



CHINA HAS THE WORLD'S LARGEST agricultural economy and one of the most varied. The nation stands first among all others in the production of rice, cotton, tobacco, and hogs and is a major producer of wheat, corn, millet, tea, jute, and hemp. This wide range of crops is possible because of the country's varied climate and agricultural zones. China participates on a large scale in international agricultural markets, both as an exporter and as an importer.

For over 4,000 years, China has been a nation of farmers. By the time the People's Republic of China was established in 1949, virtually all arable land was under cultivation; irrigation and drainage systems constructed centuries earlier and intensive farming practices already produced relatively high yields. But little prime virgin land was available to support population growth and economic development. However, after a decline in production as a result of the Great Leap Forward (1958-60), agricultural reforms implemented in the 1980s increased yields and promised even greater future production from existing cultivated land.

A successful agricultural sector is critical to China's development. First, it must feed more than 1 billion people, about 21 percent of the world's population, using only 7 percent of the world's arable land. Second, it must provide raw materials for the industrial sector. Third, agricultural exports must earn the foreign exchange needed to purchase key industrial items from other countries.

Since 1949 China's political leaders have tried a variety of large-scale social experiments to boost agricultural production. First, a massive land reform program eliminated landlords and gave land to those who farmed it. Next, farm families were progressively organized into cooperatives, collectives, and finally people's communes. After more than twenty-five years of experience with communes, officials abolished these institutions, which had become too bureaucratic and rigid to respond to the flexible requirements of agricultural production. Also, farm production incentives languished in the commune system. In 1978 China's leaders began a program of far-reaching agricultural reforms. Townships and villages were organized, and new incentives were incorporated into contractual relationships tying farmers to economic cooperatives and businesses.

Since the revolution in 1949, China has devoted most of its investments and administrative energy to the industrial sector. Generally, the agricultural sector received special attention only when the leaders perceived that the sector was beginning to restrain China's overall economic development. Agricultural output basically kept pace with the growth of population but did not expand fast enough to raise living standards. Per capita consumption of grains, fibers, edible oil, sugar, fruits, vegetables, fish, meat, eggs, and dairy products remained low. The value of goods generated by the agricultural sector has grown, but not as fast as output generated by other sectors in the economy. In 1949 about half of the country's output came from the agricultural sector. This ratio dropped to 41 percent by 1955, declined to 31 percent by 1965, and fell another few percentage points in 1975 to 25 percent. But agricultural reforms initiated in the early 1980s brought a rise in agriculture to 33 percent of GNP in 1985. At the same time, more than 60 percent of the national labor force was employed in agriculture.

China in the late 1980s was thus poised to confront growing demands for agricultural production with a combination of timetested farming methods and modern agro-technology. The size and diversity of the country--in geography and in population--however, presented a unique challenge to China's policy makers and implementors.

OPERATIONAL METHODS AND INPUTS

China's farmers have long used techniques such as fertilization and irrigation to increase the productivity of their scarce land. Over time, many farming techniques have been modernized: chemical fertilizers have supplemented organic fertilizers, and mechanical pumps have come into use in irrigation. Government planners in the 1980s emphasized increased use of fertilizer, improved irrigation, mechanization of agriculture, and extension of improved seed varieties as leading features of the agricultural modernization program.

Cropping Patterns

All of these elements of modern agriculture are used in the context of the traditional intensive cropping patterns. To maximize year-round use of the land, two or more crops are planted each year where possible. Rice, wheat, cotton, vegetable, and other crop seedlings are sometimes raised in special seedbeds and then transplanted to fields. Transplanting shortens the time required for a crop to mature, which allows farmers the opportunity to squeeze in an additional crop each growing season. Another method to make optimum use of scarce land is to plant seedlings in a mature stand of another crop. For example, when planting winter wheat in October, farmers in the north leave spaces among the rows so that cotton seedlings can be planted or transplanted in April and May. Without intercropping, farmers could raise only one crop a year. Mechanization supports this intensive cropping pattern. Despite a huge rural labor force, labor shortages occur each season when farmers are required to harvest one crop and plant another in its place, all within the space of a few weeks. In the 1980s farmers invested in harvesting and planting machinery to overcome the shortage of labor. Seed breeders also supported intensive cropping patterns by selecting and breeding varieties that had shorter growing seasons.

Pest Control

In 1987 the main method of weed and insect control continued to be labor-intensive cultivation. Fields were carefully tended, and a variety of biological controls, such as breeding natural enemies of crop pests, were used. Production and use of chemical herbicides and pesticides increased rapidly from the mid-1950s to the mid-1970s, but output fell subsequently by more than half (to about 200,000 tons) because the products were relatively ineffective, expensive, and highly toxic. Chemical pesticide use, therefore, was low compared with use in other countries.

Seed Varieties

Improved seed varieties have contributed significantly to improving crop yields. Highly fertilizer-responsive varieties came into use beginning in the mid-1960s. These were

comparable to those developed outside China but were adapted to the shorter growing season imposed by multiple cropping. Their extensive use has complemented the large increases in fertilizer use and the increase in irrigated area. In the mid-1970s farmers began to plant hybrid rice, claiming yield increases of more than 20 percent. Hybrid rice is not used elsewhere because of the amount of labor it requires, but more than 6 million hectares of it were planted in the mid-1980s, accounting for 20 percent of total rice area. The China National Seed Company was established in 1978 to popularize improved seed varieties; it exported Chinese vegetable seeds and imported improved grain, cotton, forage, and oil seeds. About 5 percent of China's arable land was being used to raise seed in the mid-1980s, and the company operated more than 2,000 seed companies at provincial, prefectural, and county levels.

Crops

In the mid-1980s China's farmers annually planted crops on about 145 million hectares of land. Eighty percent of the land was sown with grain, 5 percent with oilseed crops, 5 percent with fruits, 3 percent with vegetables, 2 percent with fiber crops, and 0.5 percent with sugar crops and tobacco. Other crops made up the remaining 4 percent. In the 1960s and 1970s, when policies emphasized grain output, the area sown with grain exceeded 85 percent. After the reforms were launched in the early 1980s, the area sown with grain fell below 80 percent and the area sown with other crops expanded correspondingly.

Grain is China's most important agricultural product. It is the source of most of the calories and protein in the average diet and accounts for a sizable proportion of the value of agricultural production. China's statisticians define grain to include wheat, rice, corn, sorghum, millet, potatoes (at one-fifth their fresh weight), soybeans, barley, oats, buckwheat, field peas, and beans. Grain output paralleled the increase in population from 1949 through 1975 but rose rapidly in the decade between 1975 and 1985 (see table 13, Appendix A).

In 1987 China was the world's largest producer of rice, and the crop made up a little less than half of the country's total grain output. In a given year total rice output came from four different crops. The early rice crop grows primarily in provinces along the Chang Jiang and in provinces in the south; it is planted in February to April and harvested in June and July and contributes about 34 percent to total rice output. Intermediate and single-crop late rice grows in the southwest and along the Chang Jiang; it is planted in March to June and harvested in October and November and also contributed about 34 percent to total rice output in the 1980s. Double-crop late rice, planted after the early crop is reaped, is harvested in October to November and adds about 25 percent to total rice production. Rice grown in the north is planted from April to June and harvested from September to October; it contributes about 7 percent to total production.

All rice cultivation is highly labor intensive. Rice is generally grown as a wetland crop in fields flooded to supply water during the growing season. Transplanting seedlings requires many hours of labor, as does harvesting. Mechanization of rice cultivation is only minimally advanced. Rice cultivation also demands more of other inputs, such as fertilizer, than most other crops.

Rice is highly prized by consumers as a food grain, especially in south China, and per capita consumption has risen through the years. Also, as incomes have risen, consumers have preferred to eat more rice and less potatoes, corn, sorghum, and millet. Large production

increases in the early 1980s and poor local transportation systems combined to induce farmers to feed large quantities of lower quality rice to livestock.

In 1987 China ranked third in the world as a producer of wheat. Winter wheat, which in the same year accounted for about 88 percent of total national output, is grown primarily in the Chang Jiang Valley and on the North China Plain. The crop is sown each fall from September through November and is harvested in May and June the subsequent year. Spring wheat is planted each spring in the north and northeast and is harvested in late summer. Spring wheat contributes about 12 percent of total wheat output.

Wheat is the staple food grain in north China and is eaten in the form of steamed bread and noodles. Per capita consumption has risen, and the demand for wheat flour has increased as incomes have risen. Wheat has been by far the most important imported grain.

Corn is grown in most parts of the country but is most common in areas that also produce wheat. Corn production has increased substantially over time and in some years has been second only to production of rice. Consumers have traditionally considered corn less desirable for human use than rice or wheat. Nevertheless, it frequently yields more per unit of land than other varieties of grain, making it useful for maintaining subsistence. As incomes rose in the early 1980s, consumer demand for corn as a food grain decreased, and increasing quantities of corn were allocated for animal feed.

Millet and sorghum are raised in the northern provinces, primarily in areas affected by drought. Millet is used primarily as a food grain. Sorghum is not a preferred food grain and in the 1980s was used for livestock feed and maotai, a potent alcoholic beverage.

Both Irish and sweet potatoes are grown in China. In the 1980s about 20 percent of output came from Irish potatoes grown mostly in the northern part of the country. The remaining 80 percent of output came primarily from sweet potatoes grown in central and south China (cassava output was also included in total potato production). Potatoes are generally considered to be a somewhat lower-quality food grain. Per capita consumption has declined through time. Potatoes are also used in the production of vodka and as a livestock feed.

Other grains, such as field peas, beans, and pulses, are grown throughout China. These grains are good sources of plant protein and add variety to the diet. Barley is a major grain produced in the lower Chang Jiang Basin. It is used for direct human consumption, livestock feed, and increasingly is in great demand as a feedstock to produce beer.

Soybeans, a leguminous crop, are also included in China's grain statistics. The northeast has traditionally been the most important producing area, but substantial amounts of soybeans are also produced on the North China Plain. Production of soybeans declined after the Great Leap Forward, and output did not regain the 10-million-ton level of the late 1950s until 1985. Population growth has greatly outstripped soybean output, and per capita consumption has fallen. Soybeans are a useful source of protein and fat, an important consideration given the limited amount of meat available and the grain- and vegetable-based diet. Oilseed cakes, by-products of soybean oil extraction, are used as animal feed and fertilizer.

Cotton is China's most important fiber crop. The crop is grown on the North China Plain and in the middle and lower reaches of the Chang Jiang Valley. In the 1970s domestic output did not meet demand, and significant quantities of raw cotton were imported. Production

expanded dramatically in the early 1980s to reach a record 6 million tons in 1984. Although production declined to 4.2 million tons in 1985, China was still by far the largest cotton producer in the world. In the 1980s raw cotton imports ceased, and China became a major exporter of cotton.

Significant quantities of jute and hemp are also produced in China. Production of these crops expanded from 257,000 tons in 1955 to 3.4 million tons in 1985. Major producing provinces include Heilongjiang and Henan and also provinces along the Chang Jiang.

China is an important producer of oilseeds, including peanuts, rapeseed, sesame seed, sunflower seed, and safflower seed. Oilseed output in 1955 was 4.8 million tons. Output, however, did not expand between 1955 and 1975, which meant per capita oilseed availability decreased substantially because of population growth. Production from 1975 to 1985 more than tripled, to 15.5 million tons, but China continues to have one of the world's lowest levels of per capita consumption of oilseeds.

Sugarcane accounted for about 83 percent of total output of sugar crops in 1985. Major producing provinces include Guangdong, Fujian, and Yunnan provinces and Guangxi-Zhuang Autonomous Region. Production has grown steadily through the years from about 8 million tons in 1955 to over 51 million tons in 1985.

Sugar beet production accounted for the remaining 17 percent of total output in 1985. Major producing provinces and autonomous regions include Heilongjiang, Jilin, Nei Monggol, and Xinjiang. Sugar beet production rose from 1.6 million tons in 1955 to 8.9 million tons in 1985. Despite these impressive increases in output, per capita consumption was still very low, and large quantities were imported. China is the world's largest producer of leaf tobacco. Farmers produce many kinds of tobacco, but flue-cured varieties often make up more than 80 percent of total output. Major producing areas include Henan, Shandong, Sichuan, Guizhou, and Yunnan provinces.

Tea and silk, produced mainly in the south, have traditionally been important commercial crops. The domestic market for these products has been substantial, and they continue to be important exports.

Given China's different agricultural climatic regions, many varieties of vegetables are grown. Farmers raise vegetables in private plots for their own consumption. Near towns and cities, farmers grow vegetables for sale to meet the demand of urban consumers. Vegetables are an important source of vitamins and minerals in the diet.

Temperate, subtropical, and tropical fruits are cultivated in China. Output expanded from 2.6 million tons in 1955 to more than 11 million tons in 1985. Reforms in the early 1980s encouraged farmers to plant orchards, and the output of apples, pears, bananas, and citrus fruit was expected to expand in the late 1980s.