Agriculture in Taiwan

Food & Fertilizer Technology Center

TAIWAN'S AGRICULTURAL SECTOR has faced increased pressure from rapid economic development and soaring labor costs in recent decades. World Trade Organization (WTO) accession in January 2002 and subsequent trade liberalization have brought more challenges, as Taiwan fulfills its WTO commitments of opening its markets and eliminating protective trade measures. The government has been working to assist the agricultural sector in dealing with these challenges. A knowledge-based restructuring of Taiwan's agricultural sector is being implemented, agricultural e-commerce and the Certified Agricultural Standards (CAS) system are being promoted, high-tech and recreational agriculture developed, and the use of agricultural resources modified. In response to a freer market, the government will continue to accelerate adjustments to the agricultural sector, enhance the international competitiveness of Taiwan's agricultural products, and develop the high-value-added food processing industry, thus moderating pressure on an imbalance between production and sales, and facilitating the transformation of, and upgrades to, agriculture. In addition, the Council of Agriculture (COA) under the Executive Yuan (行政院農業委員會) well aware of the importance of having safe agricultural products, designated 2005 as the Year of Safe Agriculture (農業安全年) to further promote organic agriculture, CAS products, and traceability systems for agricultural products. In 2004, the agricultural sector accounted for only 1.68 percent of Taiwan's GDP. Agricultural production totaled US$ 11.6 billion, an increase of 8 percent from 2003 and 9.6 percent from 2001, the year prior to Taiwan's accession to the WTO. Of this total production value, farming accounted for 42.00 percent, livestock for 32.33 percent, fishing for 25.54 percent, and forestry for a mere 0.14 percent. The agricultural sector employed 6.6 percent of Taiwan's workforce in 2004.

Agricultural Agencies

The principal government agency overseeing agricultural affairs in Taiwan is the Council of Agriculture. In addition, every city and county has a department of agriculture. As of 2005, there were 303 farmers' associations (農會), 17 irrigation associations (農田水利會), and 40 local fishermen's associations (漁會).

Research Institutes

Agricultural Research Institute (農業試驗所) - Established in Taipei in 1895, the Agricultural Research Institute is currently located in Wufong, Taichung County. The institute conducts both basic and applied research on agronomic and horticultural crops in the fields of breeding and genetics, physiology, soils, plant nutrition, diseases, pests, and farm machinery. Improved
strains of crops and advanced technologies developed by the institute over the last five decades have contributed to marked increases in agricultural production in Taiwan and rapid progress in rural economic development.

Livestock Research Institute (畜產試驗所) - The Livestock Research Institute was established in Tainan County in 1940 as a horse-breeding farm. It conducts research on breeding and genetics, physiology, nutrition, livestock management, animal product processing, and forage crops, in the hope of contributing to the development of the animal industry in Taiwan.

Fisheries Research Institute (水產試驗所) - The Fisheries Research Institute, established in Keelung in 1929, conducts research on fishery resources, fishing technology, fishery stock enhancement, aquaculture development, and the preservation and processing of fishery products in Taiwan. It also offers technical training and services to domestic and international fishing communities.

Forestry Research Institute (林業試驗所) - Established in Taipei in 1896, the Forestry Research Institute conducts research related to forestry and forest products, such as forest technology, silviculture, forest protection, forest management, watershed management, forest economics, forest utilization, forest chemistry, wood cellulose, and forest extension. Recently, focuses of research have centered on long-term ecological study, forest ecosystem management approaches, forest biotechnology and "green" forest products.

Animal Health Research Institute (家畜衛生試驗所) - Located in Danshuei, Taipei County, the Animal Health Research Institute was established in 1905. It carries out research on diseases of concern to the animal industry, functions as a national laboratory of animal disease diagnosis, conducts disease monitoring and surveillance schemes to develop national animal disease control measures, performs statutory assays of animal drugs, develops and manufactures diagnostic reagents and vaccines for animal use, and provides technical consultation and extension services on veterinary sciences to public veterinarians and others.

Agricultural Finance

In order to improve agricultural management and efficiency, as well as to take care of the welfare of farmers and fishermen, the Bureau of Agricultural Finance (BOAF) (農業金融局) was established under the COA, following the promulgation of the Agricultural Finance Act (農業金融法) in January 2004. Since then, the COA has had authority for agricultural finance, taking over the responsibility from the Ministry of Finance (財政部).

The BOAF is responsible for supervising agricultural finance institutions and planning agricultural loans. It also assisted in the establishment of the Agricultural Bank of Taiwan (ABT) (全國農業金庫) in 2005. The opening of the ABT created a two-level agricultural finance system, with the ABT at the top and the credit departments of farmers' and fishermen's associations below. There were 253 credit departments attached to farmers' associations and 25 to fishermen's associations in 2005.

Farmers

In 2004, about 835,507 hectares of land were being farmed by 721,418 households, an average of only 1.16 hectares per household. The average income, of each farming household, increased by 2.2 percent from its 2003 level to US$ 26,724 in 2004. Only 21.92 percent of this
income came from agricultural activities, however, as over 70 percent of Taiwan’s farming households have members working just part-time on the farm or have full-time non-farming jobs.

Agricultural modernization has been inhibited by the small size of farms and a lack of investment in the facilities and training necessary for developing larger and more profitable businesses. Farming’s bleak prospects have pushed many young people to seek better-paying jobs in the cities. As a result, the agrarian workforce has aged rapidly, with those over 65 accounting for about 40 percent of the main agricultural workforce in 2004.

To encourage young farmers to stay in the business, the COA has introduced modern farm management techniques, provided technical training, and offered guidance on the establishment of an entrepreneurial production and distribution system. The COA also recognized the need to provide alternative forms of assistance to aging farmers. Since January 2006, monthly allowances were raised from NT$ 4,000 (US$ 120) to NT$ 5,000 (US$ 150) for farmers aged 65 and over who were covered by the farmers’ health insurance program for more than six months. A total of NT$ 42.8 billion (US$ 1.3 billion) was allocated in 2006 to subsidize about 710,000 elderly farmers.

Farmland

According to Article 3, Item 10 of the Agricultural Development Act, farmland includes any property necessary to the farming, forestry, animal husbandry, or aquaculture industries. This includes farm houses, animal stalls or coops, storage facilities, drying areas, collection areas, farm roads, irrigation ditches, and catchment areas, as well as land used for warehouses, refrigeration facilities, equipment centers, sericultural farmhouses, and collection centers that have been provided by farmers’ associations or agricultural cooperatives and stations.

In recent years, the diminishing GDP share of the agricultural sector and a large increase in the import of agricultural goods following Taiwan’s WTO accession have underscored the need to make better use of farmland. The government has worked with farmer’s organizations and other agencies to gradually reduce the amount of land under cultivation by converting unprofitable farmland to other uses and consolidating plots into larger areas of land that are easier to farm.

The Agricultural Development Act (農業發展條例) was revised in 2003 and now allows more flexibility on land use, facilities, and equipment. Farmers’ associations were given a new role to minimize the impact of WTO entry. Quotas on farmland holdings were repealed to encourage capital- and technology-intensive agriculture. Biotechnology is seen as the wave of the future, and the act serves as the legal basis for the government’s plans to establish agricultural technology parks. In October 2003, Taiwan’s first agricultural biotechnology park was established in Pingtung County (屏東縣). It was estimated that at least 8,000 jobs would be created in southern Taiwan once the number of factories in the park reached 120. The annual production value of the park is expected to reach NT$ 18 billion (US$ 539 million) by 2013.

With regard to farmland consolidation, oddly shaped plots have been combined and then reallocated, giving each farmer a better-proportioned plot of land about the same size as the original parcel. Farm roads and irrigation ditches that serve these areas have also been
improved, rebuilt, or repaired, thereby reducing production and marketing costs and increasing operational efficiency.

Water
Irrigation works are the key to agricultural production. Although Taiwan has an annual average precipitation of 2,515 mm, about 80 percent of this falls between May and November. Thus, water transfer and conservation measures have to be made in advance to counter regional or seasonal water shortage or drought. In addition to strengthening irrigation management, the COA allocates water resources to facilitate agricultural production. The Ministry of Economic Affairs' data for 2004 shows that irrigation, aquaculture, and livestock activities used 12.6 billion cubic meters, or 70.9 percent of the total water used in Taiwan during the year. The agricultural sector is expected to require water amounting to between 10.63 and 13.19 billion cubic meters by 2011.

Crops
The types and quantities of crops produced in Taiwan have changed over the past two decades. Taiwan's accession to the WTO has put pressure on farmers to diversify crop production into horticulture, agritourism, exotic fruits and vegetables, organic produce, and other high-value products. Taiwan's people have changed their dietary habits, and are now eating more flour-based foods and dairy products while consuming less rice. In addition, Taiwan's rising standard of living has boosted demand for such products as exotic flowers and processed foods.

Rice
Despite the decrease in rice consumption, however, rice still ranked as Taiwan's most valuable crop in 2004. According to the COA, there were approximately 272,735 hectares of rice fields in Taiwan in 2005, 28,000 hectares more than the previous year. Two crops that year yielded 1.2 million metric tons of rice, which roughly correlated to demand. Changes in dietary habits caused annual per capita rice consumption to fall by 63.8 percent between 1974 and 2004, from 134 kilograms to 48.56 kilograms. After Taiwan entered the WTO in January 2002, foreign competition intensified the downward pressure on rice prices. Since then, the COA has adjusted paddy field utilization to balance supply and demand. As of 2005, it had redesignated 289,950 hectares of paddy, of which 245,311 were left fallow and the remainder planted with other crops; reduced the total area where rice is cultivated from 364,000 hectares in 1997 to 272,735 hectares in 2005; and lowered rice yields to 1.47 million metric tons from 2.04 million metric tons.

Under the terms of its accession to the WTO, Taiwan has been importing 144,720 metric tons of rice annually since 2002. To stabilize the price of rice, the government purchased some 213,000 metric tons of rice from local farmers in 2005. It is also working to strengthen the international competitiveness of domestic rice, upgrade cultivation techniques, and encourage the production and marketing of high-quality rice. In 2004, Taiwan exported 126 metric tons of high-quality, locally grown rice to Japan, the first time rice has been exported to Japan in three decades.
Vegetables

Increasing numbers of Taiwan's farmers are growing organic produce to meet local needs as more people choose an organic diet.

Most vegetables produced in Taiwan are for domestic consumption. In 2004, about 165,338 hectares of land were devoted to vegetable cultivation, mainly in Yunlin (雲林), Changhua (彰化), Tainan (臺南), and Pingtung counties. A total of 3,064,607 metric tons of vegetables were produced, with a per hectare yield of 18,535 kilograms.

In 2004, bamboo shoots, watermelons, leafy vegetables, cabbages, and vegetable soybeans were the leading vegetables in terms of area planted. By value, the most important vegetable crops were bamboo shoots, watermelons, shiitake mushrooms, cabbages, leafy vegetables, scallions, tomatoes, and Chinese cabbages. Currently, more than 100 kinds of vegetables are grown in Taiwan. Radishes, Chinese cabbages, leaf mustard, and garlic thrive in northern Taiwan’s cooler climate, while in southern Taiwan, cauliflower, bamboo shoots, and beans are cultivated.

Fruits

Over 30 types of fruits are cultivated in Taiwan. Such deciduous varieties as apples, pears, and peaches thrive at high elevations, while citrus fruits, bananas, pineapples, leeches, longans, mangoes, papayas, persimmons, loquats, and guavas are grown in the lower plains and undulating slope lands. The main crops are citrus fruits, mangoes, cantaloupes, leeches, bananas, pineapples, wax apples, and oriental pears. In 2004, 2.73 million metric tons of fruit were grown in Taiwan on a total planted area of 218,650 hectares.

Local growers have suffered tremendously from foreign fruit imports, which have flooded the domestic market after the reduction or elimination of tariffs on imported fruit. In response to this growing competition, Taiwan’s fruit growers have begun using advanced horticulture technology to modernize their operations. Through the effective control of diseases, adjustments to fruit maturation time, cultivation of improved fruit strains, and implementation of multiple harvests each year, fruit production has become a profitable and growing industry. Orchards are also diversifying into agritourism.

The COA has been proactive in expanding the international market for locally grown fruit. For instance, after years of negotiations, the export of papayas to Japan and mangoes to New Zealand was allowed from 2004 and 2005 respectively. The total value of fruit exports in 2004 reached approximately US$ 33 million, and Japan was Taiwan’s largest fruit export market, accounting for 42 percent of all exported fruit.

Sugarcane

Price fluctuations and competition from imported sugar have presented a serious challenge to Taiwan’s sugar industry. The state-run Taiwan Sugar Corporation (TSC) 臺灣糖業公司 has met these new developments by expanding its product line and diversifying into biotechnology, land development, and overseas investments in order to remain competitive.

Taiwan was formerly one of the world’s leading sugar exporters. In the 1950s and 1960s, over 100,000 hectares were dedicated to sugarcane production, and over one million metric tons of sugar was produced annually. Farm labor shortages and steadily declining prices over the
following decades dealt a heavy blow to the industry. By 2004, only 14,231 hectares were under cultivation, more than two-thirds of this farmed by the TSC. Decreased domestic production led to an increase in sugar imports, amounting to 610,828 metric tons in 2005.

**Tea**

Tea was once a major export commodity for Taiwan. The situation has changed, however, and Taiwan has been a major tea importer since 1991, one year after the domestic market was opened to Southeast Asian tea imports. Since then, annual tea imports have multiplied. From 2003 to 2004, tea imports increased to 19,568 metric tons while local production decreased 2.3 percent to 20,192 metric tons. Taiwan has transferred tea-processing techniques to Vietnam, Indonesia, and Thailand in order to take advantage of these nations' lower labor costs, and the tea produced in these countries is usually exported back to the Taiwan market. Taiwan’s oolong tea, on the other hand, still remains highly competitive in the international market. It accounts for about 20 percent of the world's annual production and is exported mainly to Japan, Southeast Asia, and China.

**Flowers**

Phalaenopsis orchids are symbolic of Taiwan, the world's leading exporter of such flowers. Producing a wide variety of fresh, beautiful flowers, Taiwan's horticulture industry has flourished in recent years. In 2004, its output value was US$ 375 million, while its exports totaled US$ 58.1 million. A total of 12,579 hectares was used for flower production in 2004. Of this, 6,823 hectares were used for nurseries, 4,498 hectares for cut flowers, 761 hectares for potted flowers, 475 hectares for orchids, 22 hectares for bulbs, and 1 hectare for herbaceous flower seeds. Major export markets include Japan, Hong Kong, the United States, and South Korea. Phalaenopsis orchids were the leading flower export, valued at US$ 23.39 million and accounting for 35 percent of total flower exports in 2004. The Taiwan Flower Expo 臺灣花卉博覽會 and Taiwan International Orchid Show 臺灣國際蘭展 were held in Changhua County and Tainan County, respectively, in 2005 to promote the local flower industry and create opportunities for interaction with the international market.

**Recreational Agriculture**

While traditional farm operations have long been a part of the economy, recreational agriculture is a relatively recent development in Taiwan. This new form of recreation for busy people in modern society integrates agricultural production, rural life, natural ecology, and local cultural resources. More than 2,000 hectares of land have been officially converted into tourist farms 觀光農園 where visitors can pick fruits and vegetables. As of 2004, the COA had approved the establishment of 184 recreational farms休閒農場 throughout Taiwan. Recreational farms are similar to tourist farms, but also offer visitors areas for picnicking, bird watching, and other low-impact activities. The COA provides assistance and counseling on recreational farm management and services. Domestic recreational farms have been encouraged to form strategic alliances and participate in international tourism exhibitions, while the COA's agritourism website offers information and services online.
Fishing

Over the past half-century, Taiwan's fishing industry has developed from small-scale coastal fisheries to deep-sea commercial fishing. In 2004, Taiwan had 136,224 fishing households, 40 percent of which were engaged in coastal fishing, 25 percent in inland aquaculture, and 23 percent in offshore fishing. Taiwan's fishing fleet totaled 26,750 ships, of which 25,800 were powered craft. Total fishery production, including aquacultural products, was 1.26 million metric tons in 2004, which represented a 16-percent decrease from the previous year.

In 2004, Taiwan produced US$ 3 billion worth of fish. Of this, 47.48 percent came from deep-sea fishing, 25.84 percent from inland aquaculture, 13.71 percent from offshore fishing, 6.87 percent from coastal fishing, and 3.38 percent from marine aquaculture. Deep-sea fishery production fell 16 percent from 2003 due to disruptions in international cooperation. About 45.8 percent of Taiwan's total production was exported, with skipjack, squid, big-eye tuna, yellow-fin tuna, and tilapia as the leading exports.

As the consequence of a minority of Taiwan's fishing boat operators engaging in illegal, unreported, and unregulated activities, in November 2005, the International Commission for the Conservation of Atlantic Tuna (ICCAT) ruled to cut Taiwan's annual quota for 2006 for Atlantic big-eye tuna by almost 70 percent, from 14,900 metric tons to only 4,600 metric tons.

In line with the ICCAT's decision, the COA was slated to reduce the number of large, long-line tuna vessels by 160 from 614 in 2005 and 2006. To minimize the impact of this move, approximately NT$ $4 billion (US$ 120 million) has been promised to ship-owners over the next two years to offset the costs associated with it.

Aquaculture

Aquaculture has grown steadily over the years as an industry in Taiwan. In 2004, aquacultural production was 327,513 metric tons, accounting for 26 percent of Taiwan's total seafood production. Taiwan's geography and climate are ideal for aquaculture, offering fish farmers with tropical, subtropical, and temperate climates in which to raise a wide variety of fish. Even the North American rainbow trout can be cultivated in some of Taiwan's mountains. In 2004, aquaculture was undertaken on 55,666 hectares of land and in nearly one million cubic meters of cage culture.

Tilapia and eel are two of Taiwan's most important aquacultural products. Taiwan exports over 47,000 metric tons of tilapia annually, making it the world's second largest export country of such fish. The annual production of eel is 33,480 metric tons, worth more than NT$ 257 million (US$ 7 million) in 2004. Other important aquacultural products in Taiwan included milkfish, grouper, oyster, and hard clam.

Livestock

Starting from backyard farms in poor villages during the 1950s, the livestock industry in Taiwan has grown into a US$ 3.7 billion business, accounting for 32 percent of Taiwan's total agricultural production value in 2004. The industry covered 11,172 hectares of land that year, with hog and chicken farms each accounting for over 30 percent. Hog production ranked first in terms of value, followed by chickens, chicken eggs, and milk.

The Animal Industry Act of 1998 gives the COA authority for meat inspection. The COA's Bureau of Animal and Plant Health Inspection and Quarantine (BAPHIQ) has 386 meat inspectors conducting meat and poultry inspections at 77
registered slaughterhouses around Taiwan. The BAPHIQ also takes action against illegal livestock slaughtering and is in charge of countering the increased danger of pests and epizootic diseases entering Taiwan with imported goods.

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<th>Year</th>
<th>Hogs (carcass weight; millions of metric tons)</th>
<th>Chickens (millions)</th>
<th>Chicken Eggs (billions)</th>
<th>Milk (metric tons)</th>
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<td>1.13</td>
<td>233</td>
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Source: Council of Agriculture

**Challenges after WTO Accession**

After Taiwan's accession to the WTO, the simple average nominal duty rate for the agricultural sector was reduced from 20.02 percent to 15.21 percent. By the time the scheduled tariff concessions covering 1,021 agricultural items are completely phased in, the average rate will have fallen to 12.9 percent. Taiwan's markets are expected to be required to open further in the future, which will pose greater challenges to Taiwan's agricultural sector.

**Countermeasures**

Following Taiwan's accession to the WTO, agricultural imports and tariff reduction and elimination have affected the supply, demand, and prices of domestic agricultural products. Prices of rice and fruit dropped significantly due to import substitution, while the impact on other farm products was not as great as had been anticipated.

The government has taken steps to ensure market stability. Short-term price stabilization measures have been implemented for all sensitive farm and livestock products and important coastal fishery and aquacultural products that were affected by WTO accession. These measures include marketing, low-interest loans, and assistance in finding alternative livelihoods for those wishing to leave these industries.

Should the opening of its agricultural markets or tariff reductions result in an enormous increase in imports that jeopardize the domestic farming sector, Taiwan may take safeguard measures under the WTO rules such as strengthening import quota controls and implementing tariff-rate quotas for 20 kinds of agricultural products. Special safeguard measures can also be adopted for 15 kinds of sensitive agricultural products, such as peanuts and oriental pears. The government also launched a mechanism in 2004 to stabilize the price of any domestic agricultural product that drops 5 percent or more below the production cost. A relief fund of NT$ 100 billion (US$ 3 billion) has been budgeted for those whose sales of agricultural products have been affected by imports, according to the *Agricultural Development Act*. 
Agricultural Exports

Trade liberalization led to increased imports, but it also created export opportunities for Taiwan's farmers. In 2004, the COA launched a three-year project for marketing Taiwan's agricultural products abroad. Measures to increase the volume and value of exports under this project include participation in international food exhibitions held in target markets, organization of festivals abroad featuring foods from Taiwan, and sales promotions of seasonal fruits.

To help expand the foreign market for local agricultural products, Taiwan has also conducted research on quarantine inspection techniques, strengthened export quarantine inspection facilities, and stepped up technical and information exchanges. After the introduction of a vaccine in May 2003, the Paris-based Office International des Epizootics declared Taiwan to be free of foot-and-mouth disease.

As a result of these efforts, agricultural exports increased 10 percent from 2003 to 2004, from US$ 3.24 billion to US$ 3.55 billion. Significant breakthroughs were seen in the export of rice, papaya, poultry meat, and phalaenopsis orchids. Japan was the largest market for Taiwan's agricultural exports, followed by Hong Kong, the United States, China, and Vietnam. To stimulate more growth in exports, the COA chose phalaenopsis orchids, oolong tea, tilapia, and mangoes as Taiwan's flagship agricultural products. The COA will continue to offer assistance in improving export supply chains and enhancing international marketing.

In the future, the government will continue to monitor sensitive products like rice in the face of international competition, seek more flexibility to mitigate the impact a freer market may have on Taiwanese products, and actively engage in trade talks to safeguard the sustainable development and interests of Taiwan's agricultural sector.

Source: Government Information Office (GIO), Taiwan ROC, Taiwan Yearbook 2006.

Related websites: Council of Agriculture (COA), Bureau of Animal and Plant Health Inspection and Quarantine (BAPHIQ) and (COA)'s Agritourism Site

Source: Food & Fertilizer Technology Center
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