there also discovered that alternating the cultivation of grains and pulses (plants yielding edible seeds such as lentils and peas) helped maintain fertility.

Plants domesticated in the Middle East spread to adjacent lands, but in many parts of the world, agriculture arose independently. Exchanges of crops and techniques occurred between regions, but societies that had already turned to farming borrowed new plants, animals, and farming techniques more readily than foraging groups did.

The eastern Sahara, which went through a wet period after 8000 B.C.E., preserves the oldest traces of food production in northern Africa. As in the Middle East, emmer wheat and barley became the principal crops and sheep, goats, and cattle the main domestic animals. When drier conditions returned around 5000 B.C.E., many Saharan farmers moved to the Nile Valley, where the river’s annual flood provided water for crops.

In Greece, wheat and barley cultivation, beginning as early as 6000 B.C.E., combined local experiments with Middle Eastern borrowings. Shortly after 4000 B.C.E., farming developed in the light-soiled plains of Central Europe and along the Danube River. As forests receded because of climate changes and human clearing efforts, agriculture spread to other parts of Europe over the next millennium.

Early farmers in Europe and elsewhere practiced shifting cultivation, also known as swidden agriculture. After a few growing seasons, farmers left the fields fallow (abandoned to natural vegetation) and cleared new fields nearby. Between 4000 and 3000 B.C.E., for example, communities of from forty to sixty people in the Danube Valley supported themselves on about 500 acres (200 hectares) of farmland, cultivating a third or less each year while leaving the rest fallow to regain its fertility. From around 2600 B.C.E., people in Central Europe began using ox-drawn wooden plows to till heavier and richer soils.

Although the lands around the Mediterranean seem to have shared a complex of crops and farming techniques, geographical barriers blocked the spread elsewhere. Rainfall patterns south of the Sahara favored locally domesticated grains—sorghums, millets, and (in Ethiopia) teff—over wheat and barley. Middle Eastern grains did not grow at all in the humidity of equatorial West Africa; there, yams became an early domestic crop.

Domestic rice originated in southern China, the northern half of Southeast Asia, or northern India, possibly as early as 10,000 B.C.E. but more likely closer to 5000 B.C.E. The warm, wet climate of southern China particularly favored rice. Indian farmers cultivated hyacinth beans, green grams, and black grams along with rice by about 2000 B.C.E.

In the Americas a decline of game animals in the Tehuacán° Valley of Mexico after 8000 B.C.E. increased people’s dependence on wild plants. Agriculture based on maize° (corn) developed there about 3000 B.C.E. and gradually spread. At about the same time, the inhabitants of Peru developed a food production pattern based on potatoes and quinoa°, a protein-rich seed grain. People in the more tropical parts of Mesoamerica cultivated tomatoes, peppers, squash, and potatoes. In South America’s tropical forests, the root crop manioc became the staple food after 1500 B.C.E. Manioc and maize then spread to the Caribbean islands.

The domestication of animals expanded rapidly during these same millennia. The first domesticated animal, the dog, may have helped hunters track game well before the Neolithic period. Later, animals initially provided meat but eventually supplied milk, wool, and energy as well.

Refuse dumped outside Middle East villages shows a gradual decline in the number of wild gazelle bones after 7000 B.C.E. This probably reflects the depletion of wild game through overhunting by local farmers. Meat eating, however, did not decline. Sheep and goat bones gradually replaced gazelle bones. Possibly wild sheep and goats learned to graze around agricultural villages to take advantage of the suppression of predators by humans. The tamer animals may gradually have accepted human control and thus become themselves a ready supply of food. The bones of tame animals initially differ so little from those of their wild ancestors that the early stages of domestication are hard to date. However, selective breeding for characteristics like a woolly coat and high milk production eventually yielded distinct breeds of domestic sheep and goats.

Elsewhere, other wild species were evolving domestic forms during the centuries before 3000 B.C.E.: cattle in northern Africa or the Middle East, donkeys in northern Africa, water buffalo in China, humped-back Zebu<sup>o</sup> cattle in India, horses and two-humped camels in Central Asia, one-humped camels in Arabia, chickens in Southeast Asia, and pigs in several places. Like domestic plant species, varieties of domesticated animals spread from one region to another. The Zebu cattle originally domesticated in India, for example, became important in sub-Saharan Africa about 2,000 years ago.

Once cattle and water buffalo had become sufficiently tame to be yoked to plows, long after their initial domestication, they became essential to the agricultural cycle of grain farmers. In addition, animal droppings provided valuable fertilizer. Wool and milk production also followed initial domestication by a substantial period.

In the Americas, domestic llamas provided meat, transport, and wool, while guinea pigs and turkeys provided meat. Dogs assisted hunters and also provided meat. Some scholars believe that no other American species could have been domesticated, but this cannot be proven. Domestic species could not be borrowed from elsewhere, however, because of the geographical isolation of the Americas.

Pastoralism, a way of life dependent on large herds of grazing livestock, came to predominate in arid regions. As the Sahara approached its maximum dryness around 2500 B.C.E., pastoralists replaced farmers who migrated southward (see Chapter 7). Moving herds to new pastures and watering places throughout the year made pastoralists almost as mobile as foragers and discouraged accumulation of bulky possessions and substantial dwellings. Like modern pastoralists, early cattle keepers probably relied more heavily on milk than on meat, since killing animals diminished the size of their herds. During wet seasons, they may also have engaged in semicultivation or bartered meat and skins for plant foods with nearby farming communities.

Why did the Agricultural Revolutions occur? Some theories assume that growing crops had obvious advantages. Grain, for example, provided both a dietary staple and the makings of beer. Beer drinking appears frequently in ancient Middle Eastern art and can be dated to as early as 3500 B.C.E. Most researchers today, however, believe that climate change drove people to abandon hunting and gathering in favor of pastoralism and agriculture. So great was the global warming that ended the last Ice Age that geologists gave the era since about 9000 B.C.E. a new name: the **Holocene**<sup>o</sup>. Scientists have also found evidence that temperate lands were exceptionally warm between 6000 and 2000 B.C.E., when people in many parts of the world adopted agriculture. The precise nature of the climatic crisis probably varied. In the Middle East, shortages of wild food caused by dryness or population growth may have stimulated food production. Elsewhere, a warmer, wetter climate could have turned grasslands into forest and thereby reduced supplies of game and wild grains.

In many drier parts of the world, where wild food remained abundant, agriculture did not arise. The inhabitants of Australia relied exclusively on foraging until recent centuries, as did some peoples on the other continents. Amerindians in the arid grasslands from Alaska to the Gulf of Mexico hunted bison, and salmon fishing sustained groups in the Pacific Northwest. Ample supplies of fish, shellfish, and aquatic animals permitted food gatherers east of the Mississippi River to become increasingly sedentary. In the equatorial rain forest and in the southern part of Africa, conditions also favored retention of older ways.

Whatever the causes, the gradual adoption of food production transformed most parts of the world. A hundred thousand years ago, world population, mostly living in the temperate and tropical regions of Africa and Eurasia, did not exceed 2 million. The population may have fallen still lower during the last glacial epoch, between 32,000 and 13,000 years ago. Agriculture supported a gradual population increase, perhaps to 10 million by 5000 B.C.E., and then a mushrooming to between 50 million and 100 million by 1000 B.C.E.<sup>2</sup>

**1. Why did the Neolithic Revolution start (at all)? Where did the Neolithic Revolution first transform human populations?**

**2. What labor adjustments did humans make in order to facilitate the Neolithic Revolution?**

**3. Where did pastoralism persist even after the Neolithic Revolution?**

**4. What various crops & animals were developed or domesticated during the Neolithic Revolution?**