

## Special Article

## Taiwan's Hog Industry— 3 Years After Disease Outbreak

It has been 3 years since the highly contagious foot-and-mouth disease (FMD) hit Taiwan's densely packed hog farms. The outbreak ravaged Taiwan's hog industry and eliminated Japan's largest single source of imported pork. The severity and duration of the epidemic and the ways that the Taiwan authorities have handled the industry during and since the crisis have set the future course of Taiwan's hog industry, with substantial implications for production and trade of most major pork trading countries.

In Taiwan, pork is traditionally the leading meat produced and consumed. For years before the outbreak of FMD, pork—exported almost exclusively to Japan—had been Taiwan's most valuable agricultural export. In 1996, the last full year before the outbreak, Taiwan had a total yearend sow population of about 1.4 million, with 14.3 million hogs slaughtered and about one-third of these for the Japanese market. According to Japanese customs data, Taiwan supplied 41 percent of Japan's pork imports in 1996; the U.S. was next in line, supplying 23 percent, Denmark 18 percent, and Canada 5 percent.

In 1996, hog population density in Taiwan was high—the ratio of hogs to land area was second only to the Netherlands. Many small, inefficient hog farms packed in crowded areas coexisted with Taiwan's large, modern operations. Nearly two-thirds of Taiwan's hog farms had fewer than 200 hogs each, and these farms accounted for less than 8 percent of the total hog inventory.

For years before the outbreak of FMD, the hog industry had been lucrative; pork sales were highly profitable both off and on the island. For live-weight hogs, the 10-year-average auction price in U.S. dollars per 100 kg was about \$183 (NT\$ 4,980—New Taiwan dollars), against an estimated production cost of about \$147 (NT\$ 4,000). Exports of hog products, primarily pork exports to Japan, totaled \$1.6 billion in 1996.

While Taiwan exported prime meat cuts, offal and other cuts were sold on the local market. Many of these products commanded high prices locally, not only because they were favored menu items among consumers but because the market was protected from imports. Taiwan had banned pork offal imports since 1975 and had effectively banned low-value pork cuts (cuts other than hams, shoulders, tenderloins, and loins) through discretionary licensing since 1989. Yearly domestic consumption of pork per capita was, at 40 kg, among the world's highest.

### *Battling the Disease*

On March 20, 1997, Taiwan announced an export ban on its pork because of an outbreak of FMD on its hog farms. By the time of the announcement, 3,828 hogs were infected on 28 farms, and 1,440 were dead. The number of farms affected by this highly



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contagious disease soared. By the end of March, 235,114 hogs were infected on 1,300 farms, and 56,127 hogs were dead.

Taiwan authorities, along with the island's hog industry, faced a dilemma. Farmers and meat processors wanted to kill all the hogs and start over. But for several reasons, the Council of Agriculture (COA)—Taiwan's equivalent of the U.S. Department of Agriculture—recommended controlling the disease by vaccinating healthy hogs at disease-free farms. First, with about 100,000 people raising hogs and 700,000 in related businesses, and with 11 million hogs in stock before the outbreak, destroying the entire hog population would seriously impact the island economically, socially, and politically, and carry a substantial environmental cost of disposal. Second, given that the last recorded FMD outbreak had occurred in 1918, it seemed highly possible that the disease had come from abroad. If that were true, destroying the domestic hog population might not prevent a reinfection. Taiwan's legislature on March 25 adopted COA's recommendation: exterminate all hogs at FMD-contaminated farms and inoculate uninfected animals.

Since late March 1997, it has been compulsory for each of Taiwan's hogs to be vaccinated twice in its life for FMD. In addition, since September 1997, FMD surveillance regulations require farmers to submit a monthly veterinary report on vaccination of their hogs.

As the vaccinations began to take effect, the FMD epidemic slowed. In less than 3 months, it was basically under control. Only a handful of new cases were reported after early June 1997, and the COA relaxed its policy. Rather than destroying all hogs raised on farms where disease was present, only the diseased

hogs had to be destroyed. After a case of FMD turned up on July 16, 5 months passed with no new cases reported. Taiwan optimistically targeted being FMD-free by June 2001.

Between March 20 and July 16, 1997, FMD had cost Taiwan more than 4 million of the island's nearly 11 million hogs. Of these, 185,000 died from the disease, and 3.85 million on infected farms had to be destroyed. In the course of 4 months, the epidemic had contaminated 6,147 of the island's 25,357 farms.

The virus, called O/Taiwan/97 by the International Epizootics Office (OIE)—the international body that monitors disease outbreaks among livestock—apparently affected only hog farms, bypassing Taiwan's small dairy, beef, water buffalo, and sheep operations. Testing indicated that O/Taiwan/97 was a strain of virus also present in China.

FMD appeared again in Taiwan in December 1997. A handful of FMD cases cropped up until April 29, 1999, the last time that infected hogs have been reported there. Although the more recent instances were few, they indicated that Taiwan's FMD surveillance regulations were not fully effective. For example, many of the 1998 cases were discovered at auctions, as farmers tried to unload sick hogs to avoid losses. Thus, effective August 1, 1998, hogs vaccinated against FMD had to display eartags, and untagged hogs could not be sold at auction or to slaughterhouses. In addition, farmers who did not vaccinate their hogs were fined from \$300 to \$1,500 (NT\$10,000 to NT\$50,000).

Still, it has been difficult to ensure islandwide vaccination because many small-scale farms do not sell hogs at auction and easily evade the authorities' supervision. The 12 hogs involved in the April 1999 case, for instance, and killed after they tested positive for FMD, were found deserted in a mountain area in northern Taiwan. In December 1999, the COA was able to report that Taiwan's hog FMD vaccination rate had reached 92 percent.

But in June 1999, FMD had turned up in cattle farms in Kinmen, a small island associated with Taiwan and a few kilometers off the shore of mainland China—Taiwan's first reported case in cattle in five decades. Later in June and in July 1999, FMD was found on nine beef cattle farms on the island of Taiwan; all cattle on these farms—several hundred head—were destroyed or died of the disease.

In January 2000, additional cases of FMD, this time in dairy cattle, were reported in central Taiwan. Authorities decided on January 10 to try across-the-board vaccination for all cloven-hoofed animals, including hogs. Since then, only two outbreaks of FMD have occurred, both in February on sheep farms in southern Taiwan.

Testing indicated that the FMD virus on Taiwan's cattle and sheep farms, called O/Taiwan/99 by OIE, was 99 percent identical to the virus on Kinmen, where widespread smuggling of agricultural and livestock products from mainland China was suspected.

Foot and mouth disease (FMD) is highly contagious, affecting primarily cloven-hoofed animals (e.g., cattle, sheep, goats, hogs). The disease is characterized by the formation of blisters on tissues of the mouth (reducing appetite and hindering food conversion) and on the skin above the claws of the feet. The disease cause is a virus, which can be found in the blood and other body secretions (e.g., saliva, milk). The virus can be spread by many different carriers, including humans, flies, ticks, most meat products, manure, semen, feeds, water, and soil. Although deaths of adult animals are not ordinarily high from FMD, infected animals are usually destroyed. To avoid infecting their own herds, nations ban imports of live cloven-hoofed animals and fresh, chilled, and frozen meats of those animals, from areas experiencing outbreaks of FMD. Under these bans, only canned and cured meats from susceptible animals may be imported from FMD-affected countries.

### ***Restructuring the Hog Industry: Downsizing & Rebuilding***

Taiwan's authorities have taken advantage of the FMD crisis to address generally the problems of hog farming on the island. Even before the FMD outbreak, official policy aimed to reduce the number of hogs, because raising hogs posed a serious environmental hazard to this land of limited water resources and more than 20 million people.

The need to reshape the hog industry intensified after the U.S. and Taiwan concluded the Bilateral Market Access Agreement on February 20, 1998, a precondition for Taiwan to join the World Trade Organization (WTO). Since the agreement, Taiwan has allowed a pre-accession annual import quota for pork bellies and offal (fresh and frozen). This year, Taiwan raised the quota to the level agreed upon for year one of its WTO access—6,160 tons of pork bellies and 10,000 tons of pork offal. As a result, parts, such as hearts and kidneys, will face import competition, reducing the profitability of hog raising.

To chart a new course for the hog industry, in July 1997 Taiwan implemented the 4-year Hog Industry Sustainable Management Plan, which remains in place today. New standards for water discharged from hog farms have been implemented on schedule since January 1, 1998 (for the new Chemical Oxygen Demand standard, farms had a 2-year grace period). Today, any farm with more than 20 hogs is subject to these new waste water regulations. In addition, after December 31, 2000, strict limits will apply to hog farming in the watershed of rivers used as sources of drinking water.

The authorities published the first Hog Industry White Paper in April 1998. A new Livestock Law passed in June of that year required all farms with more than 20 hogs to register by June 30, 2000, and thereby become subject to its various regulations. Fines for those who fail to register range from about \$930 to \$4,650 (NT\$30,000 to NT\$150,000). In addition, a buyout program with a budget of more than \$54 million (NT\$ 17.5 billion)

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targeted small livestock and poultry farms from October 1998 until June 1999.

In the course of this radical restructuring, Taiwan's hog industry has downsized substantially since the outbreak of FMD was announced in March 1997. Hog prices dropped immediately and dramatically with the loss of the Japanese market and because of consumers' fear of the disease (although FMD poses no threat to human health). The hog industry started to rebuild when authorities allowed hog farms to resume operation in August 1997. But by the end of that year, Taiwan had 19 percent fewer hog farms than in 1996 (20,454 in 1997) and 26 percent fewer hogs (less than 8 million in 1997). Although pork consumption picked up, hog prices remained generally low until mid-1998.

In 1998, the hog industry downsized still further—down 16.5 percent from 1997 in hog farms and 17.9 percent in hogs. With no large and lucrative Japanese pork market and with new import competition that followed the U.S.-Taiwan bilateral WTO agreement, farmers in 1998 cut hog production. In addition, stringent wastewater standards and authorities' hog buyout program have caused many hog farmers to exit the industry, resulting in a short supply of pork products since late 1998.

In fact, since mid-1998, hog prices have been relatively high. As a result, although the number of hog farms dropped another 6 percent in 1999, to 16,016, the year-end hog inventory rose 11 percent, to 7.24 million. Compared with pre-FMD levels (1996), the number of hog farms in 1999 had fallen nearly 37 percent, while the number of hogs had declined more than 32 percent.

Along with industry downsizing, the ratio of large to small hog farms has changed. Recent restrictions imposed by the Livestock Law and the new environmental regulations are relatively expensive for small hog-farm operations, and the 1998-99 buyout program gave substantial incentive to many small farm operators to quit the industry permanently. Of the 5,070 hog farms that took advantage of the buyout program, 45 percent had fewer than 200 hogs, and nearly 90 percent had fewer than 1,000. The upshot has been a rise in the percentage of farms that raise more than 1,000 hogs, from 9.5 percent in 1996 to 11.4 percent in 1999, as farms that raise fewer than 200 hogs dropped from 62.2 percent to 59.9 percent.

### Industry Prospects Revised Down

Taiwan's hog farmers will not reclaim their lucrative pork export market in the near future. Although the FMD outbreaks have been controlled, Taiwan still is listed as an FMD-infected area. According to OIE, a country must meet at least two important criteria to be recognized as FMD-free: No disease outbreaks in the preceding 24 months, and no FMD vaccination for the preceding 12 months.

The reoccurrence of FMD also means that neither Taiwan nor its hog industry can relax its guard. Although Taiwan authorities have imposed stricter regulations and harsher penalties to deter smuggling and to make farmers inoculate hogs regularly and report any animal infections, there is room for improvement, particularly in being better prepared to handle an epidemic such as FMD. In addition, the tenacity of the FMD virus is a serious challenge to regulatory authorities. The virus can survive for long periods in the air, in food, or in garbage, and even in hides, hair, and wool. Given the nature of FMD, no matter how carefully laid the plans for confining and eradicating the disease, anything can happen.

Ongoing fundamental problems for Taiwan's hog industry include high prices and production costs, and the harmful practices of some small hog operations. The *high prices* that hogs and pork commanded in Taiwan appeared to be part of the undoing of the industry because they encouraged smuggling of live piglets or meat products that are thought to have brought the disease to the island. High prices also made Taiwan vulnerable to import competition, particularly since the signing of the U.S.-Taiwan Bilateral Market Access Agreement.

*Production costs* are high in Taiwan because all feed ingredients must be imported and because land and labor are relatively expensive. With relatively modest import quotas in place now, current imports of pork products have not had much impact on Taiwan's hog industry. But with the gradual relaxation of trade barriers in the future, it is likely that only the best-managed farms will survive and that small farmers will be squeezed out by relatively high production costs.

On top of high prices and high production costs, other challenges facing authorities charged with supervising hog operations are liable to limit the hog industry's comeback. For example, inadequate vaccination practices at some smaller farms not

### Taiwan's Hog Inventory Dropped Sharply and Shifted to Larger Farms

	Farms	Yearend inventory	Farms with herds less than 200 head		Farms with herds more than 1,000 head	
			Share of total farms	Share of inventory	Share of total farms	Share of inventory
	No.	1,000 head	Percent			
1996	25,357	10,698	62.2	8.0	9.5	55.6
1997	20,454	7,967	63.6	9.0	8.7	54.8
1998	17,072	6,539	65.4	8.3	8.7	56.9
1999	16,016	7,243	59.9	6.6	11.4	60.2

Source: Council of Agriculture, *Agricultural Policy & Review*, various issues. Economic Research Service, USDA



## Replacing Taiwan's Pork in Japan's Import Market

The sudden end of Taiwan's exports to Japan, the world's largest pork importer, offered a potentially large opportunity for meat exporters. However, Japan's total pork imports in fiscal 1997 fell by 146,000 tons—over half of Taiwan's trade was not replaced by imports from other sources. Instead, Japan increased production in 1997 and 1998, for the first time in the 1990's, and drew down stocks. Consumption fell by over 2 percent.

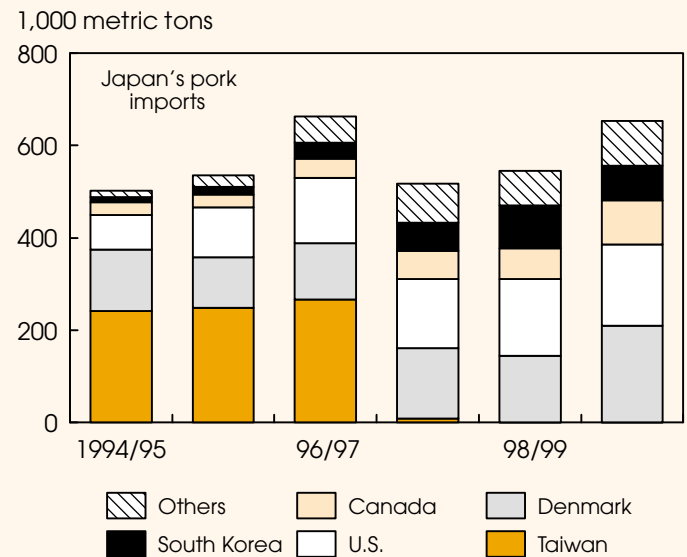
Japan's imports from the U.S. rose 7,000 tons (5 percent) from 1996 (the last pre-FMD year) to 1997, and imports from Canada grew by almost 20,000 tons (49 percent). The major immediate beneficiary of Taiwan's lost trade was South Korea, with imports rising 27,000 tons (79 percent). Since then, imports have rebounded almost to the 1996 peak level, with Denmark, Canada, the U.S., and South Korea all sharing in the gains. The outbreak of FMD among South Korean cattle in 2000 has shut down that country's ability to export pork, so that the FMD-free regions in North America and Europe will likely supply virtually all of Japan's imports in the near future.

The aftermath of Taiwan's FMD epidemic showed that Taiwan's pork exports were not easy to replace. Taiwan's consistent supply of pork was highly valued in Japan. Another development after the FMD outbreak was an outward flow of investment and production information from Taiwan's pork industry. Taiwan's large pork-exporting firms made investments in North American farms and plants that

only make it difficult for Taiwan to eradicate FMD but also jeopardize the stocks of other hog farms and increase their operational risks. In addition, these small hog farms are likely to ignore or attend less to environmental protection. Given Taiwan's limited space and large population, coupled with growing opposition from residents to environmental pollution caused by hog raising, the industry has long been a major environmental concern on the island.

Now, 3 years after the outbreak of FMD, the debate over whether Taiwan's once lucrative hog industry can or even should reach its former peak production level has died down. Such speculation has given way in most quarters to the belief that

## Taiwan No Longer Ships Pork to Japan



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could export to Japan, and experts from Taiwan taught production and marketing techniques to suppliers in South Korea and North America. **AO**

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Taiwan may never regain its status as the world's leading pork exporter to Japan. Many larger farm operators are pessimistic about the prospects for Taiwan's pork exports to Japan, and a large share of the population believes that environmental risks outweigh the economic benefits to be derived from the hog industry. The Taiwan authorities' goal for the industry in the short run is to eradicate FMD. Their long-range goal is to make the industry sustainable, environmentally safe, and competitive with imports. Finally, however, the market, not the authorities, will determine whether or not Taiwan can re-enter the pork export market. **AO**

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