PACIFIC FOOD OUTLOOK

2000–2001

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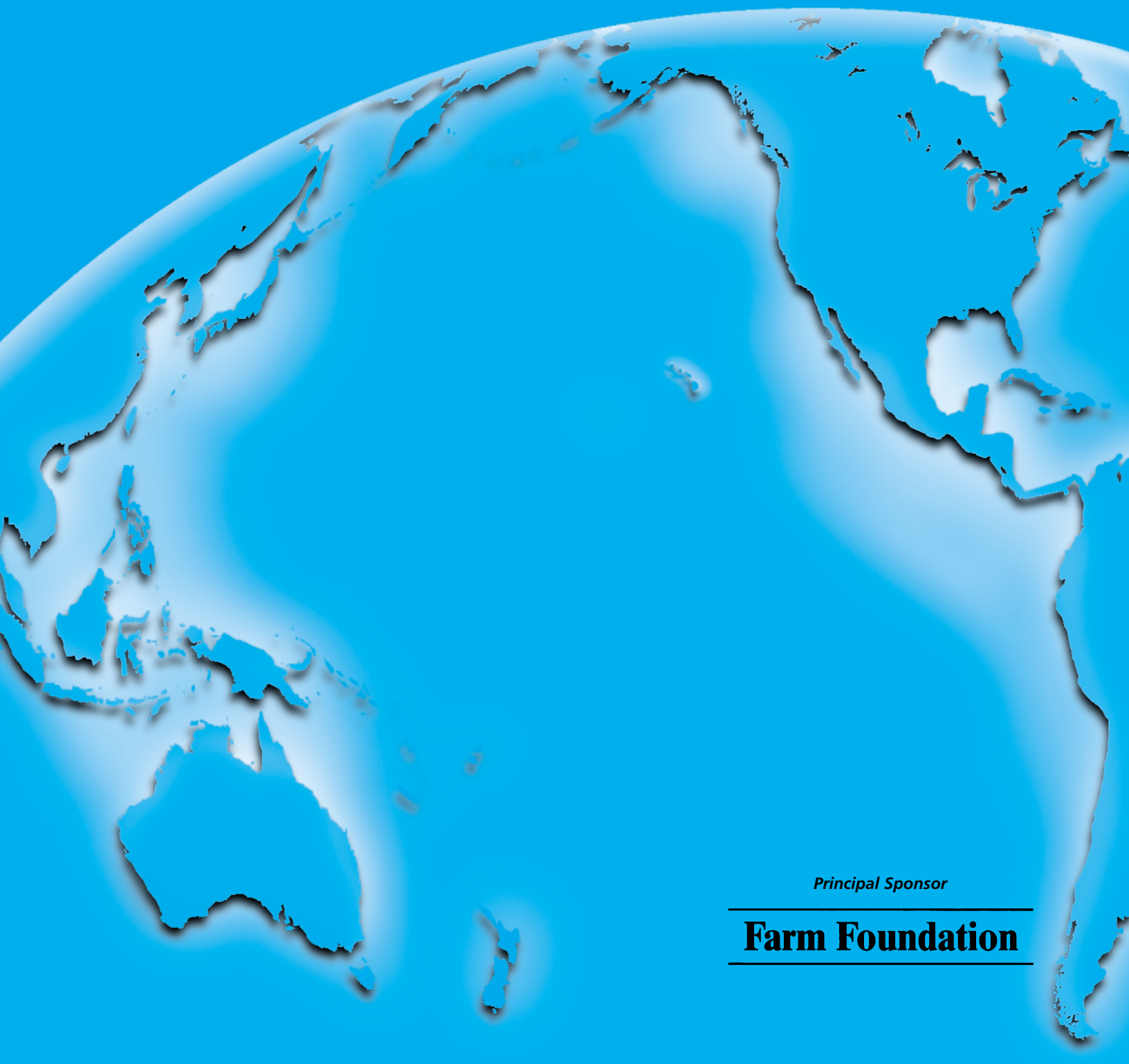

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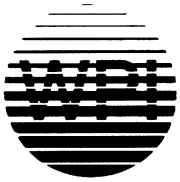

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Abbreviations used in the Pacific Food Outlook

ADB	Asian Development Bank
APEC	Asia Pacific Economic Cooperation Forum
ASEAN	Association of Southeast Asian Nations
CPI	consumer price index
EU	European Union
FY	fiscal year
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GMOs	genetically modified organisms
GST	goods and services tax
IMF	International Monetary Fund
NAFTA	North American Free Trade Agreement
OECD	Organization for Economic Cooperation and Development
R&D	research and development
USDA	US Department of Agriculture
WPI	wholesale price index
WTO	World Trade Organization

Foreword

The short-term outlook for the PECC region's food system is for continued recovery in the aftermath of the 1997–99 Asian financial crisis. This positive outlook is supported by strong economic growth across the region, moderating food prices, and greater political stability. Recent changes in political leadership promise a more reform-minded approach in future regional negotiations. The downside risks in the outlook are the potential negative effects of persistently high oil prices and unstable equity markets in the United States and around the region.

Looking beyond the short term, limited agricultural land resources and a growing, more affluent world population will put increasing pressure on technology to assure a sufficient and healthful food supply for the next generation. In addition to its regular short-term analysis of the region's food system outlook, this year's *Pacific Food Outlook (PFO)* assesses efforts by member economies to harness new technologies to meet the future challenge of an adequate and healthful food supply.

Technologies come in many forms. In the PECC region's food system, there are three important categories of technology. The first involves innovations oriented toward raising yields or reducing on-farm production costs. These include traditional plant breeding as well as the more recent development of transgenic varieties that are resistant to pests and pesticides and also can embody favorable characteristics, such as the vitamin A in a newly developed rice variety. A second category of technology is directed at reducing spoilage, enhancing quality, extending shelf-life, and reducing delivery times beyond the farm gate. These technologies make the supply chain from producer to processor to consumer more efficient. Finally, information technology (IT) is becoming a pervasive tool in both food production and marketing, primarily in developed economies and in the urban areas of less developed economies. IT makes markets more efficient by disseminating information and data for better farm-level decision making, facilitating online marketplaces for businesses and consumers, and enhancing communications and processes throughout the supply chain.

Developing economies often have a large share of their population in rural areas and tend to focus on production-raising technologies with the potential to improve rural income. Developed economies are concerned about both technologies that raise on-farm yields and those that speed up delivery of products to urban consumers. Both types of technologies are discussed in this report, representing the range of situations in the PECC economies.

This report was made possible with generous financial contributions from our meeting host country and sponsors. We appreciate the work of Christopher Findlay and Jim Short of the Australian Pacific Economic Cooperation Committee (AUSPECC) and Terry Sheales of the Australian Bureau of Agricultural and Resource Economics (ABARE) for organizing and hosting the forecasters' meeting in Canberra, Australia, May 9–10, 2000. Financial support for this meeting was generously provided by Agriculture, Fisheries and Forestry—Australia. Perry Smith and Max Foster, both of ABARE, made excellent substantive contributions to the meeting on biotechnology and setting economic re-

search priorities for the food industry. We are most grateful to the individual economists representing 17 economies in the PECC region (listed on pp. 6–7) for their dedication to and support of this unique multinational project, now in its fourth year. Thanks to Brad Gilmour of Canada for his help in developing the overview section of the report. A special thanks goes to William Coyle and Constanza Valdes, both of the USDA's Economic Research Service (ERS), for their dedicated leadership in producing the report.

We also appreciate the continued financial support of the Farm Foundation, the Economic Research Service, and USDA's Emerging Markets Program and new support this year from Perdue Farms.

Special thanks are due to Carole Brookins, chair of this project for its first three years, for her pivotal role in conceiving and developing the food system concept that is at the core of the *Pacific Food Outlook*. We will miss her energy and vision.

Thanks also to Mark Borthwick, executive director of the US National Committee for Pacific Economic Cooperation, for his continued support; Anita Chomsky of World Perspectives, Inc., for her assistance in organizing the Canberra meeting; Wilma Davis of ERS, USDA, for statistical support; Anne Kelleher for editorial services; Joseph Yacinski and Hal Downs for design and production; and Liz Hughes of Beach Brothers Printing.

Finally, as the new chair of PECC's *Pacific Food Outlook*, I am grateful to the PECC member committees and the PECC International Secretariat for their continued support and guidance for this important project.

Walter J. Armbruster
Chair, *Pacific Food Outlook*, PECC
President, Farm Foundation
November 2000

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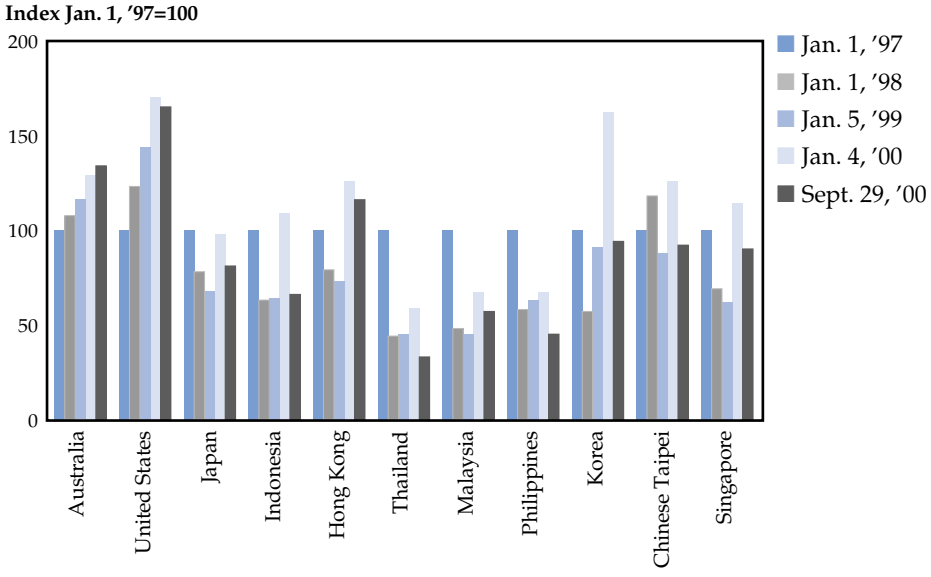
Pacific Food Outlook 2000–2001: An Overview

Strong worldwide income growth tops the current list of positive factors for the PECC food system. This year's global rate of 4.2 percent is more than twice the 1998 rate. The growth is broad based, with expansion in North America, Europe, Latin America, and Asia. Within the PECC region, Korea has had the most remarkable recovery, but other economies hit hard by the recent Asian financial crisis also have rebounded significantly. Even Japan is showing signs of improvement. Exchange rate markets, while volatile from time to time, have stabilized since 1997–98. Equity markets, on the other hand, have faltered in 2000, following the downward trend in the US market. Most Asian equity indices, after rising in 1998–99, are lower now than they were prior to the onset of the financial crisis in mid-1997 (Figure 1). Food and agricultural trade is beginning to pick up as reported by the region's net food exporters (Australia, Canada, New Zealand, and the United States); the US agri-food export forecast for FY 2001 is $51.5 billion, up from $49.5 in 1999 and $50.5 billion in 2000.

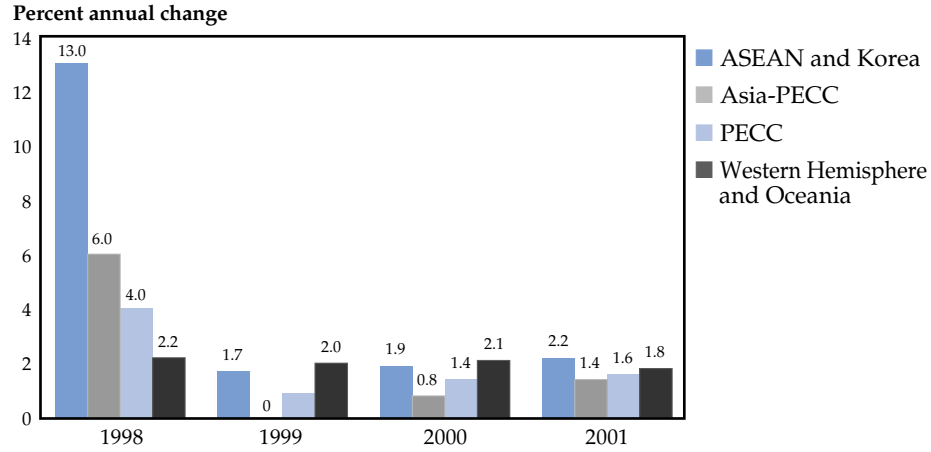
Food price increases across the region are moderating (Figure 2). In some economies, food prices in 1999–2000 actually dropped, an expected response to the rapid run up in prices in some parts of the PECC region during the financial crisis. Higher incomes and lower rates of food price inflation mean that the share of disposable income spent on food in the region is back on a downward trajectory, leaving the region's consumers with more nonfood spending power. This comes at a time when agricultural commodity prices are generally stable, albeit at a low level compared with the mid-1990s.

Figure 1—Equity Markets in the PECC Region



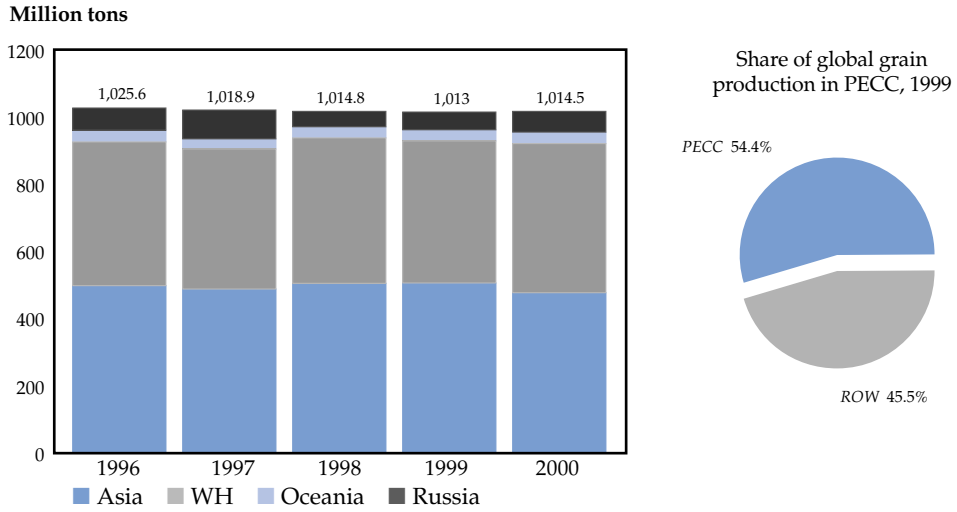
Source: *Financial Times*

Figure 2—Food Price Increases Moderating in the PECC Region



Source: PFO 1999 to 2001 country profiles and indicators;
prices weighted by trade, 1995–97 averages; see table 4A in the *Pacific Economic Outlook*, 2000–01

*Figure 3—PECC Grain Production**



* Total grain equals rice, wheat, and coarse grain

Source: PS&D View, USDA

Food price changes (percent)

ECONOMY	1999E	2000F	2001F
Australia	4.0	2.6	2.6
Canada	1.3	1.7	1.7
Chile	3.4	4.0	3.0
China	–4.2	–0.5	1.0
Indonesia	–5.2	–1.4	na
Japan	0.0	0.0	1.1
Korea	2.8	1.1	1.1
Malaysia	4.6	5.8	5.8
Mexico	6.9	na	na
New Zealand	1.5	2.1	1.6
Peru	–0.8	3.0	3.0
Philippines	5.2	2.0	5.0
Singapore	0.9	1.5	1.5
Chinese Taipei	–0.5	2.0	0.5
United States	2.1	2.2	1.7
ASEAN and Korea	1.7	1.9	2.2
Asian PECC	0.0	0.8	1.4
Western Hemisphere and Oceania	2.0	2.1	1.8
PECC	1.0	1.4	1.6

Annual global grain production has been remarkably stable at between 1.86 and 1.88 billion tons from 1996 to 2000, with the PECC region accounting for 55 percent of the total (Figure 3). In 2000, declines in China's grain production are offset by gains in the United States and Russia.

More Outward-Looking Food Policy Likely in the Near Term

A more outward-looking policy approach is likely in the near term now that changes in political leadership have occurred across much of the region. Since the onset of the Asian financial crisis in 1997, political leadership changed in 14 of the 23 PECC economies: Chile (1999), Colombia (1998), Indonesia (1999), Japan (2000), Korea (1997), Mexico (2000), New Zealand (1999), the Philippines (1998), Peru (2000), Russia (2000), Chinese Taipei (2000), Thailand (1997), the United States (2001), and Vietnam (1997). Economies providing continuity in political leadership include Australia (1996), China (1993), Malaysia (1981), and Singapore (1992). Canada's current government, in place since 1993, may face elections soon.

More noteworthy recent agreements in the region were US granting China Permanent Normal Trade Relations (PNTR; September 2000) and Mexico reaching a bilateral accord with the EU (March

2000). While some agricultural and rural policy reform and liberalization did take place in the last five years, policy support to agriculture in some of the larger economies increased in 1999 (Figure 4), limiting progress toward a more open regional food system.

There is some concern that global power is becoming increasingly concentrated. With increasing global integration, national governments are perceived as less effectual while multinationals are thought to wield excessive influence on public policy. The sense that governments are either incapable or reluctant to act in the public interest prompted advocacy groups to engage in demonstrations at the WTO meetings in Seattle in November 1999 and at World Bank and IMF meetings in Washington (April 2000) and Prague (September 2000). Together with the leaders of developing countries, advocates have called for a reexamination of the WTO and other trade agreements and remedies, encouraging the adoption of mechanisms that are more transparent and inclusive, allowing for a louder voice and a larger range of options to a broader cross section of global society.

Risks in the Forecast

Rising oil prices—more than $30 per barrel in October 2000—could reignite inflation, push interest rates higher, and cause a general economic slowdown in the region. Trade balances for oil-exporting PECC economies, such as OPEC-member Indonesia and Mexico, are benefiting from higher oil prices. Developed economies with large services sectors use less energy; they also have lessened their dependence on oil through conservation measures implemented in recent decades. Oil price increases will hit hardest in the emerging economies, such as Thailand, that do not have significant energy resources and whose economies are more dependent on energy-intensive manufacturing.

The bursting of the US "bubble" economy may be another shock looming on the horizon. High price-earnings (PE) ratios and rising consumer debt in the United States may precipitate the pricking of the bubble. The PE for US tech stocks, which represent one-third of total market capitalization, was 186 in March 2000; investment analysts believe that appropriate ratios fall between 20 and 40 depending on the sector. Equity shares in the United States, particularly those for technology companies, declined through 2000.

Technology: Key to Success in the Long Term

Aside from periodic macroeconomic shocks such as the Asian financial crisis (1997–99) and higher oil prices (2000), the fundamental challenge facing the PECC region in the longer term will be raising food system productivity to keep pace with population growth and rising affluence. This is also a global issue. The world will have to produce 40 percent more grain by 2020, with population growth accounting for only 25 percent of the increase (from 6 billion to 7.5 billion worldwide and from 2.6 billion to 3.2 billion in the PECC region) and worldwide demand for a more diverse and resource-intensive diet accounting for the rest. Only about one-fifth of the increase in grain production is likely to come from expanding land under cultivation. Area is particularly constrained in the Asian PECC economies, especially in Northeast Asia, which has long been a huge net importer of agricultural products (Figure 5).

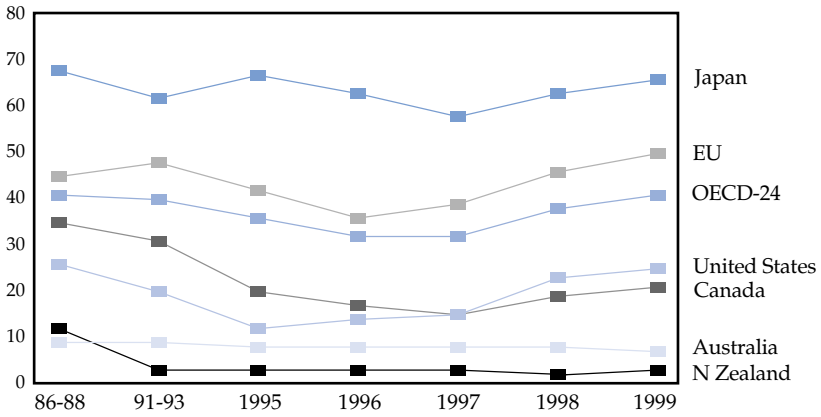
With limits to expanded land resources, technology will play an important future role not only in raising yields at the farm level but also in reducing losses, enhancing quality and freshness, and increasing the speed of product delivery to consumers. These developments also promise to widen consumer choice and raise human nutrition levels, although technology advances alone will not end hunger. The world already has sufficient capacity to feed itself. Hunger arises from poverty and the unequal distribution of income. Policy reform and strong economic growth for many years have succeeded in reducing the number of hungry people in the PECC region, now estimated at 240 million or about 9 percent of the region's population (Figure 6). According to the UN's Food and Agriculture Organization, the share of hungry in China declined from 30 percent in 1979–81 to 13 percent in 1995–97. The share for Southeast Asia also declined from 27 to 13 percent for the same period.

Technology development and its application in the food system depends on many factors, including strong public commitment, public and private sector linkages, and a variety of supportive programs and policies, such as education, infrastructure development, and extension.

The commitment to new technology development and application is often a function of economic development. But even in the less developed parts of the PECC region, the commitment to new technology can be strong as reflected in the creation of institutions and in public budgetary commitments. In Malaysia, the Third National Agricultural Policy (NAP3), Second Industrial Master Plan (IMP2),

Figure 4—International Comparisons of Farm Support

Percentage PSE for all agricultural products

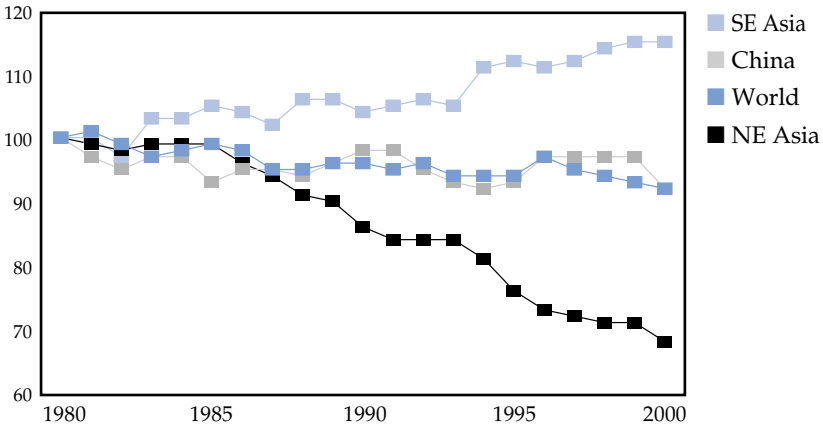


PSE=producer subsidy equivalent (i.e., government support as a share of producer value)

Source: OECD

Figure 5—Total Grain Area in Selected PECC Regions

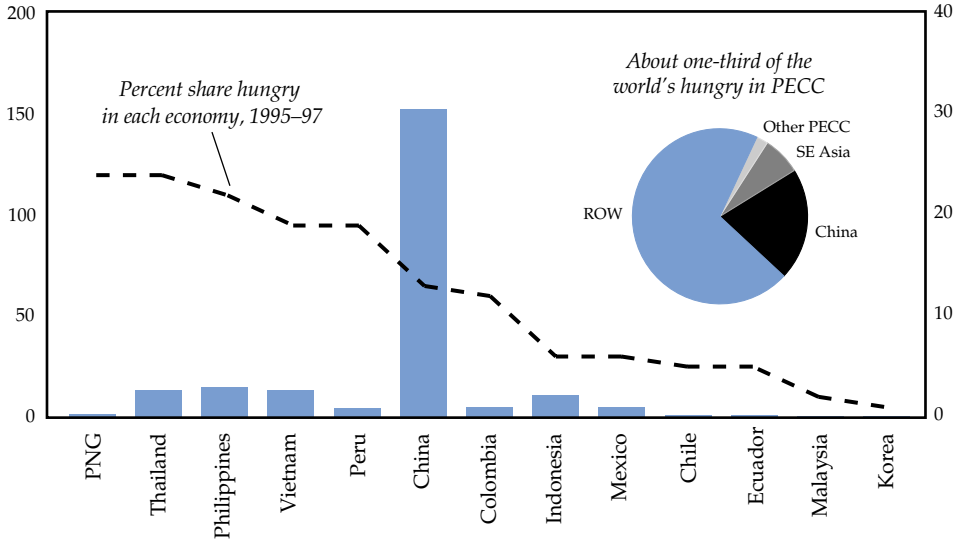
Index 1980 = 100



Source: USDA

Figure 6—The State of PECC Food Insecurity

Millions of hungry people, 1995-97 **Percent of population**



Source: FAO, *The State of Food Insecurity in the World*, 1999

and Industrial Technology Development (ITD) program are designed to guide technological developments, including those relevant to the Malaysian food system. These policy tools emphasize fully exploiting and utilizing existing technologies, improving on imported technologies, and generating local technologies. In 1998, Malaysia's R&D expenditures were estimated at 0.6 percent of GDP, with an eventual target of 1 percent. In Korea in 1998, the rate of agricultural R&D investment was 1.0 percent, while the rate of total R&D was 2.5 percent. Korea's Ministry of Agriculture and Forestry plans to raise the agricultural share to 2 percent of GDP by 2004. During the 1990s, Chile doubled the share of agricultural GDP committed to agricultural research by the public sector, but the amount spent by the private sector continues to be very limited.

Some economies, such as Singapore and Chinese Taipei, are staking their futures on becoming centers of technology development. Singapore, for example, a small city-state of 3 million people, has already created an institutional infrastructure in tropical agrotechnology consisting of the Institute of Molecular Agrobiology (IMA), the Bioprocessing Technology Centre (BTC), and the Agri-Bio Park. Singapore has played an important role in research leading to high-yield, disease-resistant crops, poultry, livestock, and fish. Its Agri-Food and Veterinary Authority (AVA) has continuously supported both in-house R&D and R&D with commercial partners to develop new food system technologies.

Chinese Taipei chose biotechnology as one of eight targeted technology development areas. Early on, development focused on traditional fermentation technology, enzymes, and antibiotics. In 1995, the government included biotechnology in a list of ten important industries eligible for special government assistance. Since then, a special task force in the Ministry of Economic Affairs has helped the private sector invest in biotech and pharmaceutical projects, with total investment of US$700 million (NT$23.1 billion). There are 21 projects in biotech development, 5 in pharmaceuticals, and 4 in herbal medicine. A promotion program for the biotech industry was approved by the government in August 1995 and revised in 1997 and 1999. The purpose of this program is to promote R&D projects and position Chinese Taipei as a center for biotechnology in the Asia Pacific region.

Traditional Plant Breeding Still Fundamental

The PECC region has a long tradition of contributing to plant breeding. Three international experiment stations in the region—IRRI (International Rice Research Institute) in the Philippines, CIMMYIT (International Maize and Wheat Improvement Center) in Mexico, and CIAT (International Center for Tropical Agriculture) in Colombia—developed important hybrid grain varieties in the 1960s and 1970s and later that have been widely adopted and played a significant role in the near doubling of global grain yields between 1970 and 2000. Within the PECC region, a heavy rice producing part of the world (about 60 percent of the world total), average rice yields rose from about 2 tons per hectare in 1970 to 3.6 in 2000.

Agricultural R&D in China is focused on increasing production. To date, more than 5,000 new crop varieties have been developed. An important example is hybrid rice, which helped double production since 1970.

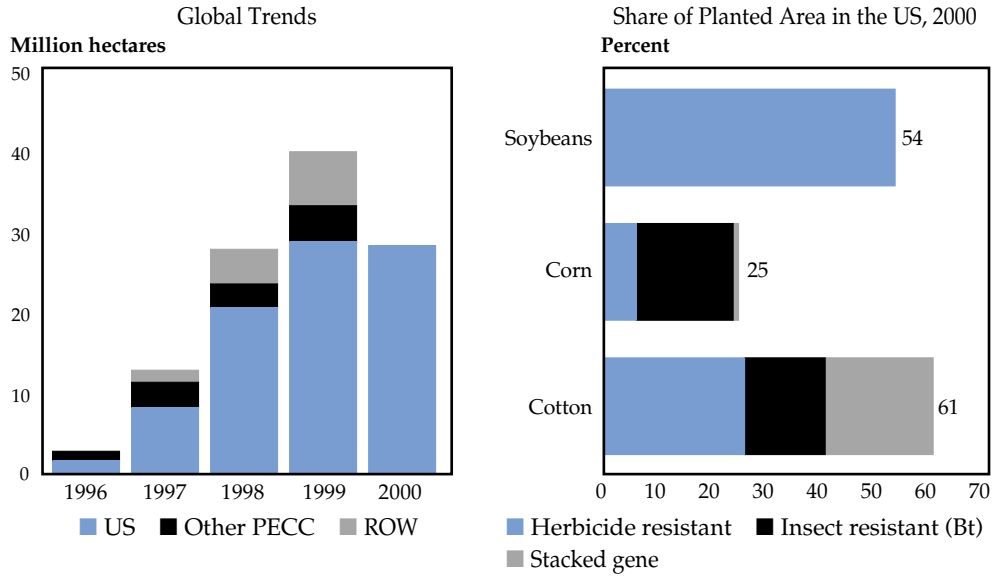
Plant breeding efforts in Indonesia have succeeded in developing a number of new rice varieties with higher yields and shorter maturation rates, allowing the harvesting of two to three crops per year. The development of agricultural technology related to rice has been driven by the government, while that of other food crop commodities, such as horticultural products, has been based on a combined government—private sector effort. In addition to rice, Indonesia has given special attention to soybeans and corn. Tissue culture has been widely used for the propagation of bananas and ornamental plants such as orchids. Other government-sponsored activities in Indonesia include developing gene banks for preserving existing plant varieties.

In Malaysia, plant breeding continues to incorporate desirable characteristics into new plant varieties of fruits such as durian, papaya, pineapple, and citrus as well as rice and maize. Mexico has concentrated on the diffusion of improved grain varieties and hybrids, not just for raising yields but also for encouraging better tolerance of pests and/or adverse weather conditions, particularly in drought-prone areas.

Biotechnology Makes a Cautious Entrance

More recently, biotech methods are ushering in a new era of plant breeding through genetic modification or engineering. The availability of biotechnology may help to offset the diminishing returns

Figure 7—Area in Transgenic Crops



Source: National Agricultural Statistics Services (NASS), US Dept. of Agriculture, Acerage Report, June 2000; James, C. (1997–99), "Global Review of Transgenic Crops," ISAAA Briefs, 1997–99, The International Service for the Acquisition of Agri-biotech Application (ISAAA), Ithaca, US.

from traditional plant breeding programs and meet the rising demand for greater quantities of food from continuing world population growth and dietary upgrading. Strides have been made in developing pest-resistant as well as herbicide-tolerant crops. The new crops offer lower input costs and in some cases higher yields.

As of 1999, five principal biotech crops—soybeans, corn, cotton, canola, and potatoes—were being commercially cultivated in eight countries—Argentina, Australia, Canada, China, France, Mexico, Spain, and the United States—five of which are PECC members. More than two-thirds of the biotech production is in the United States, making up a significant share of US planted area in soybeans, cotton, and corn (Figure 7). Significant investments by an international consortium (China, France, Japan, Korea, Taiwan, Thailand, and the United States) to decode the rice genome are laying the groundwork for developing and refining genetically modified rice varieties. The public and private sectors have already developed a number of rice varieties with distinctive characteristics, some potentially benefiting production, others targeting consumer benefits. Most publicized is "golden rice," developed by European researchers and incorporating beta carotene (a source of Vitamin A). Vitamin A deficiency is an important health issue in the low-income rice-consuming areas of the region.

While the agronomic benefits of genetically modified crops may result in increases in production and downward pressures on world prices, the pressures in some markets for segregation of product may result in increased trade uncertainty and higher costs. In some parts of the PECC region, there is strong demand from consumer organizations for labeling. But adequate procedures for detecting the existence of biotech commodities and assessing risk are not available in many of the region's developing economies.

ASEAN is promoting the establishment of a National Authority on Genetic Modification (NAGM) to monitor biotech products in the 10 ASEAN economies. Each economy will establish its own NAGM—consisting of representatives from national agencies involved in agriculture, trade, economics, environmental protection, health, and other disciplines—which will review and approve proposals related to the release of biotech products, provide public access to information on planned releases, and ensure guidelines are consistent with regional and international practices.

Biotech Developments: Highlights in the PECC Region

In Australia, the potential for genetically modified crops is being closely examined but remains at the trial stage for most products. To date, there have been around 70 field trials of transgenic crops. The most trialed crops in Australia are cotton, canola, clover, and field peas. An estimated 120,000 hectares of insect-resistant (Bt) cotton, almost 30 percent of total plantings in Australia, were sown in 1999.

The Office of the Gene Technology Regulator in Australia manages potential risks to consumers and the environment from genetic manipulation and establishes appropriate safeguards. The Australia-New Zealand Food Authority requires mandatory labeling of biotech food "in circumstances where the nature of the food has been significantly changed with respect to its nutritional quality, composition, allergenicity, or end use."

Canada's competitive biotech strengths lie in plant breeding of canola, potatoes, corn, soybeans, wheat, and barley; animal husbandry; aquaculture vaccines; yeast strains and bacterial cultures; and propagation of conifers and flowers. As a result of a positive R&D environment, many multinational agricultural companies have an active presence in Canada. Canada also has a number of plant biotech startups (Performance Plants, Prairie Plants, SemBioSys, DNA Landmarks), in addition to traditional seed companies.

In Chile, the initial biotech research efforts were in potatoes while current efforts are in the fruit sector, but no commercial product developed from local research is yet available. Fundacion Chile, in alliance with INTERLINK, the National Institute of Agricultural Research (INIA), and the private sector, is developing new products with improved post-harvest quality and resistance to indigenous pests and diseases.

The use of pest-resistant cotton in China has expanded, reaching 400,000 hectares in 2000. Some special varieties of vegetables have been introduced in field trials.

Following the required review by the Japanese Agricultural Standards Research Committee and a one-year moratorium, biotech labeling is scheduled to begin in Japan in April 2001.

Since 1991, Korea's Institute of Agricultural Science and Technology (IAST) has introduced several transgenic crops into field trials: herbicide-tolerant rice, insect-resistant Chinese cabbage, virus-resistant cabbage, virus-resistant red pepper, virus-resistant cucumber, and virus-resistant potato.

The current New Zealand government opposes the use of genetic modification in all forms, even in field trials. A Royal Commission of Inquiry into genetic engineering has been established to investigate this topic further. Their findings are due in May 2001.

Peru's Ministry of Agriculture, through the National Institute of Agricultural Research (INIA), is developing virus-free potatoes and strawberries and pursuing efforts to protect Peru's diverse germplasm.

The Philippine government favors field testing of biotech seeds developed to boost agricultural productivity. Strong environmental activist groups, however, have asked the courts to stop the field testing of Bt corn and vitamin A-enriched rice. To date, farmers in the Philippines have not planted any transgenic seeds on a commercial basis.

Thailand has faced resistance from foreign buyers of its canned tuna packed in soybean oil derived from imported biotech soybeans and of meat from poultry fed imported biotech corn and meal from biotech soybeans. So far there is no scientific evidence of a health threat. An agricultural declaration ratified in January 2000 limits the use of biotech seeds in Thailand to research purposes and prohibits commercial sale. Field tests of biotech cotton are under way.

While the United States is the leader in commercial production and use of biotech crops, there is evidence that the rate of adoption has slowed in 2000. Among other factors, uncertainty has increased regarding the marketability of biotech crops. Some large companies, for example, J.R. Simplot (potato processing), Frito Lay, and Gerber, have declined to accept biotech crops.

Less Waste and Faster to Market

Increasing the efficiency of the food system is another significant way technology can increase the supply and quality of the food supply. According to John Bongaarts, writing in the March 1994 *Scientific American* ("Can the Growing Human Population Feed Itself?"), developed market consumers require 10,000 gross daily calories to support a 3,000-calorie-a-day diet. Some of the losses result from grain conversion in meat production, but a good deal is from waste and inefficiencies in the food system, including significant losses at the household level. Post-harvest losses are a problem across the PECC region (see last year's report on infrastructure), with greater losses happening along the chain in low-income economies and more at the end of the chain in high-income economies.

Asia's significant rural population and prospects for rapid urbanization in the next 20 years suggest a crucial need for developing and adopting marketing innovations. New technologies being applied in the region reduce processing, handling, and transportation costs and delivery times, and extend the shelf-life and storability of food products.

In North America, transportation and logistics innovations have become commercially feasible. Research indicates that new intermodal technologies—such as double-stacking rail containers, hav-

ing reinforced trailers pulled directly by locomotives, and employing more fuel-efficient rail power—are now potentially cost-competitive since lower trade barriers have afforded economies of scale from higher utilization.

In packaging, consumer demand for easy-to-open, well-labeled, portable, environmentally friendly packaging has given rise to various types of resealable packages. In particular, the popularity of plastic "zipper" technologies is growing rapidly. Polymer "flexible" packaging has taken off because of advantages to both consumers and food processors.

The meat processing industry is undergoing a large-scale shift to case-ready flexible packaging. This promises to both reduce costs and reduce food contamination and losses throughout the supply chain. A combination of breathable films and new sealants now make it easy to achieve three-week shelf- life for perishable products. Cans, glass jars, and boxes will lose share to flexibles, which offer fewer problems with broken seals, sharp edges, and breakage.

A joint venture between Meat New Zealand and private industry has developed the world's first robotic technology for meat processing. Future meat processing plants are expected to combine manual operations with automated, robot-assisted sections and fully robotic operations. Research is continuing into machine vision systems that locate primal pieces of carcass, grasp individual pieces with a robot-mounted gripper, and move the pieces to the boning room for further processing.

In an effort to expand the reach of chilled food exports, New Zealand has developed a process that not only extends the chilled storage life of a product, but also improves the product by enhancing its color, flavor, and tenderness. Equipment and packaging have been developed to allow a wide range of products to be packed, from carcasses and primal cuts to case-ready retail packs. In the case of fish, bulk fillets or whole fish can be processed as well as retail-ready packs.

In the lower-income parts of the region, such as Indonesia, a wide range of food processing technology is employed, from the simple, traditional methods used by small enterprises and home industry to modern high-tech methods used by big national and multinational corporations. Although the market share of modern supermarkets and superstores offering modern processed foods has grown very fast in major cities in recent years, traditional markets offering traditionally processed foods are still dominant in both urban and rural areas.

Expanding Role of Information Technology

In the developed PECC economies as well as in the urban areas of the less developed economies, information technology (IT) is becoming pervasive in both food production and marketing. IT (which includes hardware, software, communication devices, and the Internet) makes markets more efficient by disseminating information and data—weather forecasts and real-time market information and prices—for better farm-level decision making, facilitating on-line markets for businesses and consumers, and enhancing communications and processes throughout the supply chain.

According to Paul David of Oxford University, quoted in the September 23, 2000, issue of *The Economist*, "a technology will start having a significant effect on productivity only when it has reached a 50 percent penetration rate." Using this guideline, many PECC economies have a long way to go. While rapid growth in Internet use in Asia is projected (33 million in 2000 to 95 million in 2004 according to Morgan Stanley Dean Witter), it is still very limited, particularly in China and Southeast Asia (Table 1).

Usage is more common in the city-states of Hong Kong, China, and Singapore and, as one would expect, in the developed economies. In rural areas of developing economies, Internet usage is scarce except in the presence of large national and multinational agribusinesses, like Dole and Del Monte and San Miguel in the Philippines. Rural usage is heaviest in the United States, where the number of farms with Internet access doubled between 1997 and 1999. As many as 43 percent of US farms with annual sales over $100,000, and 85 percent of US farmers between the ages of 25 and 45, have Internet access.

Table 1—Status of IT in the PECC Region

ECONOMY	PERSONAL COMPUTERS PER 1,000 1998	INTERNET HOSTS PER 10,000 JULY 1999
Hong Kong, China	254.2	142.8
Korea	156.8	55.5
Singapore	458.4	322.3
China	8.9	0.5
Indonesia	8.2	0.8
Malaysia	58.6	23.5
Philippines	15.1	1.3
Thailand	21.6	4.5
Vietnam	6.4	0
PNG	na	0.5
Japan	237.2	163.8
United States	458.6	1508.8

Source: IT and Development: Prospects and Policies, Asia Development Bank, 2000 Annual Report

IT Advances: Highlights in the PECC Region

Giving Greater Market Access to Farmers. US farmers with Internet access have expressed an interest in purchasing agricultural inputs online. Major agricultural companies and cooperatives are rushing to fill this demand. Companies have established online sites and advertise through directories and other sites.

Virtual marketplaces are being designed so farmers will be able not only to purchase farm supplies and equipment, but also market their livestock and crops and purchase crop protection prod-

Resources for further information about new technologies in the PECC food system

AUSTRALIA

Australian Bureau of Agricultural and Resource Economics
www.abareconomics.com/

Agriculture, Fisheries and Forestry Australia (AFFA)
Food Info Australia
www.affa.gov.au/foodinfo

Australian Bureau of Statistics
www.abs.gov.au

CANADA

Agriculture and Agri-Food Canada (AAFC)
www.agr.ca/

Agriculture and Agri-Food Canada Biotechnology Page
www.agr.ca/cb/biotech/biotece.html

Food Institute of Canada
foodnet.fic.ca

BIOTECanada (formerly Can. Inst. of Biotech.)
www.biotech.ca

Agricultural Institute of Canada
www.aic.ca

Plant Biotech Institute
www.pbi.nrc.ca

CHILE

Fundación Chile
www.fundch.cl

Programa Gestión Agropecuaria de Fundación Chile
www.agrogestion.com

Oficina de Estudios y Políticas Agrarias (ODEPA), Ministerio de Agricultura
www.odepa.gob.cl

Instituto de Investigaciones Agropecuarias (INIA)
www.inia.cl

Fruit OnLine
www.fruitonline.com/

Ministerio de Agricultura de Chile
www.minagri.gob.cl

INDONESIA

Ministry of Agriculture
www.deptan.go.id/

MALAYSIA

MardiNet, The Webpage of the Malayisan Agricultural Research and Development Institute
www.mardi.my

Universiti Putra Malaysia
www.upm.edu.my

Tchnology Park Malysia
www.tpm.com.my

Salamta Datang/Malayisan Cocoa Industry
www.koko.gov.my

Sunmech Engineering
www.sunmech.com.my

NEW ZEALAND

New Zealand Trade Development Board
www.tradenz.govt.nz

Organics New Zealand
www.organicsnewzealand.org.nz/

Agricultural Technology
This is the official site for Agritech members and for all people interested in New Zealand agricultural technologies, pasture

ucts and fertilizers. Product information, prices, and delivery options from participating suppliers, cash grain bids from competing buyers, and other lines of business will be organized into user-friendly, but secure systems. These sites are being organized by major US agriculture companies, such as Cargill and Dupont, as well as by local farm cooperatives.

Auctions are now taking place via the Internet, bringing purchasers and sellers together into a virtual marketplace. Remote electronic marketing systems have been applied in Australia at the producer level, but with limited success. In applying such systems to livestock and wool auctions, there have been difficulties in developing adequate product descriptions for trading, and the cost savings have been small relative to competing marketing systems.

A number of sites are being established as comprehensive Web-based marketplaces. They are similar in concept to B2B (business-to-business) sites, but broader in scope and include local farm retailers, cooperatives, and manufacturers. These comprehensive sites, which are just beginning to come online, are being designed to make it easier for farmers to do business on the Internet. These sites will be two-way virtual electronic malls for the agricultural industry that will be open 7 days a week, 24 hours a day.

Increasing the Flow of Information to Market Players. In its five-year development plan, Chinese Taipei's Council of Agriculture (COA) allotted US$50 million (NT$1.5 billion) to build an agricultural marketing system on the Internet. The first year was devoted to constructing a Website with global price and local transaction data to allow agribusinesses and consumers access to market information through the Internet. The database is categorized into five areas: floral, vegetable, fruit, meat, and fishery products.

In an effort to develop a knowledge-based economy, Singapore created the Ministry of Communications and Information Technology in 1999 and merged the existing National Computer Board and the Telecommunications Board of Singapore into the Info-Communications Development Authority (IDA). IDA has adopted a phased approach to liberalizing the info-communications industry to encourage global information technology (IT) players to participate actively in the Singapore market and develop Singapore as an IT hub in the Asia Pacific.

Singapore ONE (One Network for Everyone—http://www.s-one.gov.sg/) was launched in June 1998 to provide a nationwide broadband infrastructure. By the end of 1999, Singapore ONE offered 180 applications and had 100,000 users. It also reached 1 million North American subscribers over the broadband network in the United States. Currently, several major research collaborations with multinationals and local companies have been undertaken in the areas of bio-informatics, tele-immersive virtual reality, tele-manufacturing, and tele-medicine.

The Philippine Department of Agriculture uses the Internet to disseminate agricultural research to the extension service and to end users as well as to provide feedback to farmers who report difficulties in applying new technologies. The department has established the National Information Network (NIN) on the Internet, which electronically links the central office with its bureaus, affiliated research institutions, and other government departments. Information available via this network includes supply and demand data and price trends; product standards and consumer safety data; and credit services. The NIN facilitates communication among researchers, policymakers, and extension agents, who in turn communicate with end users.

Facilitating Business. More complex systems, called business-to-business (B2B) sites are also being developed. Already a proven business model, B2B systems were first employed by old-line manufacturing industries, such as the automotive industry. These dedicated systems, connecting manufacturers with their suppliers, are now being moved to the Internet because of recent developments in software technology. Major agribusiness firms are developing B2B models at all levels of the supply chain. FoodConnect Australia enables agri-food businesses to trade and communicate company information and product specifications electronically in both the domestic and global markets. A key feature of the system for marketing offshore is that it also includes export documentation.

Chinese Taipei selected five agricultural marketing companies and farmers' cooperatives in the Taipei metropolitan area to set up a Web-based extranet wholesale system. This system will become the demonstration model for e-commerce development in the future.

Meeting Consumer Needs. The consumer marketplace also is undergoing a revolution in the more developed areas of the PECC region. Online auctions are one development. Supermarkets in some areas have been recruited to participate in online sites for marketing retail goods. A consumer gets on the bid

site and determines whether he would like to purchase the retail items offered. For example, if he wants to buy cola, he submits a bid and the supermarket decides whether to accept or reject it. If the supermarket accepts it, the supermarket decides which manufacturer's cola they will sell at that price.

In Australia, there are several operational retail food sites, but they are largely limited to passive advertising of suppliers and their products or involve small business marketing. On a larger scale, two of the major supermarket chains, Woolworths and Coles Myer, are developing sites targeting household buyers. At these sites, consumers can order products for home delivery at a specified time. Australian winemakers also have invested heavily in Internet marketing. Cellarmasters' online sales amounted to US$61 million (A$95 million) in 1999, and the company aims to conduct 20 percent of all sales this way by 2001. Fosters Brewing Group also reportedly has made a US$62 million (A$100 million) investment in international Internet operations and a Californian wine club.

Consumers have begun to use the Internet to search for niche products. In addition to wine, organic food is another example of a niche product that has had some success in direct marketing to consumers via the Internet. Nurseries also have begun to get involved in Internet marketing.

Facilitating Supply Chain Management. Canada's ACROSS Customs Clearance System and the greater use of electronic data interchange (EDI) promises faster customs clearance, lowering transportation time and costs for shipments into Canada. The ACROSS system combines EDI with bar-coding technology to speed up clearance at the border.

Shippers can arrange for preclearance for goods destined for Canada. A complementary Canadian Customs initiative, employing Automatic Vehicle Identification (AVI) technology, will speed the movement of truck traffic across borders. Canada, Mexico, and the United States are pilot-testing an AVI project that allows trucks equipped with transponders to pass through border crossings without stopping. Soon, only trucks that do not meet preclearance requirements, and those chosen for random checks, will have to stop for inspection. This will make a big difference for shippers of perishable food products.

With the advent of bar-coding and point-of-sale information, massive quantities of data are available to customers and carriers. Sophisticated bar-coding will enable containers and vehicles to be tracked, not just packages. The next step in tracking systems is the "smart stamp," which contains 256 bytes of data, a battery, and an antenna in a casing the size of a large postage stamp. Information on each shipment is loaded onto a reusable, affordable "stamp" attached to the package. The stamp transmits information, picked up by a scanner up to a few meters away. This improves tracking and reduces labor costs in shipping commodities.

Regional Outlook for Food System Technologies

Adoption of biotech seed is limited beyond the United States and there is considerable uncertainty about its future adoption. Even in the United States, the move by several agribusinesses to limit their purchases of biotech products suggests that the uncertainty about these commodities will continue, at least in the short term or until there is stronger scientific evidence to offset the public's adverse perception. Many of the developing economies in the region are likely to continue with the more traditional yield-enhancing technologies in agriculture. The outlook for nonfood biotech commodities is better as evidenced by the expanded use of insect-resistant (Bt) cotton in Australia, China, and the United States.

Use of the Internet in the region's food system is in its incipient stages except in the developed economies where its usage is close to or in excess of 50 percent of the population. Projected rates of adoption in the less developed parts of Asia such as China are rapid but still at a very low level. Information technologies are more accessible to less developed areas because of modest infrastructure requirements and are likely to have a growing positive impact in making the region's food system more efficient, in both developed and less developed areas of the region.

Technologies related to marketing and processing food products, in combination with information technologies, are likely to be the most important to the outlook of the region's food system. These technologies will be particularly important in supporting the rapid process of urbanization in Asia. Urban population in the region now surpasses 1.1 billion and accounts for more than 45 percent of the region's total population and is growing at twice the rate of population growth. The food security of these vast urban areas, particularly in the less developed parts of the region, will depend on adequate investment in food distribution systems, food processing capacity, and storage and marketing facilities and innovations that make these systems more efficient.

based grazing systems, and innovative solutions to increase farming profitability.
www.agritech.org.nz/

GE-Free New Zealand
www.gefree.org.nz/

Genetic ID
www.genetic-id.co.nz/

PERU

National Council of Science and Technology (Consejo Nacional de Ciencia y Tecnología)
www.concytec.gob.pe/

Ministry of Agriculture (Ministerio de Agricultura)
www.minag.gob.pe/

National Institute of Natural Resources (Instituto Nacional de Recursos Naturales)
www.minag.gob.pe/MINAG/inrena/indice.htm

National Service of Agrarian Health (Servicio Nacional de Sanidad Agraria)
www.minag.gob.pe/MINAG/senasa/indice.htm

Universidad Nacional Agraria La Molina
www.lamolina.edu.pe

CHINESE TAIPEI

Food Industry Research and Development Institute
www.firdi.org.tw/

Taiwan Agriculture Information Center
www.taiwanagriculture.org/

National Genetic Resources Center
www.npgrc.tari.gov.tw/

National Laboratory Animal Breeding and Research Center
www.nlac.gov.tw/

China National Fisheries (Group) Corp.
www.bta.net.cn/business/fishery/cnfc.htm

Institute of Bio Agricultural Sciences, Preparatory Office
www.sinica.edu.tw/~ibawww/

Institute of Biomedical Sciences, Academia Sinica, Taipei
www.ibms.sinica.edu.tw/

UNITED STATES

Economic Research Service, US Dept. of Agriculture
www.ers.usda.gov/

Foreign Agricultural Service, US Dept. of Agriculture
www.fas.usda.gov/

Biotechnology Information Resource (BIC), the National Agricultural Library
www.nal.usda.gov/bic/

Biotech/Biomedical Industry
biotech.about.com/industry/biotech/

INTERNATIONAL ORGANIZATIONS

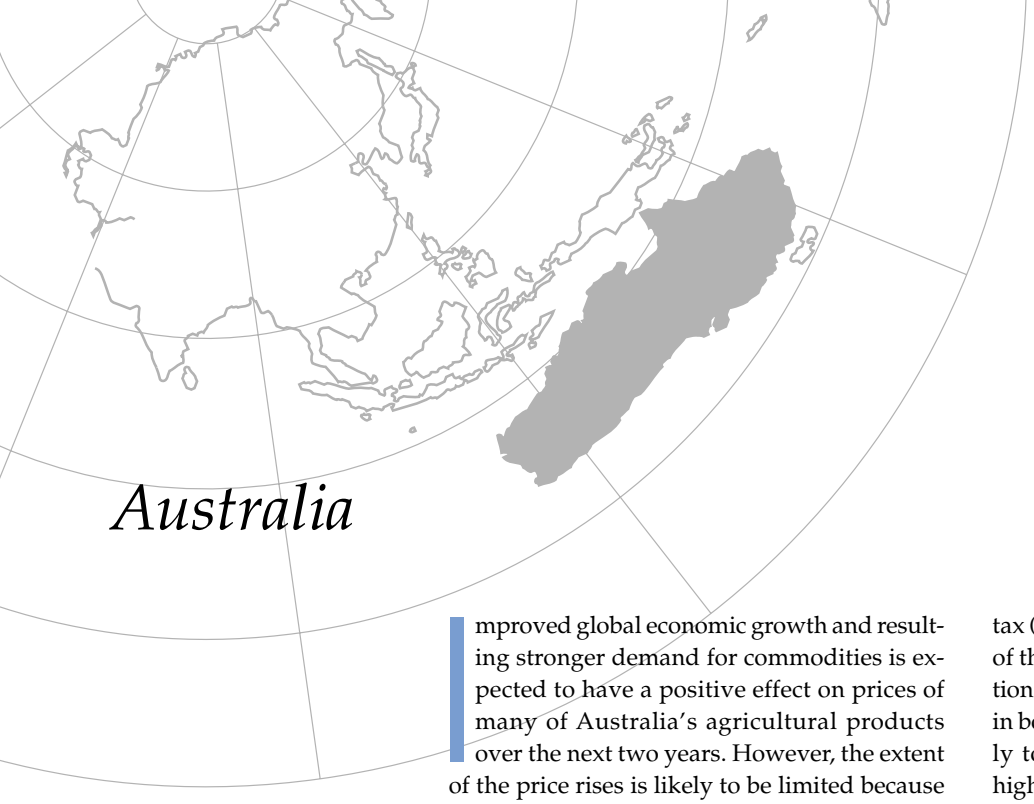
International Rice Research Institute (IRRI) The Philippines
www.cgiar.org/irri/

International Maize and Wheat Improvement Center (CIMMYT) Mexico
www.cimmyt.cgiar.org/

International Center for Tropical Agriculture (CIAT) Colombia
www.ciat.cgiar.org/

Biotechnology in Food and Agriculture,FAO
www.fao.org/biotech/

Asia Development Bank The Philippines
www.adb.org/



Australia

Improved global economic growth and resulting stronger demand for commodities is expected to have a positive effect on prices of many of Australia's agricultural products over the next two years. However, the extent of the price rises is likely to be limited because of continued heavy supplies of farm products relative to demand in major world markets. The supply/demand imbalance is largely due to market-distorting policies affecting food and agriculture in a number of major producing and consuming countries.

With Asia being a major destination for Australian food exports, economic development in the region will be important to growth in Australian production and trade of traditional commodities as well as fresh horticultural and processed food products. Australian exports of processed food and beverages to Asia were valued at US$3.4 billion (A$5.5 billion) in FY 1998–99 (July to June). By comparison, processed food exports to Europe in 1998–99 were worth US$800 million ($1.3 billion) and those to North America were valued at US$1.2 billion (A$1.9 billion).

Macroeconomic Situation and Outlook

Economic growth in Australia has been strong in the past year, supported by relatively high domestic demand, especially in the area of increased private consumption. The Australian economy expanded by an estimated 4.3 percent in calendar year 1999. Looking ahead, economic growth is expected to stay about the same in 2000 and to ease to around 3.5 percent in 2001.

Australia's inflation rate increased by a modest 1.5 percent in 1999. However, Australia's headline inflation rate is expected to increase significantly in 2000 as a result of the introduction of a 10 percent goods and services tax (GST) in July 2000. Net of the one-time effect of the GST's introduction, the underlying inflation rate is expected to average about 2.6 percent in both 2000 and 2001. Contributing significantly to the higher underlying inflation will be higher fuel prices because of increased world oil prices. Australia's prime lending rates are expected to increase slightly from an average of 8 percent in 1999 to 9 percent in 2000 and 9.3 percent in 2001.

The Australian dollar is projected to average around US$.62 in 2000 and US$.65 in 2001, despite being below US$.60 in mid-2000. Expected to contribute to an appreciation of the Australian dollar are stronger world commodity prices over the balance of 2000 and interest rate increases that will tend to dampen domestic consumption and slow growth in import demand.

Food Prices and Consumption

Australian retail food prices increased by 4 percent in the year to December 1999. The major increases were recorded in grain products, fruits, and vegetables, the latter two due to adverse weather in a number of important growing regions and higher demand. Food prices are forecast to rise by about 2 to 3 percent in both 2000 and 2001.

The introduction of the broad-based GST that replaces a range of indirect taxes is expected to affect prices and domestic consumption of food products. Once compensatory reductions to income tax rates and increased welfare payments for low income groups are taken into account, the tax changes are expected to result in a small overall increase in the disposable incomes of Australian consumers.

Under the new tax system, fresh foods are GST-free, but processed foods and foods eaten away from home are taxed. The effect of the GST

on food consumption will be a function of the size of the price change for each type of food and on overall consumer responsiveness to price and income shifts. The benefits from reductions in indirect taxes along the input chain will vary by product because of the different taxes levied under the previous and new systems and because of differences in the amount of value added between the farm gate and the end consumer.

The changes to the indirect tax system are also expected to improve the international competitiveness of Australian food industry exports. Exports will be GST-free and, with the reduction in indirect taxes, exporters' costs will fall by an estimated 3.5 percent. In terms of particular sectors, meat industry exporting costs will fall by an estimated 3.1 percent, dairy products by 3.4 percent, and fruit and vegetable products by 4 percent.

Apart from changes in the tax system and the associated effects on consumer demand, domestic food prices will be affected by what happens in global agricultural markets because of the export-oriented nature of much of Australia's agriculture.

Australian wheat prices are forecast to rise by 7 percent in 2000–01 in response to expected higher world demand and lower global stocks. Prices of the principal oilseed, canola, are forecast to be around 6 percent higher in 2000–01. Grain prices in Australia are projected to decline slightly in real terms beyond 2000–01, with some expected improvement in world demand and prices being more than offset by appreciation of the Australian dollar. Prices of raw sugar are forecast to recover from an estimated 15-year low in real terms of US$.6 per pound in 1999–2000 to almost US$.8 per pound in 2000–01 as income-sensitive consumption rises faster than production and as world stocks decline from recent record levels.

Australian cattle prices are forecast to increase by 4 percent in 2000–01 and by a further 1 percent the following year. Underpinning the price rise will be reduced supplies of beef as producers rebuild herds and stronger export demand as economic activity in Japan and South Korea picks up. Increased slaughter of prime lambs is forecast to result in slightly lower prices in 2000–01, but prices are expected to strengthen thereafter. An easing of US import restrictions will be vitally important to future growth in Australia's lamb industry. The farmgate price of milk used in manufacturing is forecast to rise from an estimated low of US$.13 (A$.21) per liter in 1999–2000 to around US$.14 (A$.22) per liter in 2000–01 reflecting improved export prices.

Food Processing and Marketing

With around 4,000 business establishments and turnover of US$32 billion (A$47 billion) in 1997–98, the processed food and beverages industry is the largest manufacturing sector in Australia. Employment in the industry amounted to almost 170,000 in 1997–98. Processed food industries make a notable contribution to the economies of regional (non-metropolitan) areas of Australia through employment, business spending, and the generation of service opportunities. Around half of Australia's processed food firms and a third of processed food and beverage industry employees are located in rural and regional areas. The number employed in rural areas has risen by about 50 percent in the past decade.

Australian food exports (unprocessed, minimally processed, and highly processed) in 1998–99 were valued at US$11.6 billion (A$18.6 billion), up by 4 percent over the previous year. While most Australian food exports historically have been either unprocessed (such as grains) or minimally processed (such as meat), there has been strong growth in highly processed foods (such as wine). Exports of highly processed foods were worth US$3.2 billion (A$5.1 billion) in 1998–99, up from US$1.6 billion (A$2.1 billion) in 1991–92.

The growing importance of minimally and highly processed foods in the overall mix of food exports reflects, in part, industry efforts to increase net returns through more value adding. For a number of commodities, such as seafood, fruits, and vegetables, this has resulted in strong export growth. For example, the value of vegetable exports rose by an average of 13 percent a year between 1991 and 1999 while fruit exports increased by about 11 percent a year. Much of this growth has been achieved through greater use of air freight to ensure products arrive in the freshest possible condition, thus maximizing shelf-life.

In the area of unprocessed food exports, the value of live animals exported for slaughter rose by an average of 35 percent a year in the seven years to 1999. Most of this growth was in cattle shipped from northern Australia to Southeast Asian markets. The trade is expected to continue expanding, with live cattle exports forecast to rise by 6 percent to 874,000 in 2000–01 and by another 5 percent in 2001–02.

Agricultural Production and Trade

The gross value of Australian farm production (food and fiber) is forecast to rise by 3.5 percent in 2000–01 and by a similar amount in 2001–02 largely as a result of an expected rise in prices

received for farm products. The net value of farm production (the residual between gross value and costs) is forecast to be US$2.9 billion (A$4.6 billion) in 2000–01 and a little over US$3.3 billion (A$5 billion) in 2001–02. Total exports of farm commodities from Australia are forecast to rise by 4.7 percent to US$15.8 billion (A$25 billion) in 2000–01 and by a further 3 percent in 2001–02.

The area sown to crops rose during the 1990s at the expense of livestock as farmers diverted land to crops because of low returns from wool. However, little further change is anticipated in the near term as wool prices have recently firmed relative to grains. Australian farmers are expected to plant around 20 million hectares (49.4 million acres) in grains (11.7 million hectares [28.9 acres] in wheat) in 2000–01 and about the same in 2001–02. Sheep numbers are forecast to be just over 113.8 million in 2000–01 and about 113 million in 2001–02, down from a peak of 173 million in 1989–1990. Prime lamb production will remain an important focus of sheep producers in those areas suited to the enterprise. The national cattle herd (beef and dairy) is projected to rise from 25.3 million in 1999–2000 to around 26.3 million head in 2001–02. Milk production is projected to rise from an estimated 10.8 billion liters in 1999–2000 to 11.1 billion liters in 2001–02, reflecting a small increase in dairy cow numbers and continued improvements in milk yields.

Substantial productivity growth has enabled Australian farmers to increase output and maintain incomes in an environment of declining real commodities prices. Most of the gains have occurred in the grains industry. Productivity on Australian grain farms (measured as the value of output relative to the value of inputs) is estimated to have increased by an average 3.2 percent a year over the 22 years to 1998–99. Annual productivity growth in the beef industry was 2.1 percent over the same period, and in the sheep industry (principally wool) it was 0.6 percent.

Food and Agricultural Policy

Government policies affecting agriculture and food will continue to reflect the pre-eminent importance of the world market to the industry's future growth and economic viability. Policies therefore will remain firmly focused on issues of global market access and export competitiveness, and on efficient use of resources in the domestic economy.

In a WTO context, failure to further liberalize global food trade will adversely affect the agriculture and food industries. For example, a 50 percent reduction in the distortions remaining after full implementation of the WTO Uruguay Round outcomes would increase annual global GNP by an estimated US$48 billion (in 1995 dollars). The Australian economy would benefit by around US$3 billion as Australian food and agricultural exporters faced reduced trade barriers and less competition from subsidized products.

There are also large potential economic gains from a less distorted trading environment in the Asia Pacific region. For example, the immediate removal of sugar import duties in the key APEC economies of China, Canada, Mexico, South Korea, and Japan, and the full liberalization of the US sugar market, would result in a 25 percent increase in traded world sugar prices in 2005. Low-cost unsubsidized sugar exporters would receive higher returns, while consumers in the importing countries would benefit from lower prices after removal of trade barriers.

In the domestic food market, both farmers and consumers are concerned about the potential implications for food marketing efficiency of agricultural processor deregulation and increased retail concentration. Retail market share held by three supermarket chains has increased from around 40 percent in 1970 to nearly 80 percent in 2000, but this share varies widely by product. For example, supermarkets' share of retail beef sales increased from about 20 percent in 1987 to 40 percent in 1998. Nevertheless, a parliamentary inquiry into the Australian retailing sector found no evidence that the high concentration of retail market shares has resulted in ongoing abuse of market power.

Deregulation of the Australian dairy industry in July 2000 has resulted in substantially lower farm-gate prices for the approximately 20 percent of production consumed directly as fresh milk and will lead to considerable industry restructuring. To facilitate the adjustment process, a program to ease the exit of some farmers from the industry and to allow for farm consolidations has been introduced, funded by a consumer tax on fresh milk sales. The program and associated tax is expected to run for eight years. Considerable changes are also occurring in the dairy processing industry, with takeovers or mergers of a number of major operators in prospect.

The new taxation arrangements introduced in July 2000 have the potential to lower the effective prices of some farm inputs. Australian farmers will pay the 10 percent GST on a wide range of purchased farm inputs. However, they will also be entitled to an input tax credit against the GST charged on sales of their livestock and

produce. At the same time, some potentially beneficial changes to fuel excise taxes will be introduced. A Diesel and Alternative Fuels Grant of up to US$.10 (A$.16) a liter for heavy on-road vehicles is expected to result in some reduction in freight costs for farmers and other businesses where the freight cost is a substantial component in the cost of inputs or outputs. The existing fuel tax rebate program for diesel used off-road in farming and fishing will continue.

New Food System Technologies

One technological issue affecting the food industry that is attracting substantial attention is genetically modified (GM) foods. The increased production of GM crops and the uncertainties associated with access to a range of markets have considerable potential to affect trade. While the agronomic benefits of GM crops may result in significant increases in production and downward pressure on world prices, the pressure in some markets for segregation of product may result in increased trade uncertainty and higher costs.

In response to public concern, the Office of the Gene Technology Regulator has been established to manage potential risks to the community or the environment from genetic manipulation and to establish appropriate safeguards. The Australia New Zealand Food Authority, which is charged with overseeing food standards and labeling, requires mandatory labeling of GM food "in circumstances where the nature of the food has been significantly changed with respect to its nutritional quality, composition, allergenicity, or end use."

At the farm level, the potential for GM crops is being closely examined but remains at the trial stage in most cases. To date, GM trials have been most numerous for cotton, canola clover, and field peas. An estimated 120,000 hectares of insect resistant (Bt) cotton, almost 30 percent of total plantings, was sown in Australia in 1999.

There has been a strong focus on increasing the value added to Australian food commodities in recent years. The goal has been to build exports of higher-valued foods that are safe, of consistent quality, and that meet consumer expectations. Satisfying the growing demand for assurances about the safety and integrity of the entire food chain is an important part of the overall program.

A number of initiatives are being pursued, including:

- Promoting use of food safety and quality systems throughout the food chain;
- Reducing supply and marketing costs by minimizing the number of food safety and quality systems and developing cross-system equivalence;
- Addressing gaps in the agri-food industry knowledge and skills base in relation to food safety, quality, and global market opportunities;
- Enhancing technical capacity in relation to risk analysis, quality assurance, and managing adverse residue incidents;
- Managing agricultural and veterinary chemicals; and
- Enhancing market intelligence and trade facilitation activities.

Internet-based commerce in Australia is in its infancy, but sales of US$850 million ($A1.3 billion) are forecast for 2001, up from US$45 million ($A61 million) in 1997. The number of business websites doubled between 1996 and 1998. Although substantial potential exists for extensive use of the Internet for business-to-business transactions, only a limited number of electronic commerce applications have been created for such opportunities in the food sector. Potentially, the most important of these is FoodConnect Australia, an Internet-based electronic commerce site. FoodConnect Australia enables agri-food businesses to trade and communicate company information and product specifications electronically in both the domestic and global markets. A key feature of the system for marketing offshore is that it also includes the completion of export documentation.

There are numerous food retail websites operating in Australia, but they are largely limited to passive advertising of suppliers and their product ranges or involve small-scale business marketing. On a larger scale, there is ongoing development of sites targeting household buyers by two of the major supermarket chains, Woolworths and Coles Myer. These systems allow products to be purchased electronically for home delivery at a specified time. There has also been substantial investment in marketing Australian wines over the Internet. Cellarmasters' online sales amounted to US$61 million (A$95 million) in 1999, and the company aims to conduct 20 percent of all sales this way by 2001. Fosters Brewing Group also has made a US$62 million (A$100 million) investment in international Internet operations.

Remote electronic marketing systems also have been applied at the producer level, but with limited success. In applying such systems to livestock and wool auctions, there have been difficulties in developing product descriptions

SHARE OF HOUSEHOLDS USING THE INTERNET MAR. 1999

adequate for trading, and the cost savings have been small relative to competing marketing systems.

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Canada

Canada's food retailing industry continues to consolidate. The top four supermarket chains will soon account for well over 70 percent of retail sales. Competition between types of retail stores is heightening and the line between retail stores and restaurants is increasingly blurred. Food prices increased by a minimal 1.3 percent in 1999; increases in 2000 and 2001 are expected to be modest as commodity prices strengthen slightly. The value of Canadian agri-food exports faltered in 1999 because of low international commodity prices, difficulties in key economies, and growing subsidy levels and export competition from key international players. The value of Canadian agri-food exports should increase slightly in 2000 and strengthen further in 2001 as markets and prices for grains, oilseeds, and livestock products strengthen and as the economies most affected by the financial crisis recover. Policy changes have increased the agri-food sector's market orientation and resulted in structural adjustments that have enabled the sector to respond better to end-user needs. However, pressure to match support levels in other affluent nations has been mounting over the last two years and will not subside without coordinated international effort.

Macroeconomic Situation and Outlook

Canada posted real GDP growth of 4.2 percent in 1999, with median predictions for 2000 and 2001 at 3.2 and 2.8 percent, respectively. The inflation rate was about 1.7 percent in 1999 and is expected to rise to slightly over 2 percent in 2000 and 2001. Disposable income grew by over 3 percent in 1999 and is expected to continue to increase but at a more modest pace through 2000 and 2001. Income growth will be helped by modest real wage gains, tax cuts, and modest employment gains. Canadian exports to countries other than the United States remained sluggish while imports increased in 1999. Continued strong reciprocal trade with the United States and nonresidential construction spending, plus tax cuts and real wage gains, are important influences on the positive economic outlook. However, high personal debt, rising interest rates, recent shocks to the US economy, Canadian dollar appreciation, and growing protectionist sentiment in important economies all contribute to downside risk.

Food Prices and Consumption

The increase in the CPI for food from stores and restaurants was only 1.3 percent in 1999 because of continuing large supplies of competing meats and grains and oilseed products, adequate supplies of fresh fruits and vegetables, strong competition in the nonalcoholic beverage and prepared food industries, and continuing consolidation in the processing and retail sectors. Labor, packaging, and other input costs will remain fairly stable for the next few years. Consequently, retail prices for food will increase by a modest 1.3 to 2 percent in 2000–01. While the share of income consumers spent in retail food stores was less than 9.5 percent in 1999, the share spent on food rose to 14.2 percent because of higher spending on food services and in restaurants.

After reaching record lows in late 1998 and early 1999, North American red meat prices strengthened in the latter half of 1999 as inventories declined. This trend should continue through 2000–01 because of the normal market cycle and industry consolidation. For similar reasons, retail prices for processed grain and edible oil products will strengthen as 2001 approaches. Retail poultry product and egg prices

will increase slightly over the next two years. Retail dairy prices will increase by a more substantial margin (3 percent) because of pricing decisions being made by the Canadian Dairy Commission. Fresh fruit and vegetable prices will be stronger (up by 3 to 4 percent) in 2000 but static in 2001. Processed fruit and vegetable prices will decline slightly in 2000–01, reflecting changing consumer preferences and structural changes.

Food Processing and Marketing

The Competition Bureau in Ottawa approved Loblaw's purchase of Provigo on the condition that Loblaw sell some of its stores. Consequently, 41 Provigo stores are being sold to Métro-Richelieu. Other Provigo and Loeb stores have been put up for sale as well, and the Ontario stores have been picked up slowly by other retailers, including independents. As of this writing, the Competition Bureau's ruling on Sobeys' purchase of The Oshawa Group was still pending. A sticking point has been the bureau's request that Sobeys sell one of its food service divisions. When these deals are complete, Canada's top four supermarket chains will account for over 70 percent of retail food sales. Further corporate purchases and takeovers are likely to push the four-firm retail market ratio over 80 percent in coming years, raising fears that retailers might abuse their dominant position. To date, competition from minor chains, independents, convenience stores, and alternative format stores like Wal-Mart and Price Club has been sufficient to curb the abuse of market power. The threat of entry by foreign firms like Carrefour (France), Royal Ahold (Netherlands), and Kroger (US) also helps discipline market participants.

FOOD PRICES
(PERCENT CHANGE)

Sales in the Canadian retail grocery industry rose by 2 percent in 1999 to approximately US$36.3 billion (C$54.5 billion). Chain supermarkets and voluntary group independent supermarkets registered sales increases while unaffiliated independent grocery stores and unaffiliated convenience stores reported declines. The Canadian Restaurant and Foodservices Association reports that spending on meals away from home rose by 5 percent in 1998 and 1999, reaching an annual total of US$24 billion (C$36 billion) in 1999. This reverses the previous trend, which was for grocery stores to capture an increasing share of all food consumed by offering value-added services.

While food service sales have increased, there are fewer food service outlets. Over the past two years the total number of restaurants has declined from 60,000 to fewer than 55,000. Food and beverage manufacturing plant (FBMP) numbers also continue to drop, while sales volumes per plant increase; FBMP sales were US$40.5 billion (C$60.8 billion) in 1999 and will exceed US$42.7 billion (C$62 billion) in 2000 and US$44.7 billion (C$64 billion) in 2001. FBMP employment has increased from 179,000 in 1992 to 225,000 in 1999.

Agricultural Production and Trade

Grain, oilseeds, and special crop receipts were lower in 1999 because of lower prices for canola, soybeans, and corn. These prices were driven down by the accumulation of large world stocks following several consecutive strong crops at home and abroad. When the large 1999 crop is marketed in 2000, higher volume will offset weaker prices, keeping year 2000 receipts about on a par with 1999. Spring wheat and canola plantings will drop substantially in 2000, with plantings of barley, durum wheat, corn, and lentils rising. Corn plantings in Ontario and Quebec in 2000 will reach a record high. In aggregate, crop receipts will strengthen in 2001, but be static in 2002.

Livestock receipts improved somewhat as 1999 progressed, largely because prices for hogs and cattle moved up from record lows in late 1998 and early 1999. Further increases in hog volumes are anticipated in 2000 based on herd breeding trends and farrowing intentions. Forward selling prices also suggest stronger cash prices for cattle as a result of slightly declining North American cattle stocks. Cattle inventories will expand in 2001 and 2002.

Canada's agri-food exports declined by around 4 percent in 1999. The decline reflects lower sales and values for grains, oilseeds and edible oil products, and livestock. Total imports of agri-food products to Canada increased by 1 percent. In 1999, inward agri-food FDI (Foreign Direct Investment) approached US$13 billion, while outward agri-food FDI approached US$7.5 billion. These aggregate figures mask large changes in trade volumes among commodity groupings and value levels and across countries. Canadian exports to the United States actually expanded by 3 percent in 1999, while imports from the United States were static. Reciprocal trade with PECC economies was relatively unchanged in 1999, but exports to South America, non-PECC Asian economies, and Europe fell substantially.

The value of Canada's exports of bulk commodities fell by 20 percent in 1999. Intermediate product exports fell by 15 percent, while exports

of higher-value food products rose by 14 percent. The trade performance of the consumer-oriented sector reflects increases in exports of red meats, lentils, and fresh and processed fruits and vegetables.

The value of agri-food exports will increase slightly in 2000 and strengthen further in 2001 as international prices for grains, oilseeds, and livestock products continue their recovery and economies elsewhere improve. Over the medium term, bulk exports will decline while increases are anticipated for consumer-oriented products. Complementarities in primary production and processing are already increasing cross-border trade with the United States and this trend will continue.

Food and Agricultural Policy

After declining since 1994, farm subsidies increased in 1999 and 2000 mainly because of the need to address the financial difficulties brought on by low world prices. Although not linked to current input or output levels, these payments may affect production decisions and impair market signals if producers are led to expect that extra assistance will be forthcoming whenever income falls.

Policy support is highest for the dairy sector, followed by the poultry sector. The dairy sector accounts for over 40 percent of Canada's total producer support and around 90 percent of market price support. Support to red meats, grains and oilseeds, and horticulture sectors is modest in comparison. Pressure has been building in these sectors to increase support in the face of declining market returns and increased support in other affluent nations. Within Canada, Quebec receives the highest level of support as a proportion of production value. Support is lowest in Manitoba, Saskatchewan, and Alberta. Rated by objective, Prince Edward Island received the most productivity enhancing subsidies, Nova Scotia the most quality control subsidies, and Quebec the most revenue enhancing subsidies.

In November 1999, the government announced additional funds amounting to US$114 million (C$170 million) would be made available to farmers under the Agricultural Income Disaster Assistance Programme (AIDA). These funds are earmarked for farmers who had negative gross margins during the base period (and therefore do not qualify for normal AIDA payments) to receive payments for both 1998 and 1999. AIDA is a two-year national program open to anyone who files income tax returns as a farmer and whose farm gross margin dropped below 70 percent of the average gross margin achieved during the previous three years. As part of a new disaster package announced in January 2000, an additional US$670 million (C$1 billion) will be available over two years to help Canadian farmers manage market and production risks. As future directions for farm income safety nets are still being discussed, it is not certain how these new funds will be provided. The next five-year framework is expected from the Ministry of Agriculture in mid-2000.

Roughly US$60 million in new funding has been allocated by Revenue Canada for biotech regulation. The Canadian Council of Grocery Distributors and the Canadian General Standards Board have also launched a project to develop a Canadian standard for the voluntary labeling of biotech foods. This initiative is chaired by Lee Anne Murphy of the Consumers' Association of Canada and involves consumer groups, private firms, academia, and governments.

After review, Health Canada said no to use of rBST (recombinant bovine somatotropin), a hormone that increases the amount of milk a cow can produce. Despite its use in the United States, a Canadian Veterinary Medical Association panel found that rBST's costs outweigh its benefits.

In his 2000 report, Canada's auditor general (AG) said that, while consolidation and cost recovery initiatives related to food inspection are commendable, industry stakeholder concerns should be more fully considered when making decisions.

New Food System Technologies

Canada's unique technology network, which consists of institutional members and technical advisors that combine technical advice with access to financial and technical resources, provides an environment conducive to scientific research and innovation. However, government R&D expenditures have been static to slightly declining over the past several years in nominal terms and overall R&D comprises a declining share of GDP. This trend causes concern for Canada's longer-term competitiveness and prosperity. On the positive side, business has been increasing its share of both funding and performing R&D. This may be linked to a number of factors, including a well-educated workforce, a populace that views scientific investigation favorably, and favorable R&D tax treatment. (Canada's Customs and Revenue Agency offers scientific research and experimental development investment tax credits of from 20 to 35 percent.) Specific measures, such

SHARE USING ELECTRONIC COMMUNICATIONS, LARGE COMMERCIAL FARMS
(PERCENT)

as Agriculture and Agri-Food Canada's Matching Investment Initiative, also promote public-private commercial cooperation that is in the national interest. However, decision makers in both public and private spheres need to be aware that their decisions in other areas also may have implications for innovation and initiative. We discuss this below in the context of transportation innovations, grading services, and genetic selection.

Plant Breeding and Biotechnology. Canada has internationally respected plant breeding and agricultural biotech regulations thanks to effective cooperation and rational science-based discourse between consumer associations, private sector interests, and government. Canada has an opportunity to build on strengths in plant breeding and plant biology in this era of gene discovery. For crops and animals, strong research clusters exist at the universities of Guelph and Saskatoon, Agriculture and Agri-Food Canada's Research Branch, and the National Research Council. Competitive strengths lie in (1) plant breeding of canola, potatoes, corn, soybeans, wheat, and barley, (2) animal husbandry, (3) aquaculture vaccines and brood stock optimization, (4) yeast strains and bacterial cultures, and (5) somatic embryogenesis for propagation of conifers and flowers. As a result of the positive R&D environment, many multinational agricultural companies, including Novaritis, Aventis DuPont, Monsanto, Pioneer, and Dow, have an active presence in Canada. Canada also has a number of plant biotech startups (Performance Plants, Prairie Plants, SemBioSys, DNA Landmarks), in addition to seed companies. Ongoing challenges include:

- Addressing consumer concerns about health, safety, the environment, and ethics;
- Maintaining a strong academic research base and improving training and strategic planning;
- Fostering technology transfer mechanisms and improving technology diffusion;
- Increasing the capability to convert research into viable commercial products; and
- Addressing financing issues, particularly for early-stage companies.

Transportation Innovations. The CUSTA and NAFTA agreements lowered the barriers to trade between North American nations, making north-south trade more attractive commercially. As barriers have fallen, new transportation and logistics innovations have become commercially feasible. Research indicates that new intermodal technologies—such as double-stacking rail containers, having reinforced trailers pulled directly by locomotives, and employing more fuel-efficient rail power—are now potentially cost-competitive since lower trade barriers have afforded economies of scale from higher utilization.

Packaging. Consumer demand for easy-to-open, well-labeled, portable, environmentally friendly packaging that reduces food loss has given rise to a variety of resealable packages. These include plastic "zipper" technology, recyclable and reusable packages, and polymer "flexible" packaging. The meat processing industry in particular has taken advantage of the new technologies and is undergoing a large-scale shift to case-ready flexible packaging. This promises both to reduce costs and lower food contamination and losses throughout the supply chain; a combination of breathable films and new sealants now make it easy to achieve three-week shelf-life for perishable products. Cans, glass jars, and boxes will lose share to flexible packages for safety and convenience reasons.

Grading Services and Genetic Selection. The Canadian pork industry's use of the turnkey carcass grading service helped facilitate its success in responding to consumer demand trends in North American and overseas markets. The grading system helped transmit information about consumer preferences back to market stakeholders, breeders, and others involved in genetic selection.

Genetic selection is a technology that develops only under continuous selection pressure from one generation to the next. The genetic makeup of a population provides the primary material producers can combine with other inputs to produce a product of the highest potential market value at the lowest possible cost, thereby maximizing their net return. Incomplete or incorrect signals of the relative value of genetic traits impair producers' ability to select the traits that yield products with characteristics valued by consumers. Obviously, grading (and labeling) must be able to accurately convey information regarding preferences throughout the marketing chain. The genetic improvement of swine that occurred in Canada probably had a number of origins: (1) ROP (Record of Performance) boar testing; (2) increased number of breeding companies; (3) increased use of artificial insemination; (4) reduced herd numbers; and (5) increased integration of the industry. Nevertheless, a main determinant of genetic improvement through selection was the grading system since most herds that failed to survive were characterized by inferior carcass merit.

Telecommunications, the Internet, and Digital Data Management. Canadian agri-food interests use the Internet for (1) electronic communication between suppliers,

carriers, and receivers; (2) advertising, promotion, and scheduling via websites; (3) direct interface with customers for such functions as providing schedules, invoicing, and order processing; (4) transfer of funds electronically; and (5) tax calculations and submissions. Internet use has a number of advantages, including low cost, wide accessibility, convenience, timeliness, and the reduced duplication of effort and materials.

The recent roll-out of the ACROSS Customs Clearance System by Canada Customs (CC) and the greater use of electronic data interchange (EDI) have resulted in faster package delivery and lower costs. The ACROSS system combines electronic data interchange and bar-coding technology to speed up clearance at the border. CC also has a program that allows shippers to arrange pre-clearance for their goods and a complementary initiative that employs automatic vehicle identification (AVI) technology to speed the movement of truck traffic across borders. Canada, the United States, and Mexico have a pilot AVI project that allows trucks equipped with transponders to pass through border crossings without stopping. Soon, only trucks without preclearance and those chosen for random checks will have to stop for inspection. This will be a significant advance for shippers of perishables.

With the advent of bar-coding and point-of-sale information, massive quantities of data have become available to customers and carriers. Sophisticated bar coding will enable containers and vehicles as well as packages to be tracked. The next step in tracking systems is the "smart stamp," which contains 256 bytes of data, a battery, and an antenna in a casing the size of a large postage stamp. Information on each shipment is loaded into a reusable, affordable "stamp" attached to the package. The stamp transmits information picked up by a scanner up to a few meters away. This will improve tracking and reduce labor costs. The "stamp" is expected to be in wide application within two to three years.

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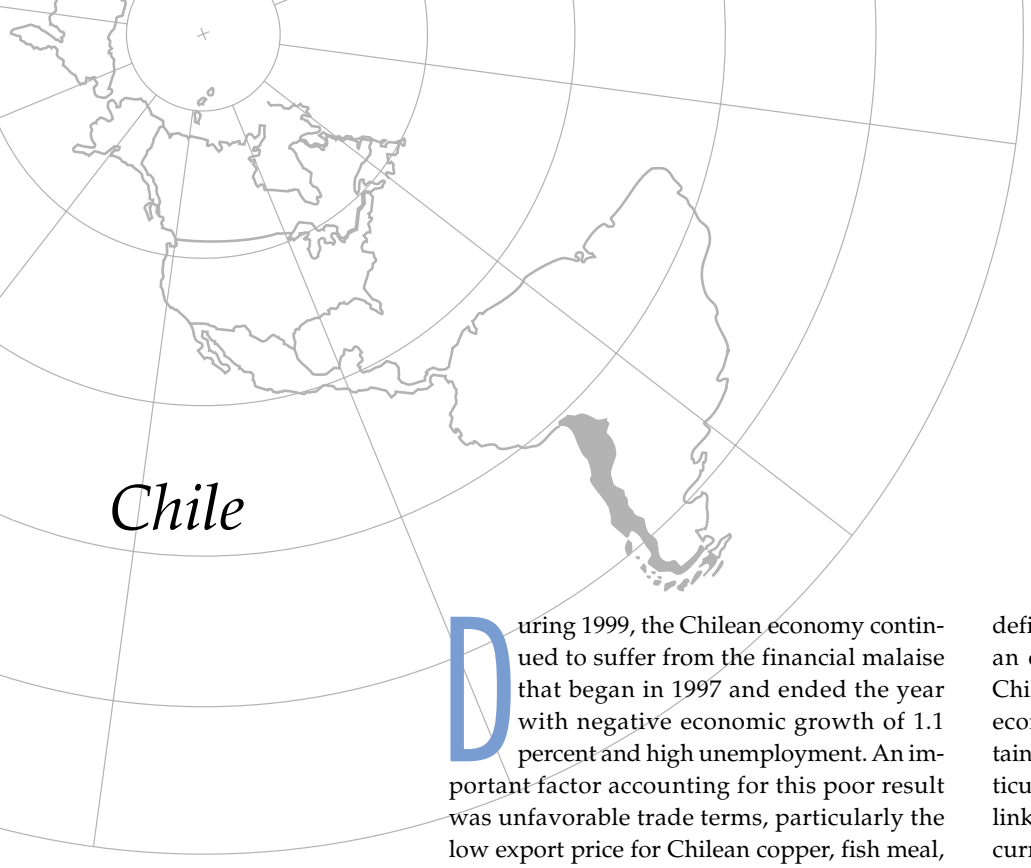


Chile

During 1999, the Chilean economy continued to suffer from the financial malaise that began in 1997 and ended the year with negative economic growth of 1.1 percent and high unemployment. An important factor accounting for this poor result was unfavorable trade terms, particularly the low export price for Chilean copper, fish meal, and cellulose. Interest rates, which were driven up in 1998 by the central bank, were lowered during 1999 to reactivate aggregate expenditures and investment. Nevertheless, aggregate demand declined drastically, driving down production in nontradable sectors, and investment failed to respond as expected to the lower interest rates.

One possible explanation for the lack of investment is that 1999 was a presidential election year. National elections typically affect expectations and make investors cautious. Moreover, it took a second round of voting for the ruling center-left coalition, which has been in power since 1990 under Christian Democratic Party leadership, to get the necessary majority. The new president is a member of the Socialist Party but has compromised to maintain a free and open economy. The policy emphasis in the coming years will be on enhancing social equity through better targeting of public expenditures, labor market reforms to empower labor unions, and tax reforms to increase public income. The government also plans to continue decentralizing decision making in the various government branches to give more autonomy to the regions. The highly centralized government structure has been a deterrent to efficient allocation of public resources for regional development.

The outlook for 2000 is much more optimistic, with most analysts expecting a 5.5 to 6 percent GDP growth rate because of slack in the external accounts. The 2000 current accounts deficit is estimated at only 2 percent because of an expected increase in the price of copper, Chile's major export commodity. Nevertheless, economic recovery may be slowed by uncertainties affecting the business environment, particularly investment. One area of uncertainty is linked to exchange rate fluctuations within the current free-market exchange rate system; another is whether the capital account will be further opened to reduce capital costs. There also are misgivings about labor reforms being discussed in Congress as these may reduce employers' flexibility in hiring labor and further increase labor costs. In 1999 and early 2000, ethnic minorities continued to seize land, especially forested areas being exploited by large forestry companies. This is a property rights issue, which coupled with strict new environmental regulations and the regulatory policies being applied to determine tariffs in telecommunications and energy could slow down economic recovery. Unemployment rates were still high in first-quarter 2000, above 8 percent around the nation and above 13 percent in Santiago where one-third of the population is concentrated.

Food Prices and Consumption

The country successfully suppressed inflation in 1999. At only 2.3 percent, the 1999 inflation rate was an unprecedented low for Chile. This helped to mitigate the unfavorable impact on food consumption of lower per-capita income and increased unemployment. The inflation rate expected for 2000 is 3.5 percent, with the increase owing to the rise in international oil prices, which have already resulted in rising transportation costs. During 1999, food prices increased by 3.4 percent, despite a 5.8 percent increase in wholesale agricultural prices in the same period. In the

next 12 months, food prices are expected to increase at about the same rate as general prices because of increased fuel costs and a modest recovery of international food commodity prices, which directly affect domestic prices in an open economy such as Chile's. Dairy product prices will rise even more as a result of safeguards applied to milk imports, while import tariffs applied to wheat and sugar associated with the price-band program will keep these prices from falling in line with world prices.

Food Processing and Marketing

The short-term outlook for Chile's food processing industry, which is strongly tied to the export outcome, especially for exports that add value to fruits and vegetables, is brighter than it has been in years. This optimism is based on the expected economic recovery of several of the main export markets and on the general trend of increased world demand for fresh and processed fruits and vegetables. Chile is well positioned to meet rising demand with its experienced industries, access to high-quality raw materials, adequate sanitary conditions, reliable supplier record, and good technological standards. Tomato paste, one of Chile's main export products, should fare better with the economic recovery of Brazil and Japan, but this is still uncertain as it depends on weather conditions in other important supply regions around the world. Favorable food consumption trends around the world as dictated by health and nutrition considerations should be a boon to exports of dried fruits, dehydrated vegetables, and nuts, especially prunes, red peppers, and walnuts. As for apple juice exports, the accusation that Chinese product has been dumped in the US market may open up better prospects for Chilean exports. The foreign demand for grape juice also is expected to grow. Again, the general trend is to favor fresh fruit juices over processed beverages. One sector of the industry that has not been able to recover is canned peaches, which faces competition from highly subsidized European exports. The frozen vegetables sector also continues to face difficulties because of weak domestic demand and strong foreign competition in export markets, especially within MERCOSUR (a free trade area comprising Argentina, Brazil, Uruguay, and Paraguay).

On the other hand, food processing companies will soon need to make substantial investments to comply with new regulations regarding the treatment of liquid effluents, Good Manufacturing Practices, the rules proposed by the International Standards Organization (ISO) in Geneva, Switzerland, and other external requirements. These costs, plus the need to continue to reduce unit costs through economies of scale, may lead to further mergers and industry consolidation. In some cases, this may also mean moving raw material production areas away from their present locations in and around the urban areas of central Chile where land is expensive and labor costs are high.

The wine manufacturing industry continues to be a very dynamic sector. Exports are increasing, particularly of bottled wines with denomination of origin—a given area that is an attribute for market differentiation. Direct foreign investors from developed countries and foreign firms seeking to engage in joint ventures continue to be attracted to this sector. However, the rapid increase in the number of wine grape plantations has already depressed producer prices and may lead to future marketing difficulties, particularly for white wines, since preferences worldwide have shifted toward red wines because of alleged health benefits.

On the domestic front, modest volumes of organic vegetables are being introduced in supermarkets at prices similar to those of conventional substitutes in an effort to gain market acceptance. Organic producers have recently formed a producer association, but the certification regulations, which are in line with European standards, are still to be implemented. Farmers and agro-industries are very interested in learning more about organic production and about the prospects for exports of organic products, which are just starting to take off.

The expansion and modernization of supermarkets, especially hypermarkets, will continue through 2005. AHOLD, the Dutch multinational that recently purchased the Chilean supermarket chain Santa Isabel, is investing in improved infrastructure and introducing better-quality fresh products and meats in all its locations. Carrefour, the French chain, is also expanding its presence in the Chilean market with very aggressive sales policies. The main Chilean chain, D&S, plans to invest US$140 million in 12 new selling points in 2001–02. D&S expects to open a total of 40 new facilities in the next five years, some of which will be located outside the country's three main regions. Meat sales in supermarkets are growing faster than sales of other items as supermarket meat distribution replaces the traditional butcher shop. Supermarket chains are paying special attention to enlarging and improving their central distribution centers. They also are beginning to introduce their own brands of a

FOOD PRICES
(PERCENT CHANGE)

number of items, from cola drinks to milk, cheese, canned products, and vegetable oil. Sales of food in supermarkets and hypermarkets account for as much as 86 percent of all food sales in Chile, compared with 54 percent in Brazil and 69 percent in Argentina. Santiago, a city of about 5 million inhabitants, contains 43 chain food stores (defined as having three or more cash registers) in 178 locations.

Another increasing trend is the location of convenience stores in gas stations. In Santiago alone, there are now 172 such stores involving all the oil companies in the country.

A recent study of food consumption trends in Chile, Argentina, Brazil, and Mexico reveals a number of common factors. Competitive price is the most important variable affecting consumer loyalty to a given supermarket chain. Other important variables are variety, freshness, and product quality. Pre-frozen and pre-cooked foods are the star items in all major food chains.

Agricultural Production and Trade

Agricultural GDP declined by 1.2 percent in 1999 in line with the decrease in total GDP. During 2000, GDP is expected to grow by about 1.5 percent because of expected increases in cereal, meat, milk, vegetable, and wine production.

During 1999, agricultural and livestock exports totaled US$2,828 million or US$4,643 million if forestry exports are added. The corresponding imports totaled US$1,104 million or US$1,156 million including forestry products. If forestry products are excluded, exports increased by 2 percent and imports declined by about 7.7 percent compared with 1998.

Fruits. Drought was once again a factor in the 1998–99 season, which especially affected kiwifruit production and exports. Spring rains also affected yields of stone fruits. Therefore, fresh fruit exports, the most important Chilean agricultural export, were stagnant in 1999. The United States and Canada continue to represent the largest market for Chilean fruit exports at 40 percent of the total, followed by Europe at less than 32 percent, and Latin America at 19 percent. Fruit plantings in Chile have remained unchanged in recent years except for the introduction of three species with better export prospects. These are avocados, mainly oriented to the US market, lemons for off-season exports to Japan, an attractive market that opened up in 1994, and, to a lesser degree, cherimoyas for the US market. Future expansion of fresh fruit exports will depend on the prospects for expanding Latin American markets and the slower-growing markets in Japan, Korea, and Chinese Taipei. In April 2000, China officially recognized vast areas in Chile as free of the fruit fly after ten years of negotiations. This will make it possible to export grapes, apples, and kiwis to China. Previously, only fruit from the United States had been admitted into China.

Exports of processed fruits are generally back to levels achieved before the economic crisis, except for a modest increase in dried fruits, pulps, and marmalades. Again, the opening of new markets and better market access, especially in the EU, will be fundamental factors for achieving further export growth.

Vegetable production has grown consistently along with the development of large-scale farming geared mainly to the export market. Total production is expected to grow by about 30 percent from 1999 through 2005. Per-capita domestic consumption of vegetables in Chile is high by Latin American standards. Vegetable exports increased modestly in 1999 but did not exceed values reached in the mid-1990s before the economic crisis.

Area sown to wheat, the single most important crop, has increased by 12 percent. This, together with the imposition of an import surcharge, will lead to lower wheat imports, which will not exceed 250,000 tons. Rice production is also expected to increase, recovering from 1998–99 when area sown was the lowest in decades. There will be some recovery in the area sown to maize because of better prices. Given the continued growth in domestic demand (mainly for poultry), imports are likely to increase again.

Dairy Products. After a decline of 4.2 percent in 1999, dairy production is expected to resume growth as a result of both better weather conditions and higher producer prices, the latter owing to surcharges recently adopted for dairy imports from countries where exports are known to be subsidized. A campaign to promote domestic milk consumption is being planned by FEDELECHE, the recently created association of dairy producers. Dairy imports continue to grow despite surcharges because of imports from MERCOSUR, which receives preferential tariffs in its trade agreement with Chile. Chile continues to develop niche exports of dairy products, such as cheese to Mexico, or powdered milk to Colombia, countries that have signed trade treaties with Chile. The future of dairy production is strongly linked to the adoption of more efficient technologies and an improvement in the quality of milk supplied to the processing plants, especially by small and medium producers where quality has slipped because of the profitability squeeze of the last five years.

Beef. Over the last decade, beef has faced strong competition from imports coming from MERCOSUR at constantly declining prices. Dry weather conditions since 1997 reduced pasture availability, making matters worse. This year, production is expected to recover slightly, but the future growth prospects for this important sector are uncertain. As this is one of the most traditional sectors in rural areas, efficiency improvements at the farm level have been slow to materialize. Most slaughterhouses are old and need to improve sanitary conditions and the cold chain. The expected declaration of Argentina as free from foot and mouth disease will make it feasible to import live animals into Chile. This may result in greater economies of scale for slaughterhouses but will require major adjustments in the breeding regions of the south, which offer few other agricultural options. Beef imports will probably continue to increase because of higher domestic consumption and the competitiveness of MERCOSUR beef supplies. In the medium term, it is possible that Chile may begin importing live animals for slaughter and subsequently exporting beef to the Asia Pacific region.

Production and consumption of poultry are expected to continue growing rapidly with income growth resuming and low-cost feed available, both from cereals and oilseeds. Swine production and consumption growthare also expected to continue as small and medium-sized enterprises decline. Fish exports constitute an important component of total exports, with salmon and trout exports expected to continue to grow at a rapid pace in the coming years. Wine exports, which increased by 5 percent in 1999, are expected to increase by another 8 percent in 2000 because of the recovering economies in Asia and Europe.

Farmers continue to criticize the free trade agreement (FTAs) signed with MERCOSUR in 1996. During 1999, total agricultural exports to MERCOSUR declined dramatically, and the sector's trade balance with this important economic block is much more negative today than when the treaty was signed. Today, MERCOSUR is Chile's major agricultural supplier, while the export flows to that market from Chile have been hampered by the Brazilian economic crises and its aftermath. Of the other FTAs signed by Chile in the region, some have had a mixed impact and others have not been in place long enough to judge. The agreement signed with Mexico in 1992 is considered by farmers and the government to have had a positive impact.

Food and Agricultural Policy

Policies in Chile are as yet not integrated in any regular or preconceived way. The Ministry of Agriculture handles agricultural policies together with forestry matters, while the Ministry of Health usually deals with food policies. Agricultural policy is expected to continue to be subordinate to the general policy of encouraging an open, free economy. Chile plans to unilaterally reduce the general uniform tariff by one point per year until the goal of a 6 percent tariff is reached in 2005. Possible exceptions to the general tariff include wheat and wheat flour, sugar, and vegetable oil, all of which are subject to a price band mechanism.

In this context, agricultural development is strongly linked to the export market, but it has exhibited a growth rate below that of the rest of the economy during the last decade. One factor that has had a negative impact on the sector's performance has been the rising trend in the real exchange rate, a trend that was interrupted during 1999. It is expected that the real exchange rate will recover slowly during the next two years, requiring continuing productivity gains for the sector to remain competitive.

The new government, which took office in March 2000, has indicated that it plans generally to continue with the agricultural strategy that has been in place for the last decade. Existing mechanisms to promote innovations, to support introduction and improvement of irrigation facilities, to improve degraded pasture lands and farm management skills, and to promote associative marketing efforts among farmers will focus on small and medium-sized farms in the southern regions of the country. A special effort will be devoted to supporting diversification of rural incomes, with programs on agro-tourism, rural acquaculture, and forestry securitization with small farmers. The rural areas in the south are highly dependent on farming, especially cereal production and cattle ranching, and have serious disadvantages in relation to MERCOSUR producers.

Other major policy deals with the so-called market perfection instruments that aim to correct distortions, such as price fluctuations in sugar, wheat, and oilseeds arising from the nature of the international markets for these commodities. During 2000, the country faces the problem of having exceeded the consolidated 35 percent tariff for these commodities. Chile is requesting a waiver from the WTO to temporarily exceed the negotiated tariff rate and has established one-year safeguards to cover the excess of the floor of the price band above the 35 percent consolidated tariff. These actions may

be controversial and criticism of the price band program is growing, particularly among beverage manufacturers upset about the sugar price band. In addition, imports of oil mixes from Bolivia, a signatory of an FTA with Chile, were taxed with the surcharge of the band mechanism, but ALADI , the Latin American Association for Integration, ruled against this. Argentina, Chile's major oil supplier, may also complain about this surcharge. In the end, the problem may be resolved by eliminating the price band mechanism for vegetable oils and applying some type of compensation plan for oilseed producers.

A compensatory tariff on dairy products imported from Poland and the Czech Republic has just been applied pending a definition of similar tariffs for milk supplied by the EU and the United States.

The low profitability of farming in the southern regions is likely to result in serious farmer mobilization against the government during the remainder of 2000. Farmers will protest the elimination of price bands and demand more protection against increased farm subsidies in the EU and the northern hemisphere.

New Food System Technologies

Over the last ten years, Chile has doubled the proportion of agricultural GDP spent on agricultural research, but public sector investment in R&D continues to be very limited.The single most important new technology that is revolutionizing food systems around the world, genetic engineering or what is being called biotechnology, has been slow in finding its way into Chile. Technical expertise and, to a lesser degree, physical infrastructure have begun to be built up with a view toward creating new products with this technology that can create substantial added value to Chilean food production. Initial research efforts have focused on potatoes and fruit, but no commercial product resulting from local research is yet available. Until 1998, such research was conducted with a clear academic bias by the National Institute for Agricultural Research (INIA) and some universities. Since then, research efforts have been redirected toward developing products with high commercial value under the leadership of Fundacion Chile in alliance with a North American company, INTERLINK, the National Institute of Agricultural Research, and the private sector. They have initiated projects in forestry and fruits, in the latter case to obtain new products with improved post-harvest quality and with resistance to pests and diseases present in the country. These projects are integrating human resources available in INIA and local universities and include technology components purchased from other research groups abroad.

Another area of technological advancement concerns reducing the negative effects of food production on the environment and producing food under sustainable conditions. This involves precision farming, integrated pest management and biological control of pests and diseases, organic agriculture, and enhanced use of renewable agricultural inputs. These technologies are just starting to be introduced in Chile. Precision farming is present only at the experimental level. Testing integrated pest management practices has just begun for apple production and will be initiated next for wine grapes. Organic farming started in Chile about 15 years ago, but more as a lifestyle than as a true commercial activity. There is as yet virtually no domestic market for organic food and exports totaled only US$2.5 million during 1999. The norms for production and certification of organic products were passed in 1999 and are expected to boost production, but appropriate technologies for Chilean conditions have yet to be developed in most instances. The legislation is not in place in most cases to enforce or induce the adoption of environmentally friendly technologies.

Technologies to increase irrigation efficiency, such as drip irrigation and micro-jet and micro-aspersion systems, are available and used by export-oriented commercial farmers, but vast areas are still irrigated by the inefficient traditional systems. Mechanization is another trend in agricultural technology that is being increasingly adopted because of rising labor costs and the scarcity of workers at harvest time. However, there is a significant lack of qualified workers to handle both the machines and the more sophisticated irrigation systems.

Finally, greenhouse production of vegetables, flowers, and seeds is becoming more widespread in Chile because it is possible to achieve much better prices in certain seasonal windows, both abroad and in the local markets.

China

The stable macroeconomic situation and new agricultural reforms helped China's agricultural and food sector maintain relatively stable growth in 1999. As a result of the country's agricultural structural adjustment strategy, grain production totaled 508 million tons, a 0.8 percent drop from 1998. Production of both meat and fishery products increased in 1999, up by 4 percent to 59.5 million tons and by 5 percent to 41 million tons, respectively.

With surpluses a market factor for most of China's agricultural products, structural adjustments to improve rather than increase production will continue to be the focus of agricultural development in 2000 and the years to come. More emphasis will be put on quality and processing improvements and environmental protection. As a result, the production of grain and fishery products is expected to remain stable while meat, vegetable, and fruit production will continue to increase. Projected production totals for 2000 are grain 490 million tons, meat 60 million tons, and fishery products 40 million tons. As structural adjustment continues, the market situation for most agricultural products is expected to be stable with slight improvements for many products.

Macroeconomic Situation and Outlook

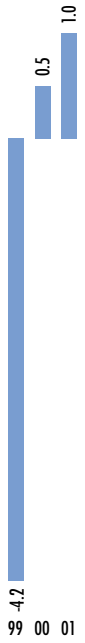
China's economy sustained stable growth in 1999 with a GDP growth rate of 7.1 percent. Although growth slowed slightly from the 1998 rate of 7.8 percent, the quality of the economy was better in many ways. First, more structural adjustments were in place in both the agricultural and industrial sectors. Second, industrial efficiency improved dramatically as a result of business reforms. The sales/production ratio of industrial products reached 97.2 percent in 1999, 0.6 of a percentage point higher than in 1998. The comprehensive efficiency index of industrial enterprises reached 99.3 percent, up by 8.4 percentage points from 1998. The loss of state-owned enterprises and state share-controlled enterprises was cut by 15.9 percent in 1999.

In addition, foreign trade was up by 11.3 percent over 1998, reaching a total of US$360.7 billion. Imports grew by 18.2 percent while exports were up by 6.1 percent. Despite these gains, economic development in China faces serious problems, including prolonged weak consumer demand, a slowdown in fixed asset investment, and rising unemployment. Urban unemployment reached 3.1 percent in 1999, and rural underemployment worsened as a result of the setback in rural labor mobility caused by industrial restructuring in urban areas. Another deterrent to economic development is the slowdown in the growth of farmers' incomes. Farmers' average net income increased by only US$4.8 in 1999. This is a major reason for the weak market demand in rural areas. These unfavorable factors are projected to continue in 2000 and have a negative impact on the performance of the food and agricultural sector in the future.

Food Prices and Consumption

Food consumption costs are determined largely by two factors in China: price and food consumption away from home. Food prices declined by 4.2 percent in 1999, a much larger drop than the 1.4 percent decline in the national CPI. Price changes varied by product.

Prices for meat and meat products suffered the sharpest drop at 8.3 percent, followed by egg prices, which were down by 8.1 percent. The prices for fishery products and grains declined by 6.7 percent and 3.1 percent, respectively.



FOOD PRICES
(PERCENT CHANGE)

Prices for fresh vegetables, the only major category of food that experienced a price increase in 1999, were up by 0.7 percent.

With slow income growth in 1999 and moderate economic prospects for 2000, food prices are likely to show little change in 2000. As of March 2000, the price of grain was down by 8.2 percent compared with March 1999, rice by 12.9 percent, maize by 3 percent, wheat by 5.8 percent, meat and eggs by 9.4 percent, fishery products by 10.6 percent, fruits by 3.4 percent, and vegetables by 13.5 percent.

Several factors have promoted increased food consumption away from home in recent years, including more families choosing to eat out during the holidays and increased interest in tourism among ordinary people Restaurant food and drink consumption was up by 13.6 percent in 1999, a strong growth trend that is expected to continue. However, this trend mainly applies to urban areas because of the slow growth of farmers' incomes in recent years.

Food Processing and Marketing

Processed food now accounts for only 40 percent of total food consumption in urban areas and far less in rural areas, but the share will grow as the rural and agricultural economy develops. In recent years, sluggish market demand and low prices for most agricultural products have negatively affected farmers' incomes. Since the domestic price of many major agricultural products now exceeds the world price, it is no longer feasible for the government to increase the procurement price for agricultural products. The most efficient way for farmers to increase their incomes is to get as much as possible from the value added in the food processing industry. China has entered a period of accelerated urbanization, which will increase the demand for processed food. A primary strategy for rural and economic development in China is the development of small rural towns. An estimated 100 million people now living in rural areas will move to these small towns in the next ten years. As the share of processed food consumed in urban areas is much higher than in rural areas, the increased migration from rural to urban areas will greatly increase the demand for processed food in China.

The development of the food processing industry in rural areas also is an important part of the agricultural structural adjustment strategy. The added value of processed agricultural products will raise the profitability of agricultural production, create more jobs for farmers, and expand the market for food exports. Although China enjoys a price advantage for many food products on the world market, its food exports are greatly restricted by the limitations of its food processing industry. To benefit from agricultural trade liberalization, China must accelerate development of its food processing industry and place a priority on technological improvements.

Many factors deter the development of the food processing industry in China. The primary factor is the poor quality of agricultural products. The conventional varieties produced in China normally do not meet the needs of the processing industry. In recent years, China has had to import large quantities of special varieties for its food processing industry. Another factor is the small size of the average farm, making it hard for food processors to get a stable and consistent-quality supply of raw materials. A lack of technological innovation and management expertise also hampers the food processing industry, which in China is dominated by small enterprises using outdated equipment and traditional technologies. Without up-to-date equipment and modern management techniques, producers have difficulty improving product quality and competitiveness.

The recent development of agricultural vertical integration not only has accelerated the development of the food processing industry, but also has improved the performance of the food marketing system. With the help of various new institutional arrangements, a closer relationship has been built between farmers and food processing enterprises. Agricultural vertical integration has contributed to the food sector in two ways: it guarantees a stable supply of raw materials for the food processing industry and relieves farmers of the burden of selling their products.

Agricultural Production and Trade

In recent years, structural adjustment has had a major impact on agricultural production in China. The objective of structural adjustment is to improve the quality of agricultural products and to increase the profitability of agricultural activities.

Production totals for 1999, in addition to those given for grain, meat, and fishery products at the beginning of this report, include sugar, 84 million tons, down by 14.2 percent from 1998; oil seeds, 26 million tons, up by 12.4 percent; and fruits, 61 million tons, up by 11.9 percent. The planted area of vegetables reached 13.1 million hectares, an increase of 7 percent compared with 1998.

As agricultural structural adjustment continues in China, it is projected that grain production will be further reduced to 490 million tons in 2000. Major production reductions are planned for maize, spring wheat, and some poor-quality varieties of rice. The production of oil seeds, fruits, and vegetables will continue to grow rapidly in 2000. Based on a recent nationwide survey, it is projected that planted areas of oil seeds and vegetables will increase by 6.8 percent and 7.6 percent, respectively, in 2000. Negatively affected by economic policy and the poor performance of the sugar processing industry, the planted area of sugar cane will decrease by 21 percent this year. Meat production is projected to increase slightly to 60 million tons. To protect fishery resources and realize sustainable development in the fishery industry, over-fishing will be severely restricted. As a result, the production of fishery products is projected to decline slightly to 40 million tons in 2000.

Although China's foreign trade growth accelerated in 1999, its agricultural trade continued to decline. China's exports of foodstuffs and major livestock products totaled US$10.46 billion in 1999, down by 1.5 percent from 1998. Imports of these products totaled US$3.62 billion, down by 4.5 percent from 1998. Beverage and tobacco exports totaled US$771 million, down by 20.9 percent from 1998. Imports of these products totaled US$208 million, up by 16.1 percent from 1998. Exports of plant oil, animal fat, and wax totaled US$132 million, down by 57.1 percent from 1998. Imports of these products totaled US$1.37 billion, down by 8.3 percent from 1998. With the introduction of various export-promoting policies, the growth rate of exports has increased since the latter half of 1999, presaging a moderate recovery for agricultural trade in 2000. But China's agricultural exports will continue to be limited by the slow pace of quality improvements. On the other hand, imports of agricultural products are likely to increase as a result of new measures to liberalize trade.

Food and Agricultural Policy

After agricultural development in China entered a new stage characterized by a quantitatively balanced market, the objectives of agricultural policy shifted from increasing production to improving quality, expanding incomes, and promoting sustainable development. Recent policy developments in this regard include the following:

Agricultural Structural Adjustment Policy. This policy is designed to promote agricultural development in accordance with market forces and the natural resource endowments of each area. Structural adjustments include sector restructuring, quality improvements, and regional reallocation. Developing high-quality products is a special focus of the policy. Production of products in surplus, such as cotton, sugar cane and beet, tobacco, and some poor-quality grain products will be reduced. Animal husbandry development will be accelerated to make full use of plant products. A "zero growth" program in the fishing industry will be implemented to preserve natural resources and protect the environment. The development of an agri-processing industry will be strongly encouraged, especially in rural areas. This policy will enhance the productivity, profitability, and competitiveness of Chinese agriculture.

"Developing the West" Strategy. This is a group of policies aimed at accelerating development of Western China. The top priorities of this strategy are to promote infrastructure development, ecological and environmental protection, industrial structural adjustments, and science, technology, and education in the West. The implementation of this long-term strategy initiated in 1999 will greatly improve the agricultural and rural development environment in the West and increase the overall productivity of Chinese agriculture.

Reform of the Rural Taxation System. This policy's major objective is to unify and simplify rural taxation to reduce the financial burden on farmers. Many taxes and fees will be removed and a maximum aggregate tax rate of 7 percent will be enforced. The policy is being implemented on an experimental basis in 2000 in Anhui Province. Other experiments will be conducted in a few other counties of other provinces before the policy is implemented nationwide. Although the experiments have just begun, it can be projected with certainty that the implementation of this fundamental reform will not only reduce the burden on farmers, but also will greatly accelerate development of the agricultural and rural economy.

WTO-related Developments. China needs to reform its agricultural system and policies to bring them into compliance with WTO rules after accession. This will inevitably help to improve the efficiency and competitiveness of China's food and agricultural sector. While there are differing opinions about the extent to which agriculture will be affected by accession to the WTO, there is agreement that the impact will vary by sector. China's grain sector likely will decline in the face of strong competition from other countries, leading to lower grain self-sufficiency and rising grain imports to meet domestic demand. On the other hand, production and exports of hor-

ticultural and animal products are expected to expand as a result of trade liberalization.

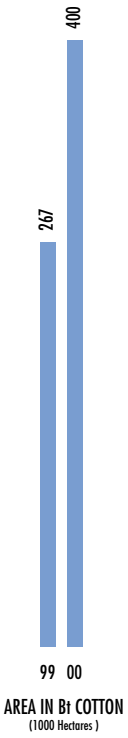
New Food System Technologies

Agricultural technology has progressed dramatically during the past 50 years in China. Because food shortages long dominated agricultural concerns in China, agricultural technology was mainly focused on increasing production. Technological advancements concentrated on developing and expanding high-yield varieties, developing rotation and multi-cropping systems, developing and introducing farm machinery, and using chemical fertilizers efficiently. To date, more than 5,000 new crop varieties have been developed.

The total power of farm machinery reached 440 million kilowatt hours in 1998. New technology is responsible for about 50 percent of the growth in China's agricultural production in recent years.

Although the development of such new technologies as biotechnology and digital information and communications systems is still at a preliminary stage in China, these technologies have played an important role in some fields:

- Remote sensing technology and geological information systems (GIS) have been used to survey and manage agricultural resources and control pollution.
- Computer and communications technologies are used in improving irrigation systems.
- An early warning system is in place to monitor China's food security situation.
- Some information systems, such as the Wheat Management System (WMS)—a computer system providing detailed guides and instructions for wheat production, have been developed and used in agricultural production.
- Agricultural market information networks developed by government and business are playing an important role in the industry.
- More than 10 million people in China had access to the Internet in early 2000, but only a small proportion were in rural areas.

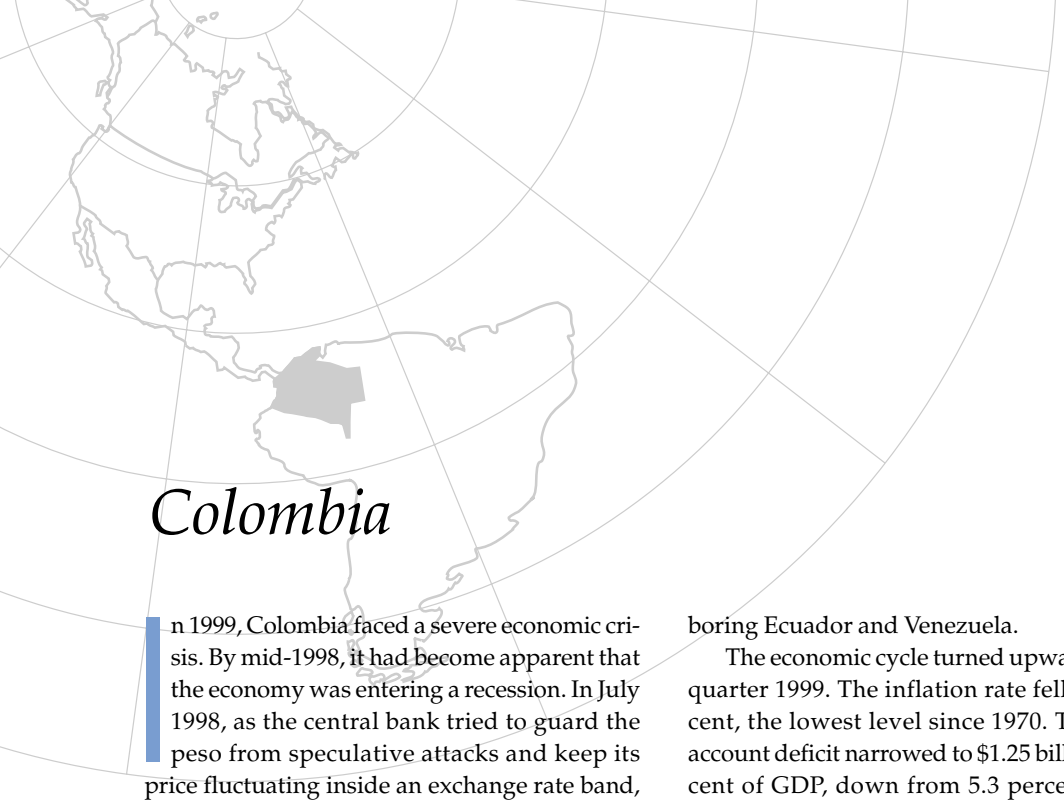


Some important progress has been made in the field of genetic engineering. A few genetically modified crops, such as pest-resistant cotton and some special varieties of vegetables, have been introduced in field production. Area in pest-resistant cotton (Bt) has expanded rapidly, reaching 400,000 hectares in 2000.

While the development of new technologies is key to agricultural development worldwide, it is even more crucial in China. With limited resources and a fast-growing population, food security will remain a challenge in China. Because new technologies promise to dramatically increase production, they will help China overcome resource constraints and realize lasting food security. In addition to increasing production, new technologies also will help improve the quality of agricultural products, a key objective of the structural adjustment policy. Furthermore, advanced information and communications technologies will improve the management of agricultural businesses and thus increase the efficiency and enhance the competitiveness of Chinese agriculture.

In recognition of the crucial role of new technologies, the Chinese government initiated a "revolution in agricultural science and technology" in 1996 to promote the development of new technologies. This program has the following objectives:

- To increase public investment in agricultural research and development with special emphasis on new technologies
- To reform the current agricultural research system to promote the initiatives of agricultural scientists and to make more efficient use of research funding
- To create a more efficient agricultural extension system to promote the use of new technologies in agricultural production, and
- To accelerate development of rural infrastructure, such as electric power supply systems and communications systems, to facilitate the spread of new technologies in rural areas



Colombia

In 1999, Colombia faced a severe economic crisis. By mid-1998, it had become apparent that the economy was entering a recession. In July 1998, as the central bank tried to guard the peso from speculative attacks and keep its price fluctuating inside an exchange rate band, interest rates climbed to 50 percent. The effect of this interest rate strategy was a rapid deterioration of bank loans. Delinquent loans increased from 12 percent at year-end 1997 to 20 percent by December 1999, threatening the health of financial institutions. The value of bank equity fell by 28 percent at the end of 1999. This deterioration was especially severe for public banks. The government had to bail out state-owned banks with a $1.7 billion capital infusion and issue $1 billion in credit to rescue nine private financial institutions. The final result of this banking crisis was a severe credit crunch.

At the same time, the newly inaugurated government initiated a plan to reduce fiscal imbalance. In 1998, the Ministry of Finance induced a slight reduction in public consumption (–0.7 percent) and a severe cut in public investment (–18.7 percent). This drop in demand, coupled with high interest rates, ignited a recession that went well into 1999.

GDP grew by a mere 0.5 percent in 1998 but plunged 5.2 percent in 1999, a record decline for the country. In 1999, the sectors that were most affected were housing (–20 percent), coffee (–20 percent), manufacturing (–11 percent), and banking (–10 percent). Agriculture (excluding coffee) was one of three sectors that showed positive growth rates (0.9 percent). The unemployment rate climbed to 20 percent, the highest in Latin America. The fall in economic activity was reduced by real devaluation of around 6.5 percent, which promoted exports and protected agriculture from foreign food imports despite severe economic crises in neighboring Ecuador and Venezuela.

The economic cycle turned upward in third-quarter 1999. The inflation rate fell to 9.2 percent, the lowest level since 1970. The current account deficit narrowed to $1.25 billion 1.5 percent of GDP, down from 5.3 percent in 1998. Nominal deposit interest rates tumbled from 35 percent at year-end 1998 to 10 percent in December 1999.

Forecasts for 2000 show a positive growth rate of about 3 percent, which is low by country and regional standards. Nonetheless, Colombia's policy management will not change abruptly to induce more growth because of the macroeconomic adjustment program Colombia negotiated with the IMF, which is fairly specific on goals and, informally, on policy orientation. This year inflation should not increase above 10 percent, and the fiscal deficit is being forecast at 3.6 percent of GDP. Total exports are expected to grow by 15 percent and nontraditional exports (those other than oil, coal, coffee, and ferronickel) by 8 percent.

Despite advances toward economic recovery, there is little confidence in the sustainability of growth in the longer term. Manufacturing production growth has been supported by only one sector (steel), and exports have increased mainly because of rising oil prices. Another important issue is the result of a negotiated peace process between two guerrilla groups, a paramilitary right wing group and the Colombian government. Political violence in Colombia has a 50-year history, but has increased substantially in the past three years. Kidnappings, armed combat, and terrorism also have increased.

Food Prices and Consumption

El Nino triggered a significant price increase for agricultural products in 1998. In 1999 and 2000,

the return of normal weather patterns, credit availability for certain products, and devaluation have increased supply and reduced prices. The economic recession also has contributed to lower food prices. Lack of demand has precipitated price reductions in processed goods such as vegetable oils, fats, sugar, and chocolate that are unprecedented in recent times. Slow economic recovery should proceed in 2000, but there will be no significant increase in domestic demand or prices. Colombia's CPI fell 0.02 percent in June 2000, the first negative change since 1986, for which a 0.7 percent drop in food prices is largely responsible. This downward trend could be reversed before the end of the year, but any food price increases in 2000 will almost surely be small.

Devaluation accelerated in 2000, discouraging legal and illegal imports from neighboring Ecuador and Venezuela and inducing domestic planting of commercial crops like rice, corn, soy, and sorghum, thus increasing their supply.

Recent data show a marked decline in per-capita consumption of fruits and vegetables in all major cities. While population in the five largest cities increased by 32 percent in the last ten years, consumption in kilos decreased by close to 30 percent for fruits and by 11 percent for vegetables. Expenditure on fruits and vegetables did not fall at the same rate, and, in some cases, increased. This reflects price increases over the last decade that have caused consumers to substitute some fruits and vegetables with other goods.

Food Processing and Marketing

Traditional distribution channels are still commonly used in food markets in Colombia. Nevertheless, changes are occurring that will eventually modify the way food is traded in the country.

The national agricultural and livestock exchange (BNA) increased its operations significantly in 1999 and 2000. It is also trading commodity futures and financial assets that are used to finance agricultural activities. For instance, it promoted the use of repurchase agreements on agricultural goods and the issuance of securities backed by cattle production. New products such as these have opened new markets for BNA, but it has not yet gained the confidence of large institutional investors and it does not have products that are within the reach of small investors.

On the retail end, changes include the entry of international supermarket chains and new distribution technologies slowly brought about by the injection of investment capital. Expectations for 2000 include the entrance of competitors such as a French supermarket chain and the merger of other large supermarket chains; this will probably lead to increased distribution efficiency.

A less publicized innovation that has reshaped agricultural marketing in the livestock industry is the introduction of auction mechanisms to traditional cattle markets, facilitating greater transparency in price formation. An undetermined but important portion of the cattle now traded in the country is sold in auctions. This will surely continue in 2000 and 2001.

Agricultural markets have been adjusting to international standards. In the milk sector, for example, a price-fixing mechanism in use since the 1980s has been changed. For years, farmers received 70 percent of the final price to consumers. Now, there are two markets that follow international conditions more closely. One of them sets farm prices by taking the international price and marking it up by a protection band. In the second market, surplus milk is sold to processors at the product price from the most competitive country so that the surplus can be processed and exported. Colombia currently uses New Zealand's price as a reference. Domestic pricing schemes that recognize international conditions are now used for coffee and cotton and will probably be implemented for corn.Through an Internet site and a monthly magazine, the Corporación Colombia Internacional, is improving its price information on commercial crops, especially fruits and vegetables.

Along with these developments, increased security concerns because of political unrest have eroded some of the distribution channels. Frequent confiscation of products and transport vehicles by the guerrillas have made highways unsafe and boosted transaction costs.

Agricultural Production and Trade

Agricultural sector output grew by 0.6 percent in 1998 and declined by 0.2 percent in 1999. The decline was attributable mainly to a substantial decrease in coffee production. Excluding coffee, agricultural production grew by 8.6 percent in 1999, according to the Ministry of Agriculture. The government forecasts that the sector will grow by 2.5 percentage points more than the GDP in 2000. Nevertheless, it seems clear that, barring unexpected adverse climate conditions, rural production will increase.

Industrial food production (excluding coffee milling) grew by a mere 1.6 percent in 1998, then

dipped by 6.7 percent in 1999. Government estimates show a 1 percent decline for 2000, although second-quarter surveys indicated that the sector would outperform these estimates, possibly obtaining a 1 percent increase.

Because of revaluation, there was a sharp reduction in planted area. For example, in 1992 34,000 hectares of cotton were planted while in 1999 the BNA estimated that only 9,300 hectares were planted. Rice and corn maintained their area, but traditional corn dropped from 280,000 hectares to 154,000 hectares, and sorghum from 109,000 to 39,000 hectares. The government expects production increases in 2000 in cotton, corn, soy, cocoa, potatoes, fruits, and vegetables. Milk and fishing are also expected to show production increases.

The continuous strengthening of the peso that started in 1991 and ended in 1999 led to increased food imports. In 1996, the value of imported food totaled $1.893 million. In 1999, because of the recession and weakened peso, the total fell to $1.477 million. The value of imported inputs for agriculture grew from $447 million in 1996, peaked at $481 million in 1998, and fell to $440 million in 1999. The stability of the dollar value of imported inputs shows that they are price and income inelastic.

Agriculture in Colombia continues to face challenges due to insecurity in farming areas, lower investment and lack of adequate production infrastructure. Agricultural imports of several items such as cereals and poultry feed inputs have continued to rise. In 1990, corn imports were negligible and Colombia was a self-sufficient producer, yet imports increased rapidly during the latter half of the 1990s to a peak of over 2 million tons in 1998. Imports now account for two-thirds of corn consumption. The Ministry of Agriculture expects to substitute new local output for at least 1 million tons of imports in 2000. Costs per ton of local production have dropped from $150 to $120, while imported corn has increased to $190 per ton. In 1990, cotton imports were valued at $8.9 million. By 1999, cotton imports reached $48.4 million. There are plans to substitute local production for a large portion of these imports.

Devaluation encouraged the export sector. According to the government statistical office, agricultural exports have increased as a percentage of total exports. In 1996, agricultural exports represented 9.8 percent of total exports, and in 1999 the share increased to 10.5 percent of total exports. While total exports grew at an average annual rate of 2.8 percent, agricultural exports grew at 5.1 percent. For 2000, exports are expected to increase, especially to Venezuela. In some cases, however, local producers are looking for new markets. For example, banana traders have increased exports to China.

Government authorities expected that Colombia would be declared free of foot and mouth disease by October 2000. This will make it possible to export meat that will probably be channeled to the Caribbean, the United States, and Venezuela. According to the private institution Fedegan (Federacion de Ganaderos de Colombia) an estimated 50,000 tons was ready to be sold abroad. These expectations induced a slight retention phase, which should increase livestock prices in 2000 and stabilize them in 2001. The meat price per kilogram is close to $.75.

Regarding international trade agreements, President Andrés Pastrana announced Colombia's interest in formally applying for entrance to NAFTA. This is seen by observers as a far-fetched proposal. Chile has been trying to enter NAFTA for more than four years without success. Trade within the Andean Community (Venezuela, Colombia, Ecuador, and Bolivia) regained momentum with Venezuelan and Ecuadorian economic stabilization.

In 2000, total annual production of coffee declined to 8.5 million bags from 16.1 million bags in 1992. Lower international prices, loss of competitiveness, and greater competition from robusta producers, especially Brazil, led to reduced profitability and planted area. The finances of the National Coffee Fund, which depend on export income, have been eroded. The fund carries out some commercial and research activities and buys most of the local crop. The National Coffee Growers Federation started a program to increase efficiency in production that should have long-term results. Frost that hit Brazil in July will produce a record price increase, but this temporary boost will not be captured by Colombian producers because of their low stock and production levels.

Food and Agricultural Policy

New agricultural policy is focused on encouraging "productive chains." By promoting cooperative agreements between agricultural suppliers, farmers, manufacturers, and distributors, the government hopes to create efficient production clusters in crops that offer clear competitive advantages. This is a significant change from previous policy, which created incentives for farm production, a single link in the chain. Eleven cooperative agreements have been completed so far in sectors such as cotton-textiles, dairy products, palm oil, poultry products, potatoes, chocolate, fruits and vegetables, and wood.

The concept of productive chains modifies the relationship between government and the private sector. Private agents agree on items such as price-fixing mechanisms, production volume, and quality improvements. These pacts are then presented to the government, and a new round of negotiations determines the state's role. Usually, the government sets up incentives along the chain, such as subsidies for rice storage, for the use of certified seeds, or for forestry projects (the Forestry Incentive Certificates). Chains allow agricultural producers to gain information on final prices and incentives and reduces conflict between links in the production chain. All participants identify major competitive problems and solve them together.

There are two other major new policy instruments: Proagro and Pran. Proagro is a program that selects and focuses resources on productive chains that show potential for competitiveness in foreign markets or that produce food for domestic consumption. Within Proagro, the Incentive to Rural Capitalization (ICR) program subsidizes 30 to 40 percent of the cost of specific investment projects and machinery. For forestry projects, the Forestry Incentive Certificate (CIF) covers an estimated 40 percent of the costs of the first four years of production.

Pran helps agricultural producers refinance bad loans and restore their creditworthiness. The state-owned second-tier bank Finagro buys delinquent loans from commercial banks and refinances them, adding a guarantee from the state-owned Agricultural Guarantee Fund. Although banks still perceive agricultural activities as risky, Pran has led to a large increase in loan disbursements (up by 68 percent as of June 2000), particularly in the cotton-textile sector.

Although bank financing seems adequate for these programs, the risk still exists that some activities will be curtailed because of the size of the national fiscal deficit.

New Food System Technologies

The Colombian government has taken a conservative stance toward introducing genetically modified seeds and products that it is expected to maintain over the short term. The National Agriculture Institute (Instituto Colombiano Agropecuario, ICA) is the organization in charge of the production, import, and use of these materials. Even though the ICA has responded positively to petitions from cotton and flower growers, implementation has been slow.

Columbia's hesitancy on GM issues can be explained by the signing of the Cartagena Protocol, which establishes some restrictions on the use of GM materials. In this sense, Colombia's position is similar to that of European countries that signed the Montreal Pact on biosafety. Nevertheless, state agency Corpoica has been a pioneer in developing a variety of GM tropical fruits in Colombia.

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Indonesia

A low inflation rate and positive GDP growth in 1999 signaled the start of economic recovery. The inflation rate dropped to 2 percent, compared with the record high of 77.6 percent in 1998, and GDP recorded positive growth of 0.23 percent after contracting by 13.2 percent in 1998. Inflation is projected to be about 4.8 percent in 2000 and to decline to 3 to 5 percent by 2004. Meanwhile, the economy is projected to grow by 3.8 percent in 2000 and reach the pre-crisis growth level of 6 to 7 percent by 2004. Another indication of economic recovery is a stable exchange rate, which has been supported by the flexible exchange rate policy adopted at the end of 1997, tight monetary policy, and expansive fiscal policy. These policies are expected to stabilize consumer prices and maintain the exchange rate at Rp6,500 to 7,500 per $US1 in the coming years.

Despite these positive signs, some sectors continued to record negative growth in 1999, such as mining (-0.11 percent), transportation and communications (-8.67 percent), and trade, hotels, and restaurants (-1.1 percent). Economic growth has been driven primarily by household and government consumption growth. Household and government consumption grew by 1.48 percent and 0.69 percent, respectively, in 1999. Investment recorded a decline of 4 percent in 1999, but is expected to rebound and grow by 2.4 percent in 2001 and reach an annual growth rate of 4.1 percent in 2004.

Food Prices and Consumption

High inflation together with the drastic contraction of economic activity at the peak of the economic crisis in 1998 has had severe consequences for the Indonesian people. The nominal value of monthly expenses for basic needs more than doubled from February 1996 to December 1998. The 1999 national census (SUSENAS) indicated that in 1998 about 24.2 percent of the country's population, or about 49.5 million people, had incomes under the poverty line, an increase of about 27 million people from the 1996 figure. The increase in poverty is consistent with the skyrocketing prices, especially for food commodities, during the same period. From February 1996 to December 1998, the annual average inflation rate was recorded at around 98.6 percent for the general index and 148.6 percent for food.

As prices of basic commodities stabilized in 1999, the poverty numbers declined. In February 1999, the number of Indonesians in poverty was estimated to have declined to about 47 million, with another sharp decline measured in August 1999 to about 37.5 million. Overall, 12 million people fewer people were living below the poverty level in August 1999 than in December 1998. In the same period, the number of urban poor dropped to 12.4 million, a 15.1 percent decline, while the number of rural poor fell to 25.1 million, a 20.2 percent decline. This improvement was almost certainly the result of deflating prices, especially for food commodities—which were down by 5.58 percent—and the steady decrease in the inflation rate for non-food items since March 1999. The inflation rate for the period from December 1998 to August 1999 was less than 3 percent. While inflation or deflation rates as measured by consumer price indices represent the urban pricing indicator, indices of prices paid by farmers for household consumer items reflect the rural pricing indicator. These indices in 14 of the 26 provinces tracked from February to July 1999 indicated declines averaging about 5.82 percent.

The above clearly suggests that the decreasing incidence of poverty recorded over the eight months to August 1999 was very much influ-

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(PERCENT CHANGE)

enced by deflating prices for food commodities. Another contributing factor may have been a slight increase in average per-capita expenditure (in nominal terms). The average per-capita nominal expenditure per month in 1996 was US$6.59 (Rp52,696). This number increased to US$13.83 (Rp110,601) in December 1998. It increased further to US$14.61 (Rp116,893) in February 1999 and decreased slightly to US$14.45 (Rp115,603) in August 1999. Given the large number of near poor whose living standard was marginally above the designated poverty line, a slight increase in expenditures would have had a substantial impact on poverty profiles.

The decline in income levels precipitated by the economic crisis changed the volume and pattern of household consumption. As incomes fell, many poor households had to change their diets and buy only the cheapest and most affordable foods. Decreased income levels also caused expenditure patterns to change, with more being spent on food and less on nonfood items, such as education and health. In some cases, the dramatic decline in income caused households to become so destitute they could hardly buy any food at all. Rural people in particular were found to have changed their diets, both in terms of quantity and quality, eating only two meals a day instead of three and buying corn and cassava instead of rice.

A situation such as this not only disrupts food security, but also hampers human development. This is evidenced in Indonesia by the growing incidence of malnutrition, especially in rural areas where the long drought and the crisis hit hard and resulted in crop failures. Obviously, children under five and women (particularly mothers) are the groups most vulnerable to malnutrition. Such poverty is a complex problem that cannot be alleviated simply by providing grants. Basic needs must be filled for food, clothing, and housing, while education, health care, and nutrition services must also be provided.

Food Processing and Marketing

In various parts of the country, food produced by using indigenous (traditional) technology is still readily available, but using this technology limits both the quantity and quality of output. For example, food produced this way does not satisfy food safety standards.

Because of the importance of processed food for promoting consumption diversity and industrial development as well as for exploiting the multiplier effect, the government has long worked to promote the food processing industry. Although to some extent the industry has been developing quite well, it is constrained by the lack of available raw materials. Indonesian agriculture thus far has been unable to provide a steady and adequate supply of raw materials both in terms of quantity and quality. The existing processing plants are operating at from 20 to 70 percent of capacity. Fruit processors, for example, currently are operating at 26 percent of the 826,337-ton installed capacity. Vegetable processors are operating at 28 percent of 169,089-ton capacity, sauces and ketchup processing at 66 percent of 199,667-ton capacity, and cassava processing at 21 percent of 2.1 million-ton processing capacity.

Nevertheless, food processing continues to attract domestic as well as foreign investment. For example, a total of about US$1.49 billion (Rp11,888.7 billion) in domestic investment was approved in 1999 compared with US$840 million (Rp6,711.8 billion) approved in 1998. Of the approved amount, the actual domestic investment made in 1999 was US$160 million (Rp1.3 trillion) in ten new projects. Foreign direct investment in food processing approved in 1999 as of September totaled US$632.8 million, compared with US$544.3 million for the same period in 1998. Total foreign direct investment implemented as of September 1999 was US$45.3 million.

Agricultural Production and Trade

In general, food production was relatively stable in 1999. Rice production (dried unhusked) reached an estimated 50.4 million tons, slightly above the 1998 level of 49.3 million tons. Soybean production increased slightly from 1.3 million tons in 1998 to 1.4 million tons in 1999. Corn and peanut production declined slightly to 9.2 million tons and 0.6 million tons, respectively, from 10.2 million tons and 0.69 million tons in 1998. Projected 2000 production totals for these four commodities—rice, corn, soybeans, and peanuts—are 50.4 million tons, 9.8 million tons, 1.3 million tons, and 0.64 million tons, respectively. For 2001, production of these commodities is expected to increase owing to good weather and the strengthened economy. Meat production in 1999 was 580,200 tons, down from 607,300 tons in 1998. Egg and milk production increased slightly from 621,200 tons and 375,400 tons, respectively, in 1998 to 699,900 tons and 384,300 tons in 1999. Both exports and imports of agricultural products were on the upswing in 1999, another encouraging sign for the national economy. The 1999 export volume for food crops and horticulture products as of July was

334,500 tons with a total value of US$51.75 million, which was lower than half the total 1998 export volume and value of 1.14 million tons and US$153.4 million. The import volume of food crops and horticulture products as of July 1999 had already reached 4.1 million tons with total value of US$1.29 billion, while the total 1998 import volume was 7.44 million tons valued at US$1.79 billion.

Food and Agricultural Policy

Indonesia's main food staple is rice. In fact, most people think of rice as a political as well as an economic commodity. This means that a rice shortage has both economic and political consequences. In the past, rice shortages have induced social unrest that in turn led to changes in the government.

At 135 kilograms per year, per-capita rice consumption in Indonesia is among the highest of any country in Asia. Due to population and income growth, especially from 1990 to 1996, rice consumption has continually risen while domestic rice production has held steady or declined because of limited resources. Consequently, minor weather disturbances severely impact rice production, which in turn means that a larger amount of rice must be imported. As a result of the prolonged drought in 1997 caused by El Nino, Indonesia had to import 5 million tons of rice in 1998.

On the other hand, good weather that leads to a bumper crop, such as happened in 1999, creates a different problem: a very low price during the peak harvesting months (February to April) that can be attributed to the rice cropping pattern. Typically, about 50 percent of Indonesian rice is harvested during these three months. The prevailing rice prices in most rice producing areas in mid-2000, for example, have been far below the floor price set by the government to guarantee adequate incomes for farmers. At the end of 1998, the government set regional floor prices. For the Java area, the floor price is US$.18 (Rp1,400) per kilogram (dried paddy). However, reports from regional areas indicated that prices in April 2000 had fallen as low as US$.10 (Rp800) per kilogram.

Another reason prices cannot be held above the floor price is because BULOG (the national logistics bureau) can no longer effectively intervene in the market as it has in the past. In previous years, BULOG was able to purchase rice from farmers with the support of special credit from Bank Indonesia (the central bank). Under a new law, Bank Indonesia can no longer support BULOG with special liquidity credit. In other words, the law prohibits Bank Indonesia from providing any special credit programs to BULOG or any other government agency.

As part of its effort to prevent further rice price decline, the government imposed an import tariff on rice of as much as US$.05 (Rp430) per kilogram effective in January 2000. In addition, the government allocated US$87.5 million (Rp700 billion) to support BULOG domestic rice purchases. Because of a lengthy disbursement procedure, however, the BULOG funds have had very little impact so far on rice prices in most areas. There is some concern that this year's extremely low prices will discourage farmers from growing rice in the future.

Another measure the government implemented to stem falling rice prices is requiring that all rice imports go through "red line" procedures at customs, which means that imported rice must now be physically verified for volume, type, and quality as specified in the import document. This is the practice with other imported commodities. Previously, imported rice went through the "green line" and was not physically verified, a practice misused by some importers who would falsify import documents.

New Food System Technologies

Production Technology. Because of the need to boost domestic rice production to meet growing demand, agricultural research from the 1970s through the early 1990s focused largely on making advances in this area. Various high-yield rice varieties have been developed with shorter plant maturation that make it possible to plant two to three crops a year. Over the last two decades, the use of modern inputs such as high-yield varieties, chemical fertilizers, and pesticides has become common practice for rice farmers. In addition, various tools and machines suitable to local conditions have been developed. This effort has significantly increased Indonesian rice production and resulted in the country achieving rice self-sufficiency in 1984.

To further promote rice production while also safeguarding the environment, integrated pest management and biological pest control have been promoted in recent years. Direct seeding has been initiated in limited areas as a way to cope with labor shortages. Increased industrial development in urban areas has attracted labor from rural areas, causing labor shortages in recent years in some rice production centers, particularly Java. Improved harvesting technology is continually being developed that aims to conserve labor and reduce harvest loss, which is still relatively high at

between 5 and 10 percent.

Technology development for rice production has been driven by the government while that for other food commodities, such as horticulture products, has been undertaken by both government and the private sector. In addition to rice, the government has given special attention to soybeans and corn. Various hybrid varieties have been developed, some of which have been adopted by farmers. Almost every year in the last decade, government research institutions have released new varieties of various crops.

New rice varieties possess the following qualities: low tillering capacity with eight to ten panicles per hill, 200 to 250 grains per panicle, height of 90 to 100 centimeters, a sturdy stem, a vigorous root system, multiple disease and insect resistance, 110- to 130-day growth cycle, and 13- to 15-ton per hectare yield potential. More than 20 new rice varieties for lowland areas that are ready to harvest in 110 to 130 days have been released since 1987. Different rice varieties have been developed for the 20.7 million hectares in the upland areas that in general are characterized by low fertility, with mostly acidic soil high in exchangeable aluminum and undulating, steeply slopping topography. Improved cultivars have been developed that are tolerant of some insects and diseases and aluminum toxicity, and that have short maturity cycles. Some of the improved upland rice varieties released between 1976 and 1995 have yields of two to four tons per hectare and maturity cycles of from 105 to 130 days.

Technology development for other agricultural crops, such as horticulture products and ornamental plants, has been driven primarily by the private sector. Tissue culture has been used widely for reproducing bananas and ornamental plants, such as orchids.

In addition to introducing new varieties, cultivation systems have been modified by the use of alley cropping and no-tillage methods. With alley cropping, food crops are grown between rows of fast-growing, densely planted, nitrogen-fixing trees. The trees are allowed to grow for a period of time, then they are pruned, and the cuttings are incorporated into the soil in the alley as green leaf manure. Some of the most frequently mentioned advantages of this cropping system are added nutrients from the tree cuttings, aluminum detoxification of the soil from organic compounds in green leaves, livestock feed from the green leaves, soil erosion prevention when alley crop trees are planted on contour lines of sloping land, and low input soil management. The no-tillage system saves time, fuel, and labor and increases soil water infiltration. Leaving and maintaining crop residues on the soil surface shades the soil, decreases soil water evaporation, slows surface runoff, and increases water infiltration, simultaneously conserving soil and water.

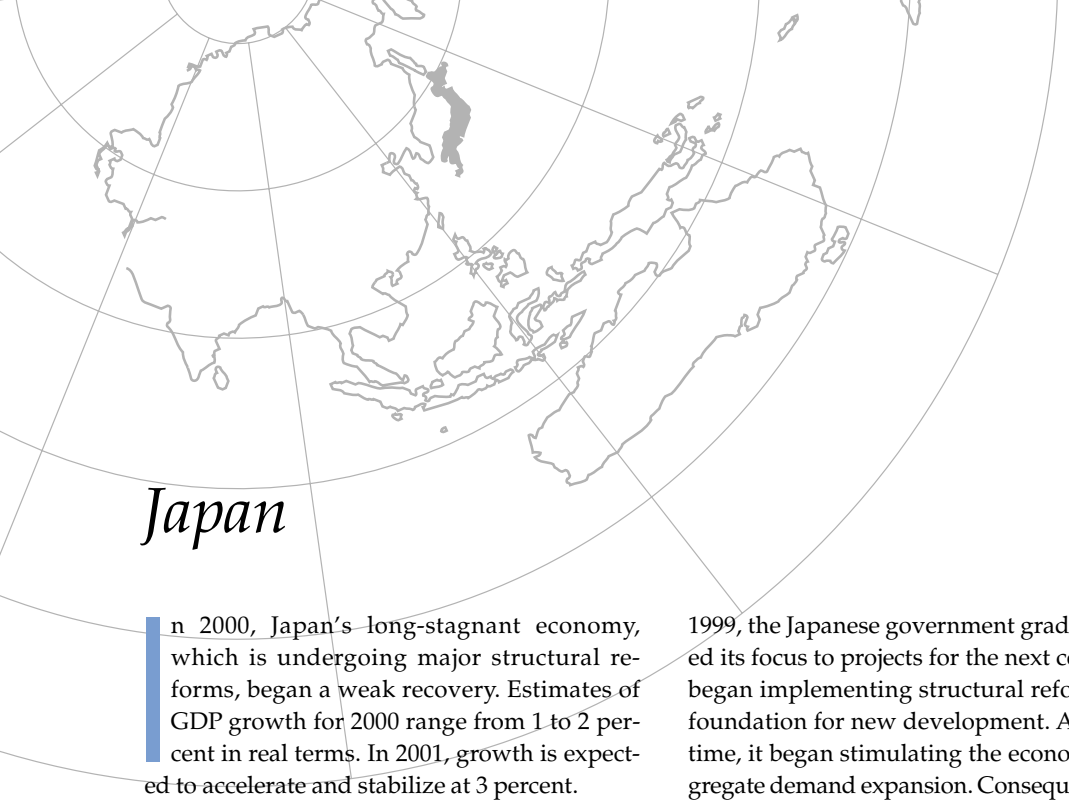
The use of biotechnology in agricultural production has been limited to research activities in government institutions. This research has been aimed primarily at improving the genetic potential of existing varieties. Other active areas of biotech research include developing a gene bank to preserve existing plant varieties.

Processing Technology. A wide range of food processing technology is currently in use, from very simple, traditional methods used by small enterprises and home industries to modern methods employed by major national and multinational corporations. This reflects the willingness of Indonesian consumers to consume both traditionally processed foods and foods processed with more modern methods. Although the popularity of modern supermarkets and superstores offering modern processed foods has grown enormously in major cities in recent years, traditional markets offering traditionally processed foods still attract many customers.

Consumer awareness of food safety issues has increased, especially among middle- and upper-income people. This prompted growing consumer demand for HACCP (Hazard Analysis Critical Control Point) application, although compliance with the HACCP system has not been mandated by the government.

Marketing Technology. Marketing technology employed in the country is in line with the characteristics of the two types of existing markets. Products such as vegetables and fruits sold in traditional markets are in general transported from farms in rural areas without any special treatment. The assumption is that these products will be sold within a day, but in fact a lot of waste is created as the products quickly deteriorate. In addition, marketing support facilities in traditional markets are rudimentary and far from providing a safe food environment.

On the other hand, products sold in modern supermarkets are transported and stored using modern technology, such as cold storage, that maintain quality and prolong shelf-life.



Japan

In 2000, Japan's long-stagnant economy, which is undergoing major structural reforms, began a weak recovery. Estimates of GDP growth for 2000 range from 1 to 2 percent in real terms. In 2001, growth is expected to accelerate and stabilize at 3 percent.

The environmental and health concerns of consumers, as well as cost reductions sought by both producers and distributors, are the driving forces behind food system change. In food-related infrastructure, the emphasis is shifting from supply-side concerns to consumer issues, such as food safety inspections.

Following enactment of the Basic Law on Food, Agriculture and Rural Areas, the Japanese government set food self-sufficiency targets in March 2000 (with 2010 as the target year) of 45 percent of total calorie supply, 30 percent of grains, and 62 percent of grains for staple foods. It will be very difficult for Japan to achieve these targets in light of both the continuous decline in the food self-sufficiency ratio in the past half century and the country's commitments to trade liberalization.

To narrow the communications gap between urban and rural areas, to promote regional agriculture, and to improve social services for the elderly, the government and local agricultural cooperatives have initiated improvements to the information technology (IT) infrastructure in rural areas. Yet, the penetration rate of IT facilities is still low, requiring further efforts. In the future, the Internet and other relevant technologies could play a critical role in revitalizing agriculture and rural areas.

Macroeconomic Situation and Outlook

From 1997 through 1998, the Japanese economy experienced its most serious recession in the half century since the end of World War II. In FY 1999, the Japanese government gradually shifted its focus to projects for the next century and began implementing structural reforms as the foundation for new development. At the same time, it began stimulating the economy via aggregate demand expansion. Consequently, in FY 1999, the Japanese economy achieved positive real GDP growth of 0.5 percent, essentially attaining the government's target.

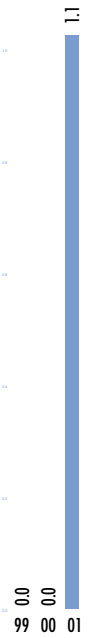
Although the Japanese economy still faces challenges, it is clearly moving toward recovery. The government has called FY 2000 "the year of self-sustaining economic recovery," reflecting its aim to put the economy on a self-sustained recovery path led by private demand.

The economic outlook released by the government in December 1999 forecast real GDP growth of 1 percent for FY 2000, but more recent predictions by private research institutes and international organizations call for a higher growth rate. With weak recovery underway, the primary policy issue in Japan in the short term will be sustaining the recovery and promoting structural reforms.

The wholesale price index fell by 1 percent in FY 1999, reflecting weakened domestic and international markets. The CPI also declined, falling by 0.5 percent in 1999 because of the stagnate economy. Prices will be stable in 2000 and 2001 reflecting a weak recovery of consumer demand.

Food Prices and Consumption

In 1999, real food expenditures per person in nonfarm households were about the same as in the previous year (down by 0.1 percent), while expenditures overall were down because of the sluggish economy. Consumer prices were stable owing to declining incomes influenced by the sluggish economy. Under these circumstances,



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(PERCENT CHANGE)

prices for "optional foods" (such as gourmet foods, prepared foods, and food in restaurants) declined indicating a responsiveness to changing economic conditions.

In general, however, food expenditures have virtually reached the saturation point compared with several decades ago, as reflected in the increases in the consumption of prepared foods and food eaten away from home. Factors behind these changes include increases in women's labor force participation and single-member households, an aging society, and diversified lifestyles. More than a quarter of total food expenditures in 1998 were for prepared foods and food eaten away from home.

Accordingly, the conventional view that food is best prepared at home has changed, and consumers show less resistance to simplifying cooking by using prepared and prepackaged foods. Dietary patterns have been influenced accordingly.

With dietary requirements now so well provided for, there is growing concern in Japan over excess intake and unbalanced diets. Another problem is food loss or waste, which is observed at every stage from production to consumption. This waste includes raw food in the production process, expired food at the distribution stage, and food processing residues and leftovers at eateries and in homes. Reduction of food waste is important not only in terms of effective use of resources in a country characterized by very low food self-sufficiency, but also in terms of reducing both waste disposal costs and harmful effects on the environment caused by such waste.

Spending on food is expected to continue to increase in FY2000 with the overall recovery of consumption. Retail food prices are expected to remain stable.

Food Processing and Marketing

The food supply system from farmers to food industries indicates that the agriculture and fisheries production totaled ¥16.2 trillion in 1995, which translated into ¥80.4 trillion in the final consumption stage after value was gradually added from the processing stage to the distribution stage. In more specific terms, 20 percent of the added value in the food system was perishable foods, 50 percent processed foods, and 30 percent meals eaten away from home. While the percentage of perishable foods has been declining, the percentages of processed foods and food eaten away from home have been increasing.

To make food distribution faster and more efficient, the government is promoting electronic commerce by making full use of information technologies such as the Internet and establishing the optimal distribution system from production to consumption.

Both government and industry are working together to reduce damage to the environment caused by food industry operations. The Law on Recycling Containers and Packaging, which became fully effective in April 2000, covers small- and medium-sized enterprises previously exempt from mandatory recycling of containers and packaging in both paper and plastic. Ongoing efforts include educating businesses about how to comply with the law, developing recycling technology and capacity, and increasing the demand for recycled products.

In response to increasing food safety awareness among consumers, food distributors and processors have taken measures to secure product safety. As of the end of December 1999, 36 implementation plans had been certified under the Act of Implementation Support of the HACCP (Hazard Analysis and Critical Control Point) Techniques enacted in July 1998. To secure food safety, it is necessary to establish an integrated system from production to consumption by enhancing cooperation among relevant business parties and facilitating information exchange.

Agricultural Production and Trade

As measured by the production index, agricultural production increased by about 2 percent in FY 1999 after declining since 1996. Rice supply and demand has been on a declining trend and heading toward a recovery of balance, thanks to a large production adjustment and emergency government measures to stabilize supply and demand.

Wheat and soybeans vary considerably in terms of yield and quality, and a system to supply homogenous products in a large lot in response to consumers' needs has not been fully established. Efficient production of feed crops is encouraged through field grouping and by promoting close cooperation between crop and livestock farmers. Wheat will be distributed through the private sector in 2000 via a bidding process that began in September 1999. The bidding results reflect consumer preferences and allow prices for different varieties to be set accordingly. The subsidy system for soybeans is under review and will be changed into a mechanism that reflects a market evaluation in the producer's net price.

Vegetable prices have been fluctuating widely. They settled down after sharp increases for fall and winter varieties in 1998, went up again

in summer 1999, and then began a declining trend because of the increased supply after September.

For the 1999 mandarin orange crop, fruit thinning was promoted in response to an anticipated supply and demand imbalance caused by a predicted good harvest and the large existing stock of juice. However, poor quality caused by bad weather, mainly in western Japan, resulted in lower prices. Appropriate measures, such as using fresh fruit in juice processing, are continuing to maintain a balance between supply and demand.

After a period of steady growth, the demand for livestock products has remained stable in recent years. Domestic production has been declining along with the decreasing number of livestock being raised each year. Livestock product imports from the United States and other countries were up in 1998 and 1999. These include pork imports, which declined sharply in 1997 because of a ban on imports of pork from Chinese Taipei following an outbreak of foot and mouth disease there. Pork imports recovered in 1999 and 2000, but are still below 1996 levels.

Overall agricultural production in FY 2000 will remain at nearly the same level as in FY 1999. Rice yield and area are expected to remain unchanged. Wheat and barley production is expected to increase mainly because of improved yield. Soybean yield is expected to increase slightly as a result of planted area increase. The output of vegetables will also increase slightly. Fruit production will significantly decline because of the decreased mandarin orange yield. Overall, production of livestock products will remain stable in FY 2000 as the production of broilers and pork decline slightly and beef production increases slightly while milk and egg production remains the same.

Imports of agricultural products of almost all kinds increased by 4.5 percent in 1999 as a result of the currency appreciation in late 1998, which lowered import prices. In FY 2000, imports of food and agricultural products are expected to increase slightly. Imports of wheat, vegetables, and fruits are expected to remain the same, while rice imports are expected to increase because of minimum access targets. Total meat imports are projected to increase steadily. As for livestock products, beef, chicken, and dairy products are expected to increase slightly while pork imports are expected to remain flat.

Food and Agricultural Policies

The Basic Law on Food, Agriculture and Rural Areas, promulgated and enacted on July 16, 1999, provides the future direction for food policy. It specifies four objectives:

- Securing a stable food supply,
- Fulfilling the multifunctionality of agriculture,
- Promoting sustainable development of agriculture, and
- Promoting development of rural areas so that public understanding and support can be obtained from all walks of life.

In the basic plan developed in March 2000 following enactment of the basic law, a new food self-sufficiency ratio target was established for 2010. The food self-sufficiency ratio in Japan declined sharply from 1965 to 1998, falling from 73 to 40 percent on a calorie supply basis and 62 to 27 percent on a grain basis. The new targets (45 percent of calorie supply and 30 percent of grains) are expected to be difficult to achieve.

In 1998, retail food prices in Tokyo were 20 to 30 percent higher than in other major foreign cities. Factors contributing to this price differential are observed at every stage from production to processing to distribution. Further efforts must be made by producers and distributors to reduce overall costs in agriculture and related industries.

In response to growing demands for improved and standardized labeling of food products, the revised Japanese Agricultural Standards (JAS) law was enacted in July 1999. It mandates such food labeling requirements as country of origin for any perishable foods as well as the establishment of a system for inspecting, certifying, and labeling organic foods.

The labeling of genetically modified organisms (GMOs) has been under review by the Council on Food Labeling. After considering consumer demands, the current situation at the production and distribution stages, and global trends, the council issued its report in August 1999. Following the required review by the JAS Research Committee and a one-year moratorium period, GMO labeling is scheduled to begin in April 2001.

Each country has dealt individually with the subject of GMO labeling. At the global level, the CODEX (globally recognized standards) Committee has been discussing the issue. With its own stance on the issue decided, Japan plans to actively participant in the global discussions.

New Food System Technologies

In the postwar era, technological development increased productivity and added higher value to agricultural products. Advances that greatly enhanced production include mechanized and

integrated systems for rice-cropping, vegetable grafting techniques, apical meristem culture, and artificial insemination of livestock.

In November 1999, a report establishing basic targets for R&D for agriculture, forestry, and fisheries was published by the government. The report sets forth a plan for research with a primary focus on technologies to support farming operations, such as through productivity and management improvements, and technologies to develop innovative agricultural techniques, such as genome sequencing and environmental research. For effective implementation of this plan, Japan must improve the relevant research and extension systems and establish specific R&D targets and strategies.

Extension activities play an important role in technology transfer from research institutions to farms. Facilitating communications between producers and R&D institutes makes researchers more responsive to sophisticated technological and management needs. A subject of great concern to farmers requiring prompt and concerted efforts by both the public and private sectors is the viability of land-extensive operations.

For industrial development using biotechnology, it is important to aggressively promote basic and fundamental research, such as genome sequencing, and to encourage technological development for practical use. R&D of genetic modification technologies should be carried out with full consideration of the relevant safety and environmental issues and at the same time public understanding should be encouraged.

Japan's information technology (IT) activities are comparable to those in the United States in terms of production capability of IT-related equipment. However, the IT revolution's potential for accelerating economic growth and improving productivity has not yet been realized in Japan. In particular, Japan lags behind the United States in the development of software. While Japan leads the United States in the fields of animated cartoons and game software, Japanese society has not yet fully appreciated the value of these industries. To fully realize the productivity benefits of the IT revolution, Japan needs to make radical structural changes, from its educational system to its administrative organizations and corporate governance.

Promoting the IT revolution to improve productivity throughout the economy is imperative for the revitalization of the Japanese economy and for the realization of a Japanese knowledge-based society. The three keys to achieving a Japanese renaissance are realizing the potential of IT, environmental conservation, and responding appropriately to the aging of the society. Although Japan is facing extremely harsh fiscal conditions, it has massive savings that far exceed the fiscal deficit.

To narrow the information gap between urban and rural areas, to promote regional agriculture, and to improve social services for the elderly, the national and local governments and agricultural cooperatives have taken the initiative to improve IT infrastructure in rural areas. Yet, the rate of penetration of IT in rural areas is still low, requiring further efforts. Just over one-fourth (25.6 percent) of all Japanese farmers own computers but only 21.3 percent of this group use their computers for farm management and only 25.7 percent are connected to the Internet. The Internet and other relevant communications technologies could play a critical role in future development of agriculture and rural areas.

Korea

Although several indicators show that Korea has overcome its economic crisis, many factors remain that could cause difficulties. As trade and investment liberalization proceed, farming conditions could worsen while consumers benefit from lower food costs. Changes in food marketing have increased competition and favored the survival of large retailers. Korea continues efforts to maintain food self-sufficiency and to stabilize agricultural production.

Although Korean scientists, including agronomists, have been working to develop transgenic crops for more than a decade, the status of biotechnology still lags behind that of developed countries. Therefore, Korean R&D policy may be redirected away from basic technologies toward applied or practical technologies. The most pressing technological needs in Korea are for biotech measures to enable identification of genetically modified organisms (GMOs) and to establish labeling systems.

Macroeconomic Situation and Outlook

After contracting by 5.8 percent in 1998, the Korean economy grew by 10.2 percent in 1999 and maintained a strong growth trend into the new millennium. In mid-2000, many experts revised their estimates of the economic growth rate expected for the year from 5.5 to 8.6 percent. Consumer prices rose by only 1.4 percent during 1999, versus 7.5 percent in 1998, and are expected to increase by only 2.4 percent in 2000. The balance of payments recorded a US$25 billion surplus during 1999, which is projected to shrink to US$8.6 billion in 2000. Per-capita income in 1999 recovered from the previous year's US$6,742 to US$8,581 and is expected to increase further to US$9,027 in 2000.

Foreign direct investment increased to US$15.5 billion in 1999 compared with US$8.9 billion in 1998. As a result, foreign exchange reserves reached US$74.1 billion in December 1999, up from US$48.5 billion in 1998 and US$8.9 billion in 1997. Most of the increase in foreign exchange reserves is the result of trade surpluses and foreign direct investment rather than indebtedness to the IMF or other financial institutions. In 1999, Korean exports totaled US$145.5 billion, surpassing imports by US$28.7 billion. Korea maintained its status as a net creditor in 1999, with total foreign credit of US$146.5 billion and total debt of US$136.8 billion.

As a result of rapid economic growth, the unemployment rate fell from 7.9 percent in 1998 to 4.8 percent in 1999. As interest rates (rate of return on three-year bonds) stabilized at 8.86 percent in 1999, down from 14.99 percent in 1998, the foreign exchange rate also fell to 1,145.5 Won per US$1 in December 1999 from 1,425.2 Won per US$1 in December 1998. The comprehensive stock market index also reflected the favorable economic conditions, recovering from 408.6 points in 1998 to 806.8 in 1999.

Nevertheless, it would be too optimistic to say that Korea has completely recovered from its economic crisis and IMF bailout. Stumbling blocks for the economy still remain, both internally and externally. Internally, Korea suffers from instability in some areas. For example, Korean stock markets, including the KOSDAQ, an index for Internet and technology stocks (like the NASDAQ in the US), are fluctuating widely, rising by more than 90 percent in 1999 and then falling by 40 percent during March and April 2000. The finances of many Korean corporations also remain fragile. Total corporate debt exceeded US$550 billion in 1999, 1.4 times GDP.

Expectations for inflation and increasing real estate prices and housing rental rates are other troublesome factors. Uneven income distribution and concentrated wealth also threaten the stability of the economy. Income disparity among earning groups widened in 1999, with the share earned by the top 20 percent rising by 0.4 percent while that of the bottom 20 percent fell by 0.1 percent.

Soaring oil prices lead the list of troublesome external factors. If higher oil prices result in cost-push inflation, "bubbles" prevailing in the economy may burst, possibly bringing about another financial crisis. Since hot money from abroad may also destabilize the economy, many foreign financial institutions are paying close attention to these financial flows and their impact on the Korean economy.

Despite the potential negative factors, the Korean economy is expected to grow by 8.6 percent in 2000, with unemployment stabilizing at 4 percent and modest inflation of 2.4 percent. Korea keeps a close watch on exchange rate fluctuations, knowing that exchange rates can get out of line with economic fundamentals.

Food Prices and Consumption

The future agenda set at the Millennium Round of WTO negotiations could spell another painful era for Korean agriculture, although consumers could benefit from lower food costs and greater access to a variety of food products from abroad. Korea has faithfully implemented most of its commitments in the Uruguay Round (UR) Agreement on Agriculture. The most significant outstanding issue now is liberalization of the rice market.

In 1999, the food price index increased by 2.8 percent compared with an 8.7 percent increase in 1998. Considering that the overall CPI increased by only 0.8 percent in 1999, food price increases exceeded general price increases but the rising trend is rapidly subsiding. Despite the recovering demand for food, stabilized exchange and interest rates helped check rising food prices. Food prices are expected to stay low in 2000 owing to expanding food imports and general price stability.

Farm-gate agricultural prices increased by 9.7 percent in 1999. Grain and rice prices increased by 5.1 and 5.2 percent, respectively, while meat prices increased by 18.9 percent. Prices for domestic beef increased by as much as 39.7 percent while prices for imported beef rose by only 0.9 percent. Pork prices increased by 11.5 percent but chicken prices fell by 18.8 percent. Since livestock prices correlate with feed grain prices that fluctuate with exchange rates, meat prices are likely to be stable in 2000. The complete liberalization of beef imports effective January 2001 may help beef prices stay low.

In 1999, total rice consumption in Korea slightly decreased to 5.1 million tons from 5.2 million tons in 1998. The decreasing trend in overall rice consumption is verified by the steady decline in per-capita rice consumption, from 99.2 kilograms in 1998 to 96.9 kilograms in 1999. Meat consumption increased by 15.5 percent in 1999 and totaled 1.51 million tons. The increasing trend of meat consumption is likely to continue in the near future, with an increase to 1.59 million tons in 2000. More specifically, beef consumption is expected to increase by 8.2 percent and total 406,000 tons with per-capita consumption at 8.6 kilograms, largely owing to the quantity of imported product. Pork consumption also increased in 1999 to 839,000 tons from 809,000 tons in 1998 and chicken consumption to 340,000 tons from 323,000 tons. However, the outlook for meat consumption may be affected by exogenous variables such as the outbreak of foot and mouth disease (FMD) in cows in April 2000.

Food Processing and Marketing

Demand for processed food, which had been on a steady rise along with rising incomes and lifestyle changes, stagnated during the recent economic crisis but resumed its upward trend in 1999. The increase in processed food imports has also helped boost demand. However, the Korean food processing industry cannot meet the increasing demand because of its structural limitations. Processors import most input materials and must compete with imported processed food. Some large corporations that have invested in this sector seem to have a competitive advantage to some extent but many small and medium businesses have gradually lost their competitiveness.

The focus of government policies concerning the food processing industry has changed from promoting new investments to supporting management and encouraging efficiencies in existing facilities. In the 2000 budget, the Ministry of Agriculture and Forestry (MAF) cut funds for constructing new facilities while enhancing support for operations and guidance. The MAF also reduced funds for developing programs for well-known brands of agricultural products by 25 percent but maintained the budget for management training in the food processing industry.

There are various types of marketing patterns for agricultural products in Korea. Owing to Korea's small size and the diversity of production and consumption, marketing channels are complex, consisting of five to six stages. Spot-sale patterns vary by product. Quasi-wholesale markets still play an important role, weakening efficiency and transparency at the wholesale stage. Retail stores are small-scale and overcrowded, resulting in abnormally high margins.

Until a few years ago, the government favored large wholesale markets where sellers and retailers are brought together. In 1996, when foreign companies were first permitted to participate in the agricultural wholesale and retail markets, traditional marketing patterns began to change, some producers began to pursue direct marketing to reduce the intermediaries' margins. Large-scale retailers that offer one-stop shopping are becoming very popular with producers as well as consumers. In 2000, the government budget for direct marketing facilities and distribution centers increased by more than 70 percent while budgets for constructing wholesale markets and marketing complexes were curtailed.

Agricultural marketing systems are expected to change in the following ways:

- Two methods of production that reflect the trend toward a buyer-oriented paradigm will emerge—on-order systems and producer-organization systems.
- As a marketing unit grows, assemblers in producing areas will specialize in field storage, farmers' marketing clubs, or packing and distribution centers.
- Even in producer organizations, marketing departments tend to be independent with separate accounting systems.

Agricultural Production and Trade

Rice production increased slightly in 1999 to 5.3 million tons from 5.1 million tons in 1998 and is expected to remain stable at 5.15 million tons in 2000. The changes in production can largely be accounted for changes in yield rather than changes in cultivated area. Rice yield grew from 4.82 tons per hectare in 1998 to 4.94 tons in 1999 but is expected to drop to 4.88 tons in 2000. As a result, the rice self-sufficiency rate increased to 99.8 percent in 1999 from 96.4 percent in 1998 and is projected to fall to 97.6 percent in 2000.

Beef production dropped to 227,000 tons in 1999 from 264,000 tons in 1998 and a further drop to 199,000 tons is expected in 2000. Pork production increased to 757,000 tons from 749,000 tons during the same period. Pork production had been projected to grow to 769,000 tons in 2000 until the outbreak of FMD in cows made it harder to predict near-term production levels for beef and pork. However, chicken production has increased continuously from 245,000 tons in 1998 to 279,000 tons in 1999 and a projected 290,000 tons in 2000.

Fruit production trends are somewhat complicated. As imports of agricultural products and fruit began increasing in the mid-1980s, Korean farmers had few production alternatives but they soon found that the prices of some fruits were higher than others. Prices for grapes, for example, have become more attractive than apples, and more recently oriental pear prices have become attractive. That's why cultivated area for apples has dropped since the mid-1990s while the area devoted to grapes has increased. A free trade agreement with Chile, which could be reached in the near future, would affect production of fruits such as grapes, apples, and kiwi.

Apple production is expected to increase slightly to 494,000 tons in 2000 from 490,000 tons in 1999, largely because of the increase in yield from 1.58 tons to 1.6 tons per hectare. However, production might drop due to the decrease in cultivated area. Grape production should increase in 2000 to 498,000 tons from 470,000 tons in 1999 since both area cultivated and yield are expected to be higher. Production of oriental pears should also expand in 2000 for the same reasons. Pear production is expected to be 321,000 tons in 2000 up from 259,000 tons in 1999.

In 1999, agricultural imports increased to US$7.4 billion from US$6.4 billion in 1998, demonstrating how much economic conditions have improved. Grain imports dropped to US$1.52 billion in 1999 compared with US$1.64 billion in 1998. Imports of pulses also decreased from US$394 million to US$331 million while oil seed imports increased to US$99.9 million from US$78.6 million. Imports of fruits, vegetables, beef, pork, and processed food also increased, reflecting consumers' income growth in 1999. Imports' rising trend should continue in 2000 as the economy continues to grow and trade is further liberalized according to Korea's WTO commitments. However, feed grain imports may drop, at least in the short run, owing to the FMD outbreak.

Exports of agricultural products totaled US$1.68 billion in 1999, up by 0.7 percent from the 1998 total. Among other things, pork exports increased to 102,000 tons or US$340 million, 8.7

FOOD PRICES
(PERCENT CHANGE)

percent higher than in 1998. Most agricultural exports—about 60 percent—were destined for Japan. In 1999, exports to Russia and Hong Kong decreased while those to China, Japan, and the United States increased. The agricultural export target for 2000 was US$2.1 billion until the outbreak of FMD when the target was revised downward to US$1.8 billion.

Food and Agricultural Policy

Recently, Korea has experienced widespread changes in agricultural production, consumption, and trade, but it still aims to maintain food security or self-sufficiency of its staple food, rice. Measures taken to reach this policy target include investments in infrastructure to maintain stable rice production and the introduction of early warning systems to track the fluctuations in world grain markets. Additionally, current policy emphasizes improved sanitation for livestock and accelerated reform of agricultural marketing systems. Other high priorities include expanding agricultural exports, fostering human resource development, enhancing the rural income safety net, and managing GMOs.

The major focus of food and agricultural policy in 2000 is agricultural policy reform and stabilization of farm management. Reflecting these priorities, the MAF increased investment and loans for agricultural marketing by 60 percent and disaster relief funds by 5.4 percent. It also increased the budget for establishing credit guarantee funds for farmers by 460 percent from the 1999 level. Overall, the MAF budget increased by 5.1 percent, from 7.8 trillion Won (US$ 6.5 billion) in 1999 to 8.2 trillion Won (US$ 6.83 billion) in 2000. However, funds to support production facilities were cut by 3.8 percent and for purchasing machinery by 6.4 percent.

SHARE OF INTERNET USE, 1999

SOURCE : *Situation of Information in the Korean Life*, Korean Center for Information and Culture, 1999

New Food System Technologies

New food system technologies in Korea can be classified into two areas: production technology and marketing technology. Traditionally, the former has been considered more important than the latter, but rapidly spreading electronic technologies such as computerization and Internet services have accelerated development of marketing technology.

The basic goal of Korea's agricultural R&D policy is to develop technologies to promote competitiveness in the global economy. To do this, the MAF aims to develop high-tech or practical technology that will lower production costs or improve product quality in the medium term. It also endeavors to create practical technology needed for market development. MAF's long-term goal is to transform Korean agriculture into a comprehensive biotech industry with competitive advantages. This entails improving plants and animals by adopting transgenic technology, automating agricultural production, introducing new materials or functions, and achieving sustainable and knowledge-based agriculture. Agricultural R&D investment amounted to only 1.04 percent of GDP in 1998 while investment in national R&D as a whole was 2.5 percent. The MAF plans to increase agricultural R&D investment to 2 percent of GDP, or almost US$400 million, by 2004.

The application of biotechnology in the agricultural sector can be measured by the adoption rates for GMOs or transgenic crops. As of 1998, there were only five principal transgenic crops grown in eight countries, five of which were industrialized countries (the United States, Canada, Australia, Spain, and France), and three of which were developing countries (Argentina, Mexico, and South Africa). Moreover, the five principal transgenic crops were soybeans, corn, cotton, canola, and potatoes. Despite enormous investment by Japan and the Japanese-US consortium to support decoding of the rice genome, work in this area is still ongoing.

Korea's Institute of Agricultural Science and Technology (IAST) has been working on transgenic crop research since 1991. It has developed eight transgenic crops under experimental conditions: herbicide-tolerant rice, insect-resistant Chinese cabbage, virus-resistant cabbage, virus-resistant red pepper, blood pressure—reducing tomato, virus-resistant cucumber, Omega 3 adipose—promoting wild sesame, and virus-resistant potato. In cooperation with Korean universities and Cornell University in the United States, the IAST has become involved in the project to decode the rice genome, which is supposed to be completed by the end of 2000.

Nevertheless, most agricultural technology experts describe the current state of biotechnology in Korea as relatively primitive. It is expected that future Korean R&D policy will focus on developing practical technology rather than basic biotechnology. Recently, the Korean government also has been confronted with strong demand from consumer organizations for a labeling system for GMOs in conjunction with the adoption in January 2000 of the Cartagena Protocol on Biosafety of the United Nations Environmental Program (UNEP). Thus, Korea enacted a law that will take effect in 2001 requiring labeling of all GMOs.

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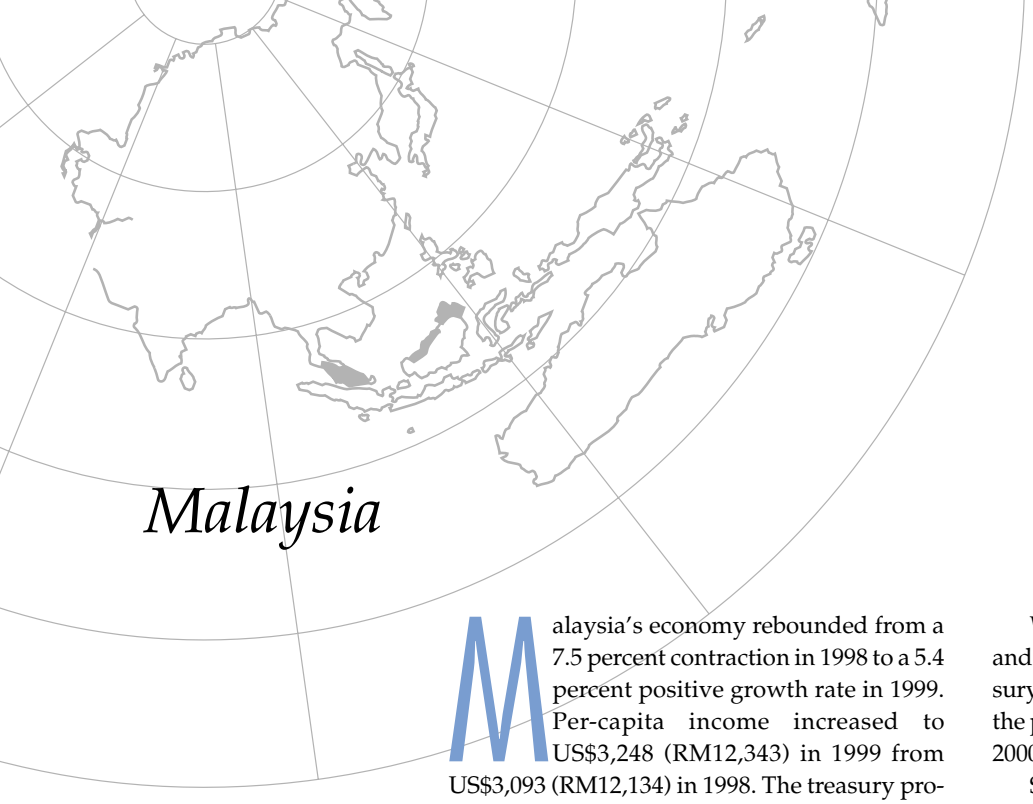


Malaysia

Malaysia's economy rebounded from a 7.5 percent contraction in 1998 to a 5.4 percent positive growth rate in 1999. Per-capita income increased to US$3,248 (RM12,343) in 1999 from US$3,093 (RM12,134) in 1998. The treasury projects GDP will grow by 5.8 percent in 2000 and by 6 percent in 2001. Unemployment should remain at just under 3 percent while consumer prices are expected to increase by 3.2 percent annually through 2001. Food costs, which make up almost 35 percent of the CPI, rose by only 4.6 percent in 1999 after a sharp 8.9 percent increase in 1998.

Agricultural production increased by 3.9 percent in 1999, largely because of a 27 percent increase in palm oil production. Production of saw logs, fish, and livestock also increased in 1999, but rubber and cocoa production declined by 13 and 7 percent, respectively, as high production costs and persistent low returns continue to lead to a shift to oil palm wherever feasible. Growth in the agricultural sector is expected to slow to 2 percent in 2000, mainly because of the slower increase in palm oil production (2.7 percent) as yields will be affected by the downturn in the biological yield cycle of the oil palm trees.

Macroeconomic Situation and Outlook

The rebound in the Malaysian economy in 1999 resulted from both external and domestic developments. World economic growth increased by 3 percent in 1999. Aggregate domestic demand expanded by 1.6 percent. On the supply side, the output of the manufacturing, construction, agriculture, and services sectors increased in 1999 by 13.5 percent, 5.6 percent, 3.9 percent, and 12.9 percent, respectively. Only the mining sector contracted (by 4 percent).

With a more favorable external environment and a strengthening domestic economy, the treasury has projected GDP growth sufficient to raise the per-capita income to US$3,393 (RM12,893) in 2000 and US$3,541 (RM13,456) in 2001.

Stability of the ringgit, excess capacity in the economy, and lower commodity prices led to moderate price increases in 1999. Inflation rose by 2.8 percent, while the CPI, excluding food, rose by 1.6 percent. Low inflation in Malaysia's trading partner countries helped keep Malaysia's inflation rate low. As domestic economic activity gains momentum and structural constraints in the food sector grow, a narrowing output gap should usher in a slightly higher inflation rate of 3.2 percent in 2000 and 2001.

The producer price index (PPI) declined by 3.3 percent in 1999, compared with a 10.7 percent increase in 1998. The reduction largely resulted from declining costs for most items, particularly animal and vegetable oils and fats, which more than offset higher costs for fuels, lubricants, and related materials caused by increases in world oil prices.

While the labor market is expected to tighten with the recovery in domestic economic activities, the unemployment rate will remain low at 2.9 percent in 2000 (down from 3 percent in 1999). Labor mobility from surplus to deficit areas should keep wage pressure in check. In addition, labor productivity has improved because of reorganizations undertaken during the economic downturn. Wage increases are not expected to exceed productivity growth and wage-push inflation also is unlikely.

Food Prices and Consumption

The CPI for food, which accounts for 34.9 percent of the CPI basket, increased by 4.6 percent

in 1999 compared with 8.9 percent in 1998. The increase in CPI in 1999 was largely caused by supply shortages, which led to price increases for most essential items, both domestic and imported, except sugar, oils and fats, and meat. The price increase was most pronounced for fish, at 10.8 percent, followed by bread and cereals (4.2 percent), milk and eggs (3.7 percent), coffee and tea (3.6 percent), and fruits and vegetables (3.5 percent). The price of meat declined marginally, falling by 0.3 percent.

As inflationary pressures arose mainly from supply constraints in the food sector, the government continued with measures to encourage domestic food production and diversify sources of food imports. Recognizing that financing is a major issue constraining the sector, the government has increased budget allocations for the Fund for Food (3F) twice since 1997 to a total of US$263.16 million (RM1 billion) from the original US$157.89 million (RM600 million). The government also continues to liberalize food import policy and provide new land for food production activities. Import duties on 43 categories of food products were abolished in 1999. The government also has provided exemptions from import duties for specific equipment and inputs that are used directly in food production.

Food Processing and Marketing

Processed food production expanded by 5.7 percent in 1999, with notable increases in the production of sugar (12.1 percent), milled flour (10.8 percent), processed fish (10.2 percent), biscuits (8.9 percent), and cocoa products (4.1 percent). Beverage production increased by 13.2 percent.

For food safety management certification, Malaysia is adopting the Hazard Analysis and Critical Control Points (HACCP) system on a voluntary basis in all food industry sectors from farm to plate. The system is based on Codex Alimentarious (under WTO) requirements and is recognized internationally. However, HACCP adoption is low among small to medium-sized industries (SMIs) and local hawkers. Therefore, the Ministry of Health is also focusing on Good Manufacturing Practice (GMP), basic food safety guidelines that are a prerequisite for HACCP adoption in these sectors.

Malaysia is also currently planning to introduce nutrition labeling for all food products sold locally. The National Consumer Council has suggested, but does not yet require, labeling for all genetically engineered food products.

Agricultural Production and Trade

Agricultural production increased by 3.9 percent in 1999, primarily because of a marked increase in palm oil production, which rose by 26.8 percent to 10.6 million tons. Palm oil accounted for 31.9 percent of agricultural value-added production in 1999. An upturn in the biological yield cycle for oil palm trees as well as an increase in mature area raised the output of palm oil. The production of saw logs, fish, and livestock also increased by 1.2 percent, 5.1 percent, and 4.2 percent, respectively, but this was not sufficient to offset the decline in the production of rubber (–13.5 percent) and cocoa (–7.2 percent). The rubber industry continued to be affected by depressed prices, labor shortages, and a reduction in cultivated area. Cocoa production also continued its downtrend; cultivated area declined as land in cocoa is converted to other crops, particularly oil palm.

Growth in the agricultural sector is expected to slow to 2 percent in 2000, mainly because of a slower increase in palm oil production (2.7 percent) since yields will be affected by the downturn in the biological yield cycle. While rubber and cocoa production are projected to decline further during the year, the production of saw logs is forecast to increase by 3.3 percent in response to expected higher external demand. The contribution of the agricultural sector to Malaysian economic growth in 2000 and 2001 is projected to be 11.6 percent and 11.1 percent, respectively.

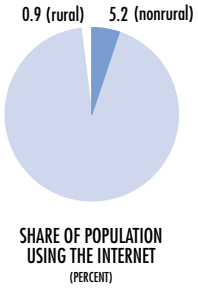
Export earnings from agriculture are forecast to decline by 8.5 percent in 2000, mainly because of lower export earnings from palm oil. Palm oil prices are expected to average US$329 (RM1,250) per ton as the global supply of vegetable oils is expected to remain ample.

Exports of food products—feed, vegetables and fruits, rice, meat, live animals, coffee and tea, dairy, sugar, fish, cereals and other foods—are expected to grow by 1.4 percent, as demand from the region, especially the ASEAN countries, Korea and Chinese Taipei, should improve in tandem with the recovery of these economies. In 2001, with the continued recovery of external demand, food exports are expected to increase by about 1.6 percent. Malaysian food imports—based on the assumption of an exchange rate of RM3.80 per US$1, population growth of 2.3 percent per year, and income growth of 5.8 percent in 2000 and 6 percent in 2001—are projected to increase by 8.5 percent in 2000 and 9.8 percent in 2001. A stable exchange rate, rising incomes, and population growth will result in stronger food demand.

FOOD PRICES
(PERCENT CHANGE)

Food and Agricultural Policy

The performance of the food and agricultural sector up to 2010 will be guided by the Third National Agricultural Policy (NAP3), which has a dual strategy. The first is aimed at addressing increasingly scarce resources, including land and raw materials, and making them available to the agro-forestry sector. This approach views agriculture and forestry as mutually compatible and complementary, thereby providing scope for joint development. The second is the product-based approach, which complements cluster-based agro-industrial development as identified in the Second Industrial Master Plan (IMP2) 1996–2005. Its aim is to strengthen both inter- and intra-sector linkages, including the development and expansion of intermediate and supporting industries.



SHARE OF POPULATION USING THE INTERNET
(PERCENT)

Based on NAP3, value-added production in the food sector is projected to grow by 3.8 percent per year from 1999 to 2010. Better performance is expected from vegetables, fruits, livestock, and fishery products. The share of food products in the agricultural GDP is expected to increase from 26.2 percent in 1995 to 32.3 percent in 2010. The contribution of value-added industrial crops, which include palm oil, rubber, cocoa, and forestry products, is expected to grow from RM11.5 billion (US$3.03 billion) in 1999 to RM13.3 billion (US$3.5 billion) in 2010. However, the industrial crop's share of agricultural GDP is projected to decline from 71 percent to 57.9 percent over the same period because of decreased contributions from rubber and saw logs.

New Food System Technologies

Policy guidance for technological development in the Malaysian food system is provided by the Third National Agricultural Policy (NAP3), the Second Industrial Master Plan (IMP2), and Industrial Technology Development (ITD). New technologies are needed for saving labor, improving yields and cost competitiveness, improving quality, developing new products, increasing processing efficiency, keeping up with changing consumer habits and demands, making marketing and distribution systems more efficient, and reducing environmental impacts. To encourage creation and adoption of new technologies, Malaysia promotes full use of existing technologies and improvements to imported technologies as well as the generation of indigenous technology.

In terms of R&D spending, Malaysia still lags behind developed countries. In 1998, Malaysia's R&D expenditures were estimated at 0.62 percent of GDP, which is below the acceptable norm of 1 percent.

In food production, plant breeding continues to provide a valuable technique for producing new plant varieties by incorporating desirable characteristics for many fruits such as durian, papaya, pineapple, and citrus as well as for grains (rice and maize). New planting technologies have been applied to cocoa, oil palm, and grain. An aeroponics system has been used commercially for vegetables. New or improved mechanization technologies have been developed for capital-labor substitution. Biological pest control is currently being used for many crops. For example, black ants are being used to control cocoa and rice plant diseases. Cost effective and sustainable agricultural practices such as the use of Rhizobacteria and Micorhizae as a bioenhancer and a biofertilizer are used for legumes, oil palm, cocoa, fruits, and vegetables. Precision farming technology has been applied to commercial production of mushrooms and poultry. Plant tissue culture has been successfully applied to orchids and bananas.

Agri-biotech products now available include microorganisms for fermentation of many products, tissue culture plantlets, DNA markers, and antibodies. The finished products include new microbial strains for local fermented food products, improved plant materials, diagnostic tools, vaccines and DNA fingerprinting, new food ingredients, modified palm oil, oleochemicals, pharmaceuticals, nutraceuticals, and feed or feed supplements.

In the food processing realm, there is a distinct dichotomy in technological levels. Large-scale multinationals, which produce agricultural chemicals and manufactured food products and constitute 10 percent of the industry, use high-tech and foreign technology. On the other hand, most local food processors have small-scale operations using low-level technology.

Despite the achievements noted above, Malaysian technological development suffers from the following weaknesses:

- Linkages with industry are essentially informal, and joint or collaborative R&D is still negligible. Closer coordination with the private sector is needed to generate more R&D projects with commercial potential.
- SMIs continue to be hampered by a lack of technology and poor production techniques and processes.
- Public sector institutions have spent significantly more on R&D than the private sector has. SMIs, which dominate the agro-food

tech structure, are less able to finance expensive R&D programs and therefore rely on such public sector organizations as universities and research institutions.

- R&D manpower, a crucial element in the technological advancement effort, has not keep pace with the increasing demand for highly trained knowledge-based scientific personnel. In 1998, Malaysia had only seven researchers engaged in R&D per 10,000 labor force participants.
- Commercial applications of R&D output are limited, partly because of a lack of intellectual property rights legislation.

Mexico

During 1999, the Mexican economy improved significantly despite uncertainty in the international economy caused by such events as the financial crisis in Brazil and rising interest rates in the United States. Rising international oil prices and economic growth in the United States contributed to expansion of the Mexican economy. Real GDP expanded by 3.7 percent, surpassing the target growth rate of 3 percent. Private consumption, investment, and exports were the major internal factors contributing to this better-than-expected economic performance.

Most manufacturing sectors performed remarkably well in 1999, continuing an upward trend initiated in the second half of 1995. The public sector economic deficit was P52.5 billion (US$ 5.49 billion or about 1.3 percent of GDP).

Consumer prices increased by 12.3 percent, below expectations. The unemployment rate fell to 2.51 percent, the lowest rate registered in the last decade. The recovery in international oil prices (from US$10.16 per barrel in 1998 to US$15.60 per barrel in 1999) allowed an increase of 39.1 percent in the total value of Mexican oil exports, while non-oil exports grew by 14.9 percent.

The Mexican banking system was strengthened with the creation in December 1998 of the Savings Protection Institute (IPAB). IPAB established an intervention and resolution framework for distressed banks and a process for managing assets acquired by the Savings Protection Fund (FOBAPROA). In June 1999, the Mexican financial authorities ensured predictable external financing through 2000 to guard against volatility in international capital markets. With a stand-by arrangement, the federal government (Secretaría de Hacienda y Crédito Público [SHCP]) secured a financial package supported by several financial institutions and the US government amounting to US$16.9 billion as a component of its strategy to achieve a smooth changeover in administrations in December 2000.

Mexico continues to open its economy to international competition and reduce government intervention in national markets. Important developments in 1999 include the trade agreement between Mexico and the EU and the decision to close the state company CONASUPO after a substantial reduction in its market role was achieved in the previous five years.

Mexico signed a Free Trade Agreement with the EU in March 2000. Its objective is to diversify Mexican trade flows and to increase foreign investment between both parties. In the agricultural sector, customs duties will be eliminated over a period not to exceed ten years. Mexico achieved immediate market access under preferential conditions for important export products such as coffee, tequila, beer, orange juice, flowers, honey, canned tropical fruits, asparagus, and melon. In addition, medium-term access was granted for other fruits and vegetables. Mexico granted the EU free access to trade in such products as alcoholic beverages (including wines) and olive oil. Highly sensitive products for both parties—such as cereals, dairy products, meat, and sugar—were not included in the agreement, but will be further reviewed after three years. Mexico established as main negotiation principles market access reciprocity, export subsidy elimination, and agreement on sanitary and phytosanitary measures to facilitate trade.

Food Prices and Consumption

Liberalization of agricultural markets has forced Mexican producers to align their prices with external prices, mainly in the context of NAFTA.

During 1999, agricultural producer prices rose by 10.5 percent and livestock product prices increased by 5.5 percent. Prices were affected by the general drop in international prices of agricultural commodities. For processed food, producer prices showed a 16.5 percent increase that resulted in a 6.9 percent increase at the consumer level.

In 2000, there is no government intervention to control prices of any food or agricultural product. Previous price-control programs were eliminated in the 1990s. Until 1998, CONASUPO was in charge of implementing market price supports for maize and dry beans. It also paid subsidies for maize tortillas and intervened in the import and distribution markets for milk powder. With the closure of CONASUPO in 1999, the private sector now purchases maize and dry beans directly from farmers. The private sector and LICONSA (the agency in charge of social programs for distributing milk) are directly importing milk powder. ASERCA (Apoyos y Servicios a la Comercialización Agropecuaria) grants marketing support for basic grains in regions where harvest concentration and crop commercialization problems exist.

Low-income families are supported through special food-subsidy programs, such as free breakfast for children attending public elementary schools, a free milk program for children, and free tortillas for families in poor areas. In 1997, the social welfare program PROGRESA was launched and is gradually replacing food assistance programs with income transfers.

Agricultural Production and Trade

During 1999, the processed food industry accounted for 24.8 percent of the manufacturing sector and had a GDP value amounting to US$23.1 billion. The food and beverages industry grew by 5.1 percent in real terms, while the agricultural sector grew by 3.5 percent in real terms and the agricultural GDP reached US$21.9 billion.

Production of basic grains in the spring/summer 1999 season declined by 2.8 percent compared with the same period a year earlier. Preliminary estimates for autumn/winter 1999–2000 predict good performance, with production for ten basic grains expected to increase by 11.4 percent. Wheat production is expected to be up by 12.7 percent, maize by 21 percent, sorghum by 10.1 percent, and rice by 4.8 percent.

Sugar production rose by 4.4 percent in 1999–2000 as average yields increased compared with the previous harvest. Fruit production is expected to grow by 5.5 percent and vegetable production to decrease by 6 percent. Coffee production in 1999–2000 is expected to grow by 12 percent and exports will reach 4.4 million bags (60 kilograms each).

The livestock sector and poultry, meat, and egg production grew by 7.8 and 9.9 percent, respectively, pig meat and beef production increased by 3 and 0.7 percent, respectively, and milk production grew by 6.1 percent.

Agrifood's trade deficit decreased by 33 percent in 1999 to a total of US$1.2 billion. The value of agricultural exports reached US$4 billion in 1999, up by 8.9 percent over 1998. There were significant increases in exports of vegetables and fresh products (up by 17.1 percent), melon and watermelon (up by 73.4 percent), chick peas (up by 38.9 percent), and cattle (up by 57.7 percent).

Exports of processed food grew by 9.4 percent in 1999 to US$3.3 billion, with the largest increases achieved for cocoa butter (79.3 percent), frozen strawberries (70.3 percent), alcohol extracts (54.5 percent), and beer (17.1 percent).

During 1999, imports of agricultural products accounted for US$8.5 billion, a 1.5 percent decline from 1998. Drybeans, cotton seeds, and soybeans registered decreases in value terms of 44.9, 36.7, and 9 percent, respectively.

Imports of processed food grew by 6.1 percent and amounted to US$4.1 billion. Imports of soybean flour, butter, and wines registered increases of 169.9, 24.4, and 16.8 percent, respectively. This expansion was in response to greater economic activity and increased domestic demand.

Food and Agricultural Policy

Agricultural policies are oriented toward raising producer income, keeping production output growth ahead of population growth, strengthening the agricultural trade balance, reducing regional differences in productivity, and contributing to rural poverty alleviation and natural resource conservation. The principal government programs are PROCAMPO, Marketing Support for Grains, the Alliance for Agriculture, and the Temporary Employment Program.

The PROCAMPO program disburses direct payments per hectare to eligible farmers to help them adapt to the structural adjustments caused by agricultural reforms. To be eligible for PROCAMPO payments, land must have been cultivated with maize, beans, wheat, sorghum, rice, soybeans, safflower, cotton, or barley in any

crop season over the three-year period prior to August 1993. In 1999, PROCAMPO distributed US$1 billion to 2.9 million producers accounting for 13.9 million hectares of land.

The Alliance for Agriculture, which was initiated in 1996, is demand driven and administered at the local level with producer and state government participation. The program is aimed at helping producers invest in and apply new technologies on their farms. Special attention is given to rural development projects in poor areas.

The Alliance for Agriculture increases the impact of public expenditures since for every peso allocated by the federal government, state governments and producers invest two pesos. In 1999, the Alliance's budget increased by 3.9 percent in real terms and benefited about 3.9 million producers. Objectives of the main Alliance programs include the following:

- Modernize irrigation systems, allowing for more efficient use of fertilizers, water, and energy.
- Improve seeds and introduce new varieties of maize and dry beans.
- Support producers in acquiring or repairing tractors.
- Expand planted area in tropical products such as coffee, rubber, and oil palm in regions with production potential.
- Support livestock forage production, genetic improvement of the herd, and investment in related infrastructure and equipment.
- Support training and extension, which is provided by the private sector. Producers are granted funds to hire firms or professionals of their own choosing.
- Support poverty alleviation programs, which operate in extremely poor regions and include off-farm activities. Special attention is given to women, young people, and indigenous people.
- Promote technology transfer by creating a Fundaciones Produce in each state, which supports producer investment in adaptive research and technological transfer to bring the best practices and most appropriate technologies to the region.

Under the Temporary Employment Program, created to relieve structural problems in rural employment, workers are paid to work on rehabilitating and improving productive and social infrastructure. In 1999, budget expenditures for this program rose by 14.5 percent in real terms and employed 1 million temporary workers.

New Food System Technologies

Promoting technological innovation in the agrifood system—for poverty alleviation and resource conservation—has been a major federal policy objective since 1995. Crop research also has benefited from increased private sector involvement, with large national and multinational companies leading the way.

In 1999, under the Alliance for Agriculture program, the federal government and state governments supported the administration of 650 agricultural research projects and the transfer of 420 technological packages in response to producer requests (the Alliance for Agriculture is a demand-driven program). Technological programs for major crops and livestock products were adapted to meet specific agronomic conditions at the regional level. Under a competitive grants program, universities and research institutes took active roles in carrying out these projects.

During the past five years, the Fundaciones Produce in each state have validated and passed on new technologies to enhance productivity and help farmers conserve natural resources. This technology has helped to increase yields and exploit comparative advantages.

Major recent developments by sector include:

Grains. Improved cereal varieties and hybrids have been introduced that offer increased yields as well as better tolerance of plagues and/or adverse weather conditions, particularly on small farms. From 1996 to 1998, these varieties were planted on more than 1.5 million hectares. Sustainable practices, such as zero or minimum tillage and the use of organic fertilizers and green manures, have been promoted. Twenty-five years of research by CIMMYT (Centro Internacional de Mejoramiento de Maíz y Trigo) and INIFAP (Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias) resulted in 26 maize varieties and hybrids of high protein quality maize (QPM) that have enhanced nutritional characteristics. Great progress also has been made in developing biofertilizers based on the use of bacteria and mushrooms.

Fruits and Vegetables. The focus over the last five years has been on applying precision agriculture techniques to increase yields and decrease the need for environmentally harmful chemicals. From 1996 to 1998, modern ferti-irrigation systems were installed on 288,500 hectares. Research also has focused on developing and promoting higher-quality varieties with a longer shelf-life.

Tropical Crops. Technological innovations have been disseminated in the poverty-stricken tropical

areas in the south and southeast to promote increased yields of oil palm, rubber, coffee, and cocoa. Area planted with improved varieties of these crops expanded by 250,000 hectares from 1996 to 1998.

Beef and Milk. Technological innovations aimed at enhancing productivity per animal and per hectare include improved forage varieties and genetically improved cattle to raise fertility, increase birth rates, and increase the daily weight gain for cattle. In the dairy industry, recent developments are oriented toward increasing the quality of dairy livestock through breeding bulls, artificial insemination, and genetically improved double utility heifers. Farm mechanization has also been advanced.

New Zealand

The election of a Liberal government in late 1999 signaled a reversal in the trend toward a smaller, less intrusive government in New Zealand. The Liberal government, which campaigned on a promise to raise taxes, replaced a National government, which was dedicated to reducing the power of government. This political reversal could mean considerable changes for New Zealand's food sector through mid-2002.

In a positive initiative, the new government wants to increase education funding, with an emphasis on science and technology. However, the government also sees a need to change existing labor laws, which would make it more difficult for businesses to hire and fire employees. In addition, the government stands ready to oppose advanced technologies, such as genetic modification, because of possible harm to the environment and the food chain. A weak New Zealand dollar, declining business confidence, the steady flow of corporate offices to new offshore homes, and a moribund share market add up to a weak overall environment for the food industry.

In the international arena, New Zealand is actively seeking free trade agreements (FTAs) with a number of countries, including Singapore. The government is also investigating possible FTAs with Chile and the United States. An FTA with the United States, in particular, would greatly benefit the dairy and forestry sectors. In addition, numerous market access issues are being addressed bilaterally.

Food Prices and Consumption

Food and fiber commodity prices have taken a battering over the past 12 months. Dairy product prices are expected to continue to be weak into 2000. Wool prices are expected to remain flat, but beef and sheepmeat prices are forecast to recover in the near term.

Most indicators suggest that the world economy has begun a slow recovery. As that continues into 2000–01, New Zealand commodity prices are expected to begin to stabilize and recover as well.

Food prices will be most affected by overall inflation and the strength of the New Zealand dollar. The current account deficit continues to be a significant concern to both government and business. The New Zealand dollar remained at about NZ$2.10 per US$1 for the first six months of 2000, well below the summer 1999 rate of NZ$1.79. Because of New Zealand's dependence on imported food, the weaker dollar will continue to force up food prices, with increases probably surpassing the overall rate of inflation.

In addition to the inflationary pressure related to the weak New Zealand dollar, increases in food prices will also reflect increased inspection and labeling expenses. For example, a significant part of the draft Australia—New Zealand Food Standards Code, released in March 2000, deals with labeling. The code, to be enacted in late 2000, stipulates product content and labeling requirements for all food imported into New Zealand and Australia. The costs of meeting these new standards will be passed on to the consumer. If the standards are not met, products normally imported into New Zealand will no longer be available.

Food Processing and Marketing

The food processing industry in New Zealand is subject to the same trends affecting other developed countries—falling commodity prices, vertical integration, increases in average farm and orchard sizes, and changing rural communities.

The New Zealand food industry's value chain also is evolving like that of its international counterparts. For example, New Zealand exporters are dealing with fewer and larger retailers, especially in the United Kingdom. The number of steps in the value chain is decreasing, as retailers vertically integrate with wholesale purchasers and seek to deal directly with suppliers. There is increasing demand for tracing the supply chain of products back to the farm, orchard, or even the animal of production.

Within New Zealand, significant concentration in supply chain management and processing continues. In the kiwifruit sector, for example, five supply chain managers now handle about 90 percent of the kiwifruit crop from packing house to port. Dairy processing company mergers over the past 25 years have resulted in a decrease in the number of dairy cooperatives from 75 to the current eight. Meat company mergers mean that four large companies now process 60 percent of total meat production for human consumption.

The significance of concentration to the food industry cannot be underestimated. Because of New Zealand's distance from major markets, logistical and marketing scale is a vital competitive component. This was recently underlined with an agreement between the New Zealand Dairy Board and Bonlac Foods in Australia. By combining the Dairy Board with an Australian consumer product and food service business, both companies are better positioned to respond to increasing pressure from rapidly expanding global competitors.

Agricultural Production and Trade

Factors that significantly affected the food industry during the past 18 months include the following: the Asian financial crisis, the Russian financial crisis, weakness in the Brazilian economy, depreciation of the New Zealand dollar, and two seasons of drought. These factors dampened the overall performance of New Zealand's economy during 1999 and through the first half of 2000. Since the majority of exports from New Zealand are commodities, however, the weaker dollar has increased the competitiveness of products such as meat and dairy products. For example, over the 12 months to mid-2001, meat and wool exports are forecast to grow by 4 percent and dairy exports are expected to be up by 2 percent. The weaker dollar also will help exports of horticultural products, with the total value of horticultural exports expected to increase by 6 percent by mid-2001.

New Zealand's medium-term economic prospects are clouded by the country's continuing current account deficit. Despite fiscal improvements and better export prospects, food industry watchers believe the economy is at risk from both a more interventionist government and high private sector external debt. As a result, Standard and Poor's expects New Zealand's high current account deficit to persist. A record current account deficit of 8 percent of GDP was recorded for the year to December 1999. Five years earlier, it was just 1 percent of GDP.

Business confidence declined during the first half of 2000, reaching a historical low in June. As promised before the elections, the new government raised personal income taxes in April. This tax increase, when combined with rising interest rates, higher employer-funded health insurance charges, and the revival of unions, accounts for the decline in business confidence, a trend which is expected to persist in the near term.

Food and Agricultural Policy

Producer boards figure in the industries that account for about 90 percent of New Zealand's agricultural and horticultural exports. Consequently, the status of producer boards is a key component in food and agricultural policy.

The trend set in motion by previous National governments has been toward reduced regulation and increased exposure to commercial forces. Virtually all producer boards' statutory powers over sales in the domestic market have been removed. The Dairy Board's single-desk powers expire as of September 1, 2000.

With the election of a new Liberal government, the impetus for deregulation has slowed. However, momentum for change continues, even without full government support, with all producer boards preparing for the loss of their statutory powers.

The trading environment for New Zealand's agricultural and horticultural exports is changing rapidly. Industry strategies and structures are changing in an effort to keep pace. It is anticipated that any new regulatory intervention will provide clear benefits to the industry and the economy in one of the following areas: 1) industry goods and levies; 2) quota management; 3) weak selling and quality issues; or 4) ownership and governance issues.

A recent outbreak of an insect-borne disease that destroys honey has highlighted the need for improved biosecurity measures. The incidence of the costs to improve biosecurity, when combined with the trade impact of such improve-

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ments, is not yet clear. However, it is expected that costs to tighten border biosecurity will be reflected in higher food prices.

New Food System Technologies

New Zealand research technology, including that endorsed and sponsored by the government, continues to focus on improving agricultural and processing activities as a way to improve the profitability of the food sector.

For example, research undertaken by a joint venture between Meat New Zealand and private industry has resulted in the world's first robotic technology for meat processing. In the future, meat processing plants are expected to combine manual operations with automated, robot-assisted and fully robotic operations. Research is continuing into machine vision systems that locate primal pieces of carcass, grasp individual pieces with a robot-mounted gripper, and move the pieces to the boning room for further processing.

Another example of industry-led research has resulted in CAPTECH, a system designed to meet the growing demand for quality chilled food exports. This new technology means exporters can transport product by sea rather than by more expensive air freight, effectively expanding the market. The CAPTECH process not only extends a product's chilled storage life, but also improves it, enhancing color, flavor, and tenderness by controlling the atmospheric environment of the product. Equipment and packaging have been developed for a wide range of meat products, from carcasses and primal cuts to case-ready retail packs, as well as bulk fish fillets, whole fish, or retail-ready fish packs.

The role of genetically modified ingredients in the food system has captured public attention in New Zealand as it has in most developed countries. New advances in biotechnology, such as animal cloning, raise a variety of safety, environmental, social, ethical, and cultural issues. These issues must be addressed openly to build confidence in New Zealand's existing regulatory processes, identify any gaps to be addressed, and ensure that biotechnology continues to be used wisely and with foresight for the benefit of New Zealand. The current government strictly opposes genetic modification in all forms, particularly in field trials. A Royal Commission of Inquiry into Genetic Engineering has been established to investigate this topic further. Their findings are due May 2001.

Another example of new technology is the introduction into New Zealand by the former government-supported Crown Research Institute (CRI) member Crop and Food, in conjunction with another former CRI member, Agresearch, of new varieties of potatoes suitable for potato chip manufacture. The work, which was sponsored in part by the government, has involved investigation into more rapid methods of tissue culture using advanced tissue culture techniques rather than traditional techniques. The end results are expected to be higher yields, resistance to sugar formation, high dry solids, and resistance to pests.

Overall, the New Zealand government is attempting to use technology to shift the country's economic base from agricultural commodities to high-value products and services. Five government initiatives are available to fund new technology aimed at improving food production, such as the improved potato varieties described above. Limited funding has also been directed to off-farm segments of the food supply chain, such as technologies to improve supply chain management or advanced process control technology.

Peru

The overall performance of Peru's economy and its agricultural sector from 2000 through 2005 will be influenced by both domestic and external factors. The chief domestic factors include the macroeconomic and agricultural sector policies implemented by the new administration that took office in July 2000. During the election process, both the victor, Fujimori, and the challenger, Toledo, indicated that the agricultural sector was a key element in stimulating sustainable economic development in the country.

The principal external factors that influenced the Peruvian economy in the past few years, including the El Nino weather phenomenon and the effects of the Asian financial crisis, seem to be under control, although not before resulting in a significant contraction in output and exports. Agricultural and food production in Peru is expected to increase by more than 5 percent in 2000 and continue growing at the same level through 2005.

Food Prices and Consumption

The CPI for food in the city of Lima decreased by 0.9 percent between 1998 and 1999. Given the importance of food in the economic picture and of Lima as a chief consumption center, this largely accounts for a reduction in general inflation from 6 percent in 1998 to 3.7 percent in 1999. Similarly, food prices at the farm level also decreased in real terms, especially prices for potatoes, rice, and coffee.

The reduction in food prices is a consequence of an increasing supply of agricultural products, both from higher production levels and increased imports, and decreasing demand, because of, among other factors, an increase in poverty. Another factor contributing to lower food prices is lower transportation costs because of improvements to rural roads.

In 2000, inflation is projected to remain stable at 3.5 to 4 percent. Given that agricultural production is developing in a normal way, no downward pressure on food prices is expected. Food prices are expected to increase in line with inflation or by about 3 percent. However, the probable increase in international fuel prices, which could mean higher transportation costs, might signal a sharper rise in food prices.

Food Processing and Marketing

Production of the major agro-industrial products grew by 8.9 percent in 1999 as a result of production increases for noodles (40.7 percent), dairy products (22.3 percent), and oats (15.9 percent). Vertical integration is an increasing trend among industrial entrepreneurs, as well as integration processes aimed at reducing costs and increasing competitiveness with imported products.

Food processing will benefit indirectly from the Alternative Development Project, whose major objective is to encourage cultivation of commercial crops (such as coffee, cacao, and fruits) instead of coca in the jungle. This US$200 million program, funded with international support, will continue through 2003.

Although two more chains have entered the market, supermarkets still account for a low proportion of retail food sales in Peru and the majority of sales are still informal. In 1999, a new wholesale market called Multimercados MINKA opened in Lima. MINKA is a 53,000-square-meter property of the Romero Group (also owner of the Credit Bank and the industrial consortium ALICORP S.A.) consisting of 440 rented stores that offer new services to merchants, such as sanitation, quality control, and

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storage. During its first month of operation, about 200 metric tons of products were traded at MINKA, about 20 percent short of its annual goal.

In addition, the consortium Urbi Mercados S.A is developing the Gran Mercado Mayorista in Lima, which has been conceived as a big distribution center specializing in sales of vegetables, fruits, and lightly processed foods. This consortium is being promoted by Wong S.A. (owner of one of the most important supermarkets in Lima), INTERBANK (a commercial bank), COSAPI (a construction company), and Propiedades URBI S.A. (a real estate developer, with financial support from the British Commonwealth Development Corporation). In its first stage, this project is planned to consist of 800 stores in a main area of 58.2 hectares.

In addition to more modern facilities, this new wholesale market will offer more market information for participants and such services as inspection and health control.Other innovations include the Bolsa de Productos (futures market), which will feature a select group of agricultural and fishing products (basically nonperishable products). This market is expected to be a more efficient and competitive way to commercialize agricultural products at the wholesale level than La Parada market. While this measure is necessary as a first step, it is not sufficient to guarantee the competitiveness of the Peruvian agricultural sector nationwide or even regionwide. Furthermore, it is also necessary for the government to encourage market development and investment in the country, as well as to support regulation in the agricultural sector.

During 2000, it is expected that the wholesale market La Parada will be gradually eliminated and the alternative markets mentioned above will be consolidated, which will have an important impact on traded food. Specifically, it is expected to boost traded volume (by 20 percent) and reduce losses (from 15 to 5 percent).

Agricultural Production and Trade

Agricultural production (agricultural GNP) grew by 12 percent in 1999 (14 percent in the agricultural sector and 7.9 percent in the livestock sector). Agricultural products with the highest growth rates include olives, lima beans, tagetes, cotton, and mangos. Cotton had been identified as a crop that could only be grown along the coast, but it is now being considered as a potential coca substitute in the jungle. Soil conditions and weather in the jungle could be favorable for the cultivation of cotton, especially "American" cotton. This variety could produce good yields suitable for use as an input in denim, which is normally supplied by neighboring countries such as Brazil, Argentina, and Uruguay.

Moving beyond the dampening effects of the El Nino weather phenomenon, Peruvian agricultural exports grew by 10.8 percent in 1999. With agricultural imports declining 26.6 percent, the agricultural trade balance improved. This trend is expected to continue through 2001.

Based on recent estimates of demand growth (in terms of population trends) and of production volumes (planted area and probable yields), Peru is expected to experience increasing deficits in commodities like wheat, rice, yellow corn, milk, and oil.

Through 2005, exports are expected to be up sharply. Nontraditional agricultural exports could triple and traditional exports double. With a better understanding of the international market and more effective commercial strategies in place, greater diversity could be achieved for market segments such as coffee (especially organic coffee), asparagus, mangoes, sweet yellow onions, olives, and oregano.

Food and Agricultural Policy

During 1999, no new agricultural policy was enacted as revisions to pending policy continued. This situation is similar to what happened with the land law, which underwent four revisions before being passed by Congress. The pending political agenda includes the following goals:

- To promulgate the new water law, which separates water rights from property rights,
- To approve land law regulations,
- To more effectively protect national resources (especially while promoting biodiversity),
- To strengthen the agricultural information system, and
- To support the agro-industrial sector.

It is believed that discussion and approval of these policies would encourage new investment, both domestic and foreign, as well as promote industrialization and agricultural development.

Agricultural sanitation policies are the responsibility of the Peruvian National Service for Plant and Animal Health (SENASA), which was created in 1993 to promote and regulate food sanitation and plant and animal health without creating barriers to world agricultural trade. SENASA allows the private sector to help ex-

porters meet sanitation standards and to assist with disease control and quarantine programs. When SENASA finds it necessary to block importation of contaminated imports, the product's relative price structure might be affected temporarily. This happened when SENASA prohibited the importation of rice infested with the Khapra weevil and also when SENASA banned cattle imports from Ecuador.

Government social programs such as the National Fund for Compensation and Social Development (FONCODES) and the National Program of Food Assistance (PRONAA) continue to provide a secure floor price for small and poor producers. These programs provide food assistance to children ages five and under and temporary employment to low-income adults. Determining the "right" floor price is critical to ensuring that these programs do not perpetuate price distortions and production inefficiencies that have prevailed in some parts of the country.

New Food System Technologies

Biotechnology in Peru benefits from both the existing biodiversity in terms of species, genes, and ecosystems and from the existing institutions (both public and private) that are working with biotechnology (16 universities, 7 institutes and research centers, and 10 private companies). Biotech programs are available at the undergraduate, graduate, and post-graduate levels.

Despite these strengths, however, biotech development in Peru remains at too low a level to affect productivity, product quality, or competitiveness. This situation could be explained by

- A lack of understanding that biotechnology is a scientific and technological tool with a high potential economic impact—biotechnology has not been well integrated into the current socioeconomic and political context in Peru,
- A lack of identification of biotechnology as an important and strategic activity for supporting development in the country,
- A lack of communication and interaction between the scientific-academic sector (technology suppliers) and the productive sectors (technology users), and
- Weak institutional prospects—scarce research and a lack of financial support.

The Ministry of Agriculture, through the National Institute of Agricultural Research (INIA), supports biotech development through such activities as

- Developing seed for commercial crops (such as potatoes and strawberries) oriented to the production of virus-free seeds and plants,
- Producing tubers and Andean roots to preserve germ plasm,
- Identifying the molecular character of the inherent material in alpacas and guinea pigs, and
- Promoting the conservation of a collection of about 16,000 varieties of vegetables at the various INIA experimental stations.

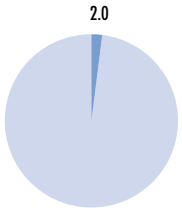
Additionally, the Peruvian Congress has approved two laws that indirectly promote biotechnology:

- The Integrated Pest Management (No. 26744) law, which supports the use of biotech and genetic methods to combat pests.
- The Conservation and Sustainable Utilization of Biodiversity (No. 26839) law, which regulates the conservation and use of ecosystems, species, and genes and promotes biodiversity. While emphasizing the importance of biotechnology, this law also makes safeguards for human health and the environment national priorities.

Currently, Congress is preparing a law to promote science and technology, which would facilitate the working relationships among universities, research centers, and other institutions attempting to apply biotechnology in their research.

The government also has created a national network of tissue culture, managed by the Ministry of Agriculture, which, in coordination with some universities, is promoting the propagation and distribution of potato, vegetable, and fruit seeds. Although this is the oldest biotech practice in Peru, it has not yet had a significant economic impact because it has not been developed on a large scale or been widely distributed.

Finally, it is important to mention that unlike what is occurring in some developed countries, the application of biotechnology in Peru is not focused on creating new products, but rather on reducing pests and diseases as well as on creating alternative agro-ecological practices. In this way, biotechnology will contribute more to the welfare of the economy as a whole, including more remote regions like the Amazon, by promoting sustainable development.



SHARE OF POPULATION USING THE INTERNET
(PERCENT)

The Philippines

The GDP of the Philippines registered 3.2 percent growth in 1999 against a 0.5 percent contraction in 1998. The industrial sector's minimal growth of 0.5 percent was offset by a robust 6.6 percent expansion in the agriculture sector as forecast in last year's Pacific Food Outlook and by the services sector's continued strong performance at 3.9 percent. The GNP turned in a 3.6 percent expansion as a result of the sustained growth of net factor income from abroad.

Ample rainfall and sufficient irrigation water throughout the year spurred farmers to increase planting area, use good seed, and increase fertilizer applications and other inputs. Thus, the 37.8 percent increase in rice production resulted from a 26.2 percent expansion in area harvested and a 9.3 percent increase in yield. Similarly, the 19.9 percent increase in the corn harvest was the product of a 12.2 percent expansion in area and a 7.4 percent improvement in yield. The recovery of the country's major crops, together with that of livestock and fisheries subsectors, expanded agricultural production by 6.6 percent in 1999 compared with a 6.6 percent contraction in 1998.

In the industrial sector, the minimal growth of 0.5 percent was due to a 1.4 percent increase of the manufacturing subsector, which, in the previous year, registered negative growth of 1.1 percent. Food processing contributed to the rebound of the manufacturing subsector.

In the services sector, the improved performance of retailing and private and government services more than compensated for a downward trend in banking and finance, transport, real estate and housing.

Although the government had forecast an optimistic 4.5 to 5.5 percent GDP growth rate for 2000 based on the improved performance of the industrial and services sectors, growth in the first quarter registered only 3.45 percent. This may indicate that growth in 2000 will be somewhat lower than forecast.

Some of the positive indicators contributing to the optimism are the continued increase in exports; the growth of manufacturing; the improved sales of appliances, passenger cars, and food and beverages; higher revenue collection by the government; and low inflation and interest rates.

Over the past two years, the government has followed a policy of lowering interest rates to help stimulate the economy. However, in view of rising interest rates in the United States, the central bank raised the overnight borrowing rate from 8.75 percent to 9 percent and the overnight lending rate from 11 percent to 11.25 percent effective May 2, 2000.

Food Prices and Consumption

The food price index increase in 1999 was 1.4 percent lower than that of the general price index over the same period.. The small increase in food prices resulted from abundant supplies as agricultural production rebounded from a slump in 1998 and posted a strong expansion in output in 1999. The general downward trend of food prices in world markets also contributed greatly to the small rise in Philippine food prices.

Commodities that registered large production increases in 1999 saw farm-gate prices decline; examples include rice (–2.85 percent), corn (–7.89 percent), pineapple (–6.5 percent), coffee (–6.8 percent), cassava (–5.5 percent), and cabbage (–31 percent). At the same time, prices continued to increase for those commodities whose supplies had not yet recovered from the lingering, dire effects of the 1998 drought, such as coconuts (9.51 percent). Prices also rose for crops whose supplies were damaged by too much

water, such as mangoes (24.4 percent), tobacco (37.9 percent), and onions (74 percent).

Barring another El Nino-induced drought and given abundant supplies, prices of food and agricultural products in the local markets will probably increase again in 2000, but only by 1 to 2 percent, which is below the CPI growth rate for all items. In first-quarter 2000, farm-gate prices declined by an average of 6.6 percent.

Prices of grains for human consumption will most likely remain stable as local production is forecast to increase at a rate exceeding population growth. The Department of Agriculture is promoting irrigation as well as the availability of good seeds and fertilizer.

Fish, particularly stocks produced by aquaculture, will continue to increase and will be sold at affordable prices. Poultry production will remain flat, but prices will not rise because of inexpensive imports. Livestock is likely to continue its good performance at stable prices. Sugar prices may remain depressed due to the world market's oversupply. Vegetable oil prices are also likely to remain low as palm oil and soybean oil prices remain depressed due to some difficulty in India, which is an important market for vegetable oils. Farm-gate prices for corn, which posted a significant production decline in 1999 are expected to increase substantially. With continued good weather, fruits and vegetables will continue to increase and become affordable to the great majority of Filipinos.

Food Processing and Marketing

The strong performance of the food processing industry, which constitutes a significant part of the Philippines manufacturing base, helped push the subsector into positive growth of 1.4 percent in 1999 from a contraction of 1.1 percent in 1998, and performance continued to be moderately good into 2000. As forecast in last year's Pacific Food Outlook, the turnaround was the result of low prices for agricultural raw materials and of a generally improving economy.

The Department of Agriculture is actively promoting agro-processing and the development of downstream agricultural enterprises to generate added value and additional employment opportunities. It is also helping develop forward and backward linkages between agricultural production and agribusiness—for example, contract farming of vegetables such as tomatoes, asparagus, potatoes and linkages between corn growers and feed millers. The effort is part of the department's Strategic Agricultural and Fisheries Development Zones (SAFDZ) project, which is intended to help modernize the agriculture sector, particularly in Mindanao.

The government is likewise pursuing a long-term policy of infrastructure development in rural areas to help further the integration of primary agricultural production with markets and processing industries. Budgetary constraints, however, limit the extent of the efforts.

The Retail Trade Liberalization Act signed into law in March 2000 repeals the restrictive Retail Trade Nationalization Law of 1954 and opens the retail trade to retailers of foreign nationalities, including those involved in the sale of food and agricultural products.

Agricultural Production and Trade

Palay (unmilled rice) production for 1999 totaled 11.8 million metric tons, up by 37.8 percent from the 1998 harvests, which were severely affected by drought. The Department of Agriculture has set a target of 12.5 million metric tons of palay for 2000 and has programmed the provision of certified good seeds to farmers, which are capable of increasing production by as much as 15 percent. The department has also programmed the upgrading of agricultural support services, including irrigation facilities and the agricultural extension service. The target implies a 5.93 percent increase over the successful palay harvest of 1999.

The Bureau of Agricultural Statistics (BAS) forecasts a 6.2 percent increase in rice production for January to September 2000. Some analysts have expressed doubt regarding the full realization of the target in view of a forecasted drought (El Nino) that may start in last-quarter 2000.

According to a nationwide survey conducted by BAS, corn production for January to September 2000 is forecast to decrease by 2.1 percent from 3.72 to 3.64 million metric tons, on the basis of planting intentions. Farmers may shift to other crops that may be more profitable during this period.

Crops that suffered from either the lingering effects of the 1998 drought or too much rain in 1999 will recover and resume normal growth patterns. Coconut oil is expected to recover from the 55 percent slump in export volume, although prices are not likely to recover from last year's 19 percent drop as palm oil and soybean oil continue to suffer from drastic fall in prices. Mango and banana availability for export may continue to increase and prices may rise slightly if China continues to open up its markets.

Fisheries products, particularly prawns, shrimp and tuna, also have good prospects for moderate price and volume increases, even if at just modest rates. Other Philippine export crops,

FOOD PRICES
(PERCENT CHANGE)

such as pineapple, seaweed and carrageenan, and sugar are expected to remain stable in terms of volume and price.

Food and Agricultural Policy

Following are the two main strategies underlying the Philippine government's drive to modernize the agriculture sector and make it globally competitive as stipulated in the Agriculture and Fisheries Modernization Act (AFMA):

- **Strategic Agricultural and Fisheries Development Zones (SAFDZs)**—While all sectors and regions of the country should be given the opportunity to develop, limited resources dictate the concentration of resources in certain key areas that show the greatest potential for development.
- **Devolution and Decentralization**—Bottom-up planning and the implementation of programs with the involvement of all stakeholders is essential. Such planning and implementation must occur under the leadership of local government units with the support of national government agencies.

To achieve the sectoral objectives specified in the Medium-Term Philippine Development Plan 1990–2004, the government has assigned priority to the following major result areas:

- Accelerated growth of agricultural production by the aggressive application of modern science to agriculture through improved research, development and extension, irrigation, rural infrastructure, credit, and reduction of post-harvest losses.
- Diversification that involves the expansion of the production base to include high-value commercial crops and the development of agro-processing and downstream agricultural enterprises to generate added value.
- Promotion of rural nonfarm income opportunities by instituting an overall policy framework and program for infrastructure development to stimulate broad-based economic activities and attract investment and industrial dispersal, including agro-processing.
- Access to land and other productive resources by accelerating a program of comprehensive agrarian reform.
- Environmental sustainability by instituting practices and technologies that maintain and enhance the productivity of the resource base.
- Institutional reform to continue decentralization by strengthening the Department of Agriculture's regional operations and the regional field units' linkages and collaboration with the department's agencies and research institutions and with local government units.

For the first time, resources totaling about US$140 million (P5.8 billion) have been budgeted for the implementation of the Agriculture and Fisheries Modernization Plan. The positive effect of the government programs should soon be felt in the countryside.

Million US$

Agricultural and Fisheries Modernization Plan (AFMP)

The AFMP budget aims to modernize agriculture through the application of modern science to agriculture and fisheries through research and development, extension, irrigation, infrastructure, credit, and the reduction of post harvest losses.

SOURCE: Philippine Department of Agriculture

New Food System Technologies

Biotechnology. To boost agricultural productivity, the Philippine government favors the field testing of genetically modified seeds and their propagation if appropriate. However, environmental interest groups active in the country, such as Greenpeace, have asked the courts to halt the field testing of BT corn and of vitamin A-enriched rice. The environmentalists claim that current scientific evidence is insufficient to conclude that there is no risk from genetically modified foods. The environmentalists are also behind a move to introduce legislation that will ban any field release of GMOs.

Aside from the controversy, several obstacles may prevent the full application of biotech advances to the Philippine agricultural sector. The first obstacle concerns intellectual property rights. While publicly funded international and national research institutions such as the International Rice Research Institute (IRRI) of the Consultative Group on International Agricultural Research (CGIAR) network developed the technology of the Green Revolution, it is the participating private corporations that now hold the associated patents. Farmers, including poor farmers in developing countries as well as research institutions, will have to pay fees to use any newly developed technologies and genetically enhanced seeds. Can they afford the fees?

The second obstacle is the skepticism of the general consuming public fueled by the controversy over the "Frankenstein foods." There may be a need for an information campaign to allay consumer doubts about the safety of GMO foods.

A third obstacle is an inadequate regulatory framework for assessing the risk of and regulating the use of GMOs in developing countries. Such a framework is required to ensure the health of consumers and the conservation of the environment and to allay unfounded fears. The initial work on the framework conducted by the Codex Alimentarius of the Food and Agriculture Organization of the United Nations may prove useful, but the trained manpower may

not yet be available in many developing countries within the government agencies that will regulate the GMOs.

To date, farmers in the Philippines have not planted any transgenic seeds except in field tests. In the meantime, researchers are developing risk assessment for biotech products. The assessments are intended to provide baseline data for developing science-based regulatory policies, sustainable strategies, and product standards.

The Internet. The Department of Agriculture now relies on the Internet to disseminate to the extension service and end-users the technologies developed by the agricultural research system and to convey back to the research system the difficulties encountered by farmers in applying the technologies.

The Department of Agriculture has designed and established the National Information Network (NIN), which uses the Internet to link the Department of Agriculture's central office, along with its bureaus and affiliated agencies and corporations, with the network of research institutions and other government departments, including the Department of Trade and Industry (DTI), the Department of Environment and National Resources (DENR), the Department of Science and Technology (DOST), the National Statistics Office (NSO), the National Statistics Coordinating Board (NSCB), the National Economic and Development Authority (NEDA), the Philippine Institute of Development Studies (PIDS), and local government units up to the municipal level. The various information systems that will be input into the NIN will include information and technology generated by the research and development institutions, production, supply and demand, price trends, product standards, consumer safety, market data, credit facilities, and so forth.

To date, the Department of Agriculture's central office is interconnected through VSAT (very small aperture terminals) to the regional field units, the Bureau of Agricultural Statistics, and the National Food Authority. By year-end 2000, the system will be expanded to cover more databases. Completion of the Internet-based information system will require four years.

At present, about 0.5 percent of the population, or about 380,000 people in the Philippines, use the Internet, and the number of users is increasing by an average of 28 percent per year. Most Internet users live in urban areas. Internet use in rural areas is still limited to government extension workers and the bigger national and multinational agribusiness concerns such as Dole, Del Monte, San Miguel, Ayala, and Purefoods.

The National Information Network, however, is considered to be of critical importance as it establishes communication among the researchers, agricultural policy makers, and extension agents, who in turn communicate with the end-users of the information, such as farmers and fishermen.

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Singapore

After hitting a trough in 1998, East Asia's V-shaped economic recovery took many by surprise and continued its resurgence in 1999. Singapore's economy grew by 5.4 percent in 1999 compared with 1.5 percent in 1998 and is expected to grow between 4.5 and 6.5 percent in 2000, according to the Ministry of Trade and Industry. Recent forecasts by the government are even more optimistic, projecting GDP growth in 2000 and 2001 at 9 and 6 percent, respectively.

Singapore's CPI rose by 0.4 percent in 1999, reversing 1998's 0.3 percent decline. The ADB expects the index to grow by 1.5 percent in both 2000 and 2001. In view of the subdued inflationary environment and less volatile currency markets, the Monetary Authority of Singapore adopted a neutral stance on exchange rate policy in 1999 and narrowed the exchange rate policy band to its pre-crisis width. In 1999, the Singapore dollar remained broadly stable against the US dollar; it depreciated by only 1.3 percent against the US dollar after its 11 percent depreciation in 1998. The Singapore dollar also depreciated against the Japanese yen and most currencies of the ASEAN in response to the region's improved economic outlook.

Because of an increase in demand deposits, the narrow money (M1) supply increased by 14 percent in 1999 compared with a contraction of 0.9 percent in 1998. As a result, Singapore's average three-month interbank interest rate decreased from 5.2 percent in 1998 to 2.3 percent in 1999. The average prime lending rate was 5.8 percent in 1999, slightly lower than 1998's 5.9 percent.

Food Prices and Consumption

Food prices in Singapore rose by 0.9 percent in 1999, slightly more than the 0.2 percent increase in 1998. The increase in food prices is the weighted average of increases in noncooked food prices (1.3 percent) and cooked food prices (0.5 percent). Among noncooked food, prices of rice and other cereals, dairy products and eggs, vegetables, and nonalcoholic beverages remain stable while the meat and poultry index recorded the largest increase at 8 percent. In particular, the average price of fresh pork surged by 18 percent in 1999 compared with 3 percent in 1998. The Niphh virus outbreak in Malaysia necessitated the closure of the abattoirs in Singapore in March 1999 and consequently reduced the abattoir meat supply and contributed to the hike in pork prices. Furthermore, to ensure that meat sold in wet markets is safe and hygienic, Singapore instituted a new refrigeration regulation in 1999. All pork stalls in Singapore's wet markets and food shops must keep retail pork under refrigeration as of November 1, 1999. Meat and poultry prices are expected to register slightly higher increases in 2000 given that poultry stalls and mutton and beef stalls were also required to begin using meat chillers by May 1, 2000, and November 1, 2000, respectively.

Singapore consumers are demonstrating a growing concern about their health. Between 1996 and 1998, Singapore's meat consumption per capita declined from 69 to 64 kilograms as vegetable consumption increased from 69 to 77 kilograms. The trend is likely to continue. Singaporeans' demand for health-related products is particularly evident in the number of health food retailers, which grew from 11 in 1987 to 155 in 1997; 40 percent are concentrated in the central business area. Total sales jumped from $2 million to $69 million during the 1990s, an impressive growth rate of 42 percent per year.

Food Processing and Marketing

Although Singapore's food and beverage pro-

cessing industry is growing, it is not a major player in Singapore's manufacturing sector. In 1998, Singapore claimed 320 processing/marketing establishments employing 14,913 workers who produced US$2 billion worth of output. Value-added products generated US$515 million or US$34,555 per worker, but accounted for only 2.9 percent of the manufacturing sector's contribution to the larger economy. With the overall growth in the services sectors, the manufacturing industry is losing its importance to Singapore's economy. In fact, manufacturing's contribution to the economy decreased from 29 percent in 1980 to 23 percent in 1998; however, it increased to 25.9 percent in 1999 owing to the faster-than-expected recovery from the 1997 economic crisis.

The most important food and beverage processing subsectors are bread, cakes, and confectioneries followed by milk processing and slaughtering of livestock and poultry. These subsectors hired 15 percent of workers and contributed 11 percent to the total value added in the economy.

Foods and beverages are distributed throughout Singapore by licensed hawkers and food establishments such as restaurants, eating houses, snack bars, canteens, coffee shops, food factories, and supermarkets. Over the last decade, the number of licensed hawkers has been decreasing while the total number of licensed food establishments—particularly restaurants—has been increasing as a function of the population's growing affluence. Specifically, the number of licensed hawkers decreased from 6,095 in 1988 to 3,698 in 1998, but the number of licensed food establishments increased from 7,820 to 10,172 over the same period.

Food retailing is largely the province of supermarkets conveniently located around the island. With more international supermarket operators such as Tops and Carrefour moving into Singapore in recent years, the competition among food retailers has intensified. The number of supermarkets grew from 143 in 1988 to 192 in 1997 and then decreased to 191 in 1998.

Agricultural Production and Trade

Singapore is a city-state with 648.1 square kilometers of land. By 1998, only 10.4 square kilometers of land was being farmed even though almost half of the island had been built up for housing, industrial sites, and infrastructure. Farmland is used mainly for producing eggs, fish, and vegetables for local consumption and orchids and ornamental fish for export. Obviously, Singapore's size limits large-scale agricultural production, making self-sufficiency impossible for a population of 3.87 million. As a result, Singapore imports almost 100 percent of the food commodities that can be inexpensively stockpiled, such as grain and sugar, and more than 90 percent of meat, eggs, fish, vegetables, and fruits.

With little land for agricultural production, farmers must apply high-tech farming methods to produce high-value and high-quality primary produce. Since 1986, the Agri-Food and Veterinary Authority (AVD) has initiated and coordinated the development of 15 square kilometers of farmland into six agrotechnology parks. The parks are equipped with the necessary infrastructure and designed to accommodate a complementary mix of nonpolluting farms that can coexist with urban land uses. Parcels of land ranging from 2 to 30 hectares are allocated on 20-year leases to farming companies for the production of vegetables, orchids, aquatic and ornamental plants, freshwater ornamental and food fish, eggs, milk, and some exotic animals such as crocodiles and birds.

Besides providing part of Singapore's fresh food supply, the agrotechnology parks are aesthetically pleasant, designed to achieve ecological balance, and intended to provide tourist destinations and educational experiences for Singaporeans and foreign visitors. The overall aim is to develop Singapore into an agrotechnology service center and regional R&D center, providing agrotechnology services and expanding the local agro-industry regionally.

As of March 1999, 351 high-tech farms had already commenced operations on 9.81 square kilometers of land. It is estimated that the agrotechnology parks will be able to produce an annual US$269 million worth of agricultural products. According to the national development plan, 20 square kilometers of land have been set aside for ten agrotechnology parks.

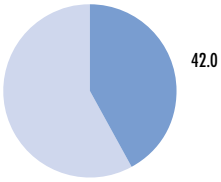
Hen egg production is an especially important farming activity in Singapore. In 1998, hen egg production from the seven large-scale layer farms in agrotechnology parks supplied 35 percent of the eggs consumed in Singapore. It is expected that hen egg production will increase to 1.6 million eggs and meet 53 percent of projected daily consumption. The main crops cultivated are vegetables and orchids. Singapore is renowned for its exotic orchids in the form of cut flowers; however, the production of orchids decreased from 37 million stalks in 1993 to 17 million stalks in 1998 as the production of vegetables increased from 10,154 to 17,291 tons over the same period.

Since the Singapore government decided to

FOOD PRICES
(PERCENT CHANGE)

phase out pig farming in 1985 and finally completed the process in 1990, the number of agricultural and fishery workers has decreased dramatically. Employed persons in agriculture and fishery dropped from 7,129 in 1990 to 2,807 in 1991, a 61 percent decline, and to 1,677 persons in 1996. However, the number of employed persons in the agricultural sector increased by 57 percent in 1997 partly due to the economic crisis. In 1999, the number decreased to 2,116.

Singapore has relied heavily on food imports for domestic food consumption. In 1998, Singapore's food imports totaled US$2.7 billion and its food exports totaled US$1.8 billion. The food imports retained for consumption totaled US$900 million, a 33 percent decline from 1997's US$1.35 billion. Among food commodities, the AVD facilitated the importation of 1.2 million tons of primary produce worth US$1.18 billion. In all, 481,572 head of livestock, 48.5 million broiler chickens, 8 million ducks, 790 million hen eggs, 161,000 tons of meat and meat products, 392,000 tons of vegetables, 355,000 tons of fruits, and 85,280 tons of fresh fish were imported. Although Singapore's food imports increased from US$1.6 billion in 1985 to US$ 2.7 billion in 1998, the island-state's share of total imports decreased from 6.1 to 2.7 percent over the same period.



SHARE OF HOUSEHOLDS WITH INTERNET ACCESS, 1999 (PERCENT)

Food and Agricultural Policy

In 1980, the Ministry of National Development adopted an agricultural policy that calls for farming to become fully commercial and unsubsidized. As a result, all inefficient or polluting agricultural activities on the island have been phased out or replaced by modern intensive farming inside the agrotechnology parks. Increased imports have offset the decrease in local production of fresh produce.

To ensure a stable and adequate supply of safe, wholesome, and high-quality meat, fish, and vegetables, the AVD adopted an integrated system of accreditation, inspection, and testing to maintain high food-safety standards and to keep food-borne diseases out of Singapore. A new US$19 million Veterinary Public Health Centre, a response to the recent emergence of many new chemical and microbiological hazards, is planned for completion by mid-2002. The state-of-the-art facility will test larger food samples and conduct newer tests in areas such as food virology and toxicology. In addition, to strengthen Singapore's authority in controlling fruit and vegetable imports through legislative changes, Singapore enacted, respectively, a new Wholesome Meat and Fish Act and a Control of Plants Act.

To participate in the region's agricultural economy, the AVD successfully organized an ASEAN workshop on regulations for agricultural products derived from biotechnology and an ASEAN seminar on risk assessment and public awareness of genetically modified organisms (GMOs). Both initiatives aim to harmonize guidelines for the release of agricultural GMOs in ASEAN to attract investments in the agri-biotech sector and to facilitate the trade of GMOs within the region.

New Food System Technologies

To transform Singapore into a center of excellence for tropical agrotechnology, infrastructure such as the Institute of Molecular Agrobiology (IMA), the Bioprocessing Technology Centre (BTC), and the Agri-Bio Park are already in place. Advances in technology have enabled Singapore to play an important role in research to produce high-yield, disease-resistant crops, poultry, animals, and fish. The AVD has continuously supported in-house R&D or R&D with commercial parties for new technologies in the food system. Some of the new technologies are discussed below.

In 1998, Singapore established its first commercial deepsea fish farm off St. John's Island in depths of 20 meters. The farm, developed after a three-year pilot project jointly conducted by the AVD and Seabass Farm Pte Ltd., has 16 deep netcages, with each circular cage capable of producing 15 tons of fish per crop. A commercial-sized deep netcage farm can produce 250 to 300 tons of fish annually compared with just 30 tons of finfish a year from existing farms in Singapore. The NTUC (National Trade Union Congress) FairPrice supermarket launched the sale of locally produced deep sea–farmed sea bass. The private sector will be encouraged to venture into fish farming, with about US$120 million expected to be invested to set up 40 fish farms in Singapore and the region. In 10 years, the fish farm project could supply 40 percent of the 100,000 tons of fresh fish consumed annually in Singapore.

An Agri-Bio Park of ten hectares was completed in 1999 to house a cluster of agri-biotech companies undertaking R&D and the production of agri-biotech products such as animal vaccines, biologics, diagnostics kits for animal and plant diseases, disease-resistant plants, insect-resistant plants, and biopesticides.

A new vegetable hybrid called Semposai, introduced from Japan, was tested under local conditions and found to grow well in the trop-

ics. The vegetable is tasty and produces a high yield. Some farms are already growing and selling it. A protocol established for live transportation of sea bass fry/fingerlings in tanks now makes it possible to transport large quantities of fish in one to two hours.

Some virus-eradicated clones of Dendrobium orchids were developed. These clones along with CyMV-infected and virus-free plants were monitored in the field for two years for flower quality and yields. The virus-free plants grew faster, flowered earlier, and produced 62 percent more sprays with longer inflorescence than virus-infected plants.

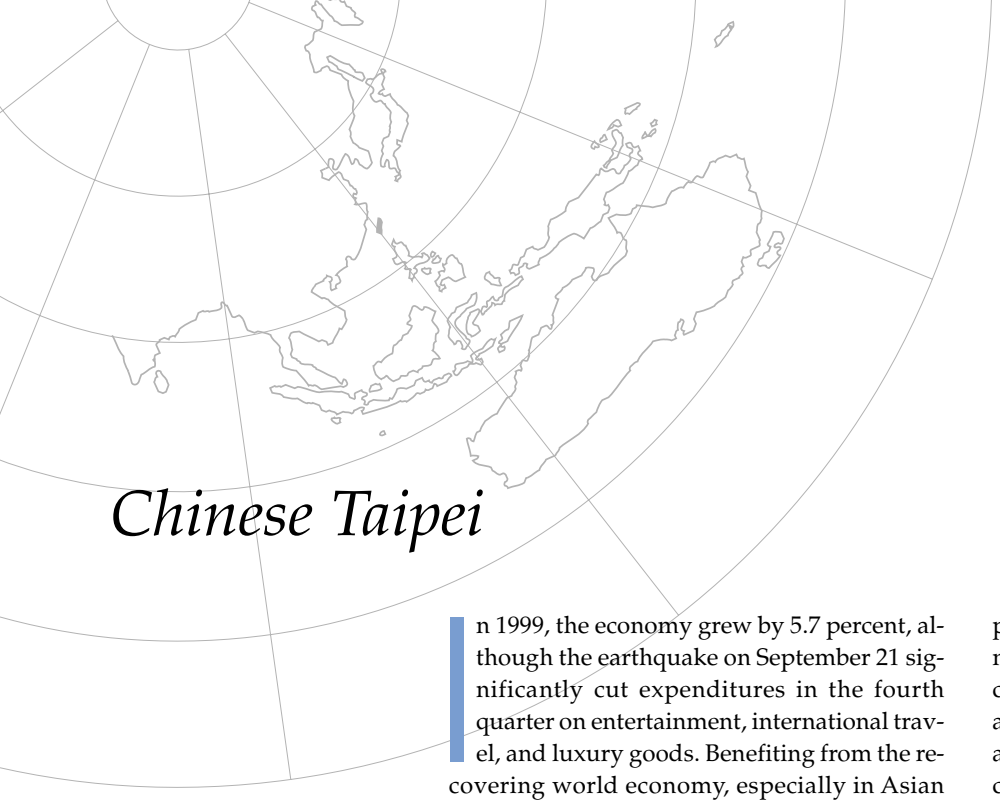
In 1998, the AVD implemented several applications systems and network enhancements to harness the power of information technology (IT) to meet future challenges. The Trade Declaration Auto-Processing System (TAPS) was enhanced with the implementation of the establishment codes and farm codes to permit faster processing and better control of food imports and thus ensure food safety. The AVD home page continues to be updated on a regular basis, and new services and products are provided for Web users.

To develop the island-state into a knowledge-based economy, Singapore created the Ministry of Communications and Information Technology in 1999 and merged the existing National Computer Board and the Telecommunications Board of Singapore into the Info-Communications Development Authority (IDA). IDA adopted a phased and sustainable approach to liberalize the info-communications industry and thereby encourage global information and communications technology (ICT) players to participate in the Singapore market and develop Singapore as an ICT hub in the Asia-Pacific.

Singapore ONE (One Network for Everyone) was launched in June 1998 to provide a nationwide broadband infrastructure. By year-end 1999, Singapore ONE offered 180 applications and had 100,000 users. It also reached out to 1 million North American subscribers over the broadband network in the United States. Currently, several major collaborations are conducting research in areas such as bioinformatics, tele-immersive virtual reality, telemanufacturing, and telemedicine.

The mobile communications segment continued to grow in 1999. As of December 1999, Singapore had 1.5 million mobile telephone subscribers and 1.2 million paging subscribers. Mobil telephones have increasingly been used to send faxes and to access the Internet and corporate databases.

An additional three Internet Access Service Providers (IASPs) were licensed after the Internet access service provision market was further liberalized in October 1999. Currently, Singapore has six IASPs. As of year-end 1999, there were 5.8 million dial-up subscribers; more than 42 percent of households in Singapore have Internet access.



Chinese Taipei

In 1999, the economy grew by 5.7 percent, although the earthquake on September 21 significantly cut expenditures in the fourth quarter on entertainment, international travel, and luxury goods. Benefiting from the recovering world economy, especially in Asian countries, Chinese Taipei's export sector showed encouraging strength. Exports grew by as much as 10 percent, the highest growth rate in four years. However, the freeze on government wages checked wage increases in the private sector, curbing private consumption. The government wage freeze and low military expenditures shrank government consumption by 6.7 percent in 1999. Private investment decreased by 0.6 percent. On the other hand, increasing telecommunications expenditures and a booming stock market stimulated private consumption. Government investment increased by 7.7 percent under the expansionary policy. Fixed capital formation increased by 2.2 percent.

In 2000, the economy is predicted to grow by 6.4 percent, led by an increase in private consumption of 6.5 percent, an 8.3 percent investment growth rate, and a 6.7 percent jump in exports. According to the latest estimates from the Directorate General of Budget, Accounting and Statistics, first-quarter economic growth in Chinese Taipei reached 7.5 percent. As of the end of March, capital inflow totaled US$7.6 billion, representing a four-fold increase over the previous year. Huge increases in private sector investment, exports, and industrial manufacturing are seen as the driving forces for the year.

As the impact of the Asian financial crisis has receded, the NT dollar has gradually appreciated, reaching NT$30.5 per US$1 as of the end of March 2000 with a projected year-end rate of NT$30.6. The CPI is expected to increase by 2 percent in 2000 because of relatively strong economic performance but moderate wage increases for government employees. Rising oil and raw material prices will offset the appreciation of the NT$ and result in a 2.1 percent increase in the WPI in 2000. Since the world economy is expected to sustain moderate but stable growth in the next few years and the financial sector will be more stable, Chinese Taipei's economic prospects are relatively good with an annual growth rate of about 6 percent expected from 2000 to 2005.

On March 18, 2000, Chinese Taipei voters elected Democratic Progressive Party candidate Chen Shui-bian as their new president ending 55 years of Nationalist rule. This political earthquake could have a dramatic impact on the country's power structure, economy, and cross-strait relationship. After the election, President-elect Chen announced plans to open direct trade, transportation, and postal links with China. He also nominated Defense Minister Tung Fei, a mainlander and member of the Kuomintang (KMT) party, to be premier and gave other friendly signals to reduce the danger of a military confrontation between China and Chinese Taipei. Although the long-run impact of this political shift is unclear, the political uncertainty will certainly be translated into economic uncertainty in the coming years.

Food Prices and Consumption

In 1999, food and beverage prices in Chinese Taipei dropped by a minimal 0.5 percent, while consumer prices overall rose by 0.2 percent. The steepest declines were in fruit and vegetable prices, which dropped by an average of 18 and 6 percent, respectively, because of unusually high prices in 1998. Prices for rice increased by about 3.6 percent.

Meat prices rose by 10 percent compared with the extremely low price in 1998. Prices for fresh seafood rose by 4 percent while prices for processed seafood dropped by almost 1.3 percent. Prices for prepared food were largely unchanged, while prices for food away from home rose by 2 percent.

During first-quarter 2000, food and beverage prices dropped by a further 0.4 percent. Oil price increases do not have a significant and immediate impact on food prices. In 2000, the CPI is expected to increase by an estimated 2 percent; food prices are expected to be stable.

Expenditures for food and beverages accounted for about 25.2 percent of total household expenditures in 1999. This is almost the same as in 1998, since both food and consumer prices were fairly stable. Daily per-capita calorie intake has remained stable in recent years at approximately 3,000 calories, a trend that is likely to continue. Per-capita consumption of rice decreased from 64 kilograms in 1990 to 56.7 kilograms in 1998. Meanwhile, per-capita consumption of meat increased from 66.2 to 78.8 kilograms. An increased concern for health has led to increased demand for dairy products. Per-capita consumption of dairy products increased from 16.6 kilograms in 1990 to 23.2 kilograms in 1998. Per-capita fruit consumption also increased sharply from 99.8 kilograms in 1990 to 135.5 kilograms in 1998. Because of the increased demand for ready-made foods from the services sector, the proportion of household expenditures spent on take-out food and in restaurants will be around 6 percent in 2000.

Food Processing and Marketing

Processed food production in 1998 had a total value of NT$496 billion (US$16 billion), accounting for 6.8 percent of total manufacturing production. The recession in the frozen foods and feed industries, caused chiefly by the ban on pork exports, continued. Total processed food production in 1999 remained stable, accounting for 7 percent of total manufacturing production. The appreciation of the NT$ and the increase in labor and raw material costs have made food exports from Chinese Taipei less competitive on the world market. The industry now has a typical local-demand orientation with export values that are less than 10 percent of total production.

Prospects for the food processing industry are hampered by the accession of Chinese Taipei into the WTO and the increased competition from foreign imports. Nevertheless, developments in the nonalcoholic beverage, frozen foods, and home meal replacement sectors have shown great potential in the domestic market. The rise in female labor force participation and rapid growth of the urban population have stimulated an increased demand for more convenient forms of food. Chain convenience stores, supermarkets, and hypermarkets are expanding their roles at the expense of traditional grocery stores. According to the government's Year 2002 Food Industry Development Plan, the value of processed food production is projected to grow at an annual rate of 3 percent through 2002.

Total sales of health foods are about NT$22 to NT$23 billion (US$700 to US$750 million) each year. Imports account for more than 70 percent of the market. The most popular items are Ganoderma, pollen, herb tea, royal jelly, vitamin C, fish oil, and lecithin. About 90 percent of these products are distributed by direct-marketing companies and drug stores. Quality and unique ingredients and product forms are the key elements in maintaining market share in this sector, particularly among female and elderly customers. Market growth has slowed slightly since the implementation in October 1999 of the health food regulation law, which enforces a strict testing and approval procedure.

FOOD PRICES
(PERCENT CHANGE)

Agricultural Production and Trade

Production conditions were very favorable during the first half of 1999, but in the second half the earthquake and freezing temperatures caused damage in some rural areas. Storage facilities for rice, flour, and animal feed in the central region suffered severe damage. Poultry production in this region, which accounts for 15 percent of the national supply, was also affected. But the overall impact on livestock production was a decline of less than 2 percent. As a result, overall agricultural production declined by only about 1.5 percent. The forecast calls for growth rates of from –1 to 1 percent per year through 2002.

Rice cultivation areas and production will be reduced progressively as a result of government diversification efforts and the encroachment of urban and industrial development on farmland. In 1999, planted area for rice was reduced by 3 percent, but production increased by 20 percent because of favorable weather.

Vegetable production has increased steadily because of structural adjustments and the popularity of greenhouse facilities in Chinese Taipei. Both planted acreage and per-hectare yield has increased over time. But in 1999, due to the heavy

rainfalls in the summer and the fall earthquake, vegetable production saw negative growth.

Fruit production also has experienced significant diversification in recent years. The planted area of citrus has been shrinking, but production improved in 1999 because of favorable weather. Banana production was down as a result of an infectious leaf disease and the aftermath of two severe typhoons in 1998. Grape producers suffered significantly because of severe damage to their irrigation systems caused by the earthquake.

The livestock sector continues to contract as a result of the government's phasing-out effort as well as the aftermath of foot and mouth disease (FMD) outbreaks, the latest of which was reported in February 2000 when more than 20 dairy goats died after becoming infected with the disease. The February outbreak not only led to heavy losses, but also prompted the Bureau of Animal and Plant Health Inspection and Quarantine to impose another quarantine on goat areas and slaughter stock. Because the outbreak was caused by outside contamination, prospects for development of the agricultural sector have become bleaker since the globalization trend may bring more serious threats of outside contamination. On the other hand, food system threats are not limited to FMD outbreaks; there are threats from other sources as well, such as the excessive use of pesticides, which should also be accounted for in the formulation and implementation of the agricultural safety mechanism.

Agricultural and food imports declined in 1999 because some food industry storage facilities and factories are located in the central region and suffered severe damage in the earthquake. The import values of cereal plus oilseeds declined by 5.6 percent, while processed food and beverage imports increased by 3 percent. Imports are expected to increase slowly as reconstruction proceeds and the economy recovers during 2000.

The total value of agricultural exports continued to decline in 1999. The country's major export is seafood and the total value of seafood exports declined by 3.8 percent in 1999 and is expected to remain stagnant in 2000 because of the loss of comparative advantages. However, exports of vegetable products increased by 22 percent because of economic recovery in the region. Processed food and beverage exports were also on the rise, increasing by 3 percent. During first-quarter 2000, seafood and processed food exports increased in value by 18 and 20 percent, respectively, while exports of vegetables declined by 9 percent.

Food and Agricultural Policy

The next few years will be a crucial period for the country following the election in March of a non-KMT president. How the new government deals with cross-strait relations will significantly affect the future of both sides. The political uncertainty will certainly destabilize the food industry and the economy as a whole.

Both China and Chinese Taipei were expected to enter the WTO by the end of 2000. However, after completing bilateral negotiations with the United States, China's bilateral negotiations with the European Community were reportedly stalled, lowering the chances that both countries could gain WTO acceptance this year. Entering the WTO would be a major shock to the domestic agricultural sector but a benefit to the manufacturing sector.

Regulations governing imports of agricultural products will likely become much more liberal after Chinese Taipei is granted WTO membership. The Council of Agriculture (COA) allotted a total of NT$21.5 billion (US$700 million) in 1999 to compensate those farmers who will suffer financially from the impending trade liberalization, with a further NT$25.3 billion (US$820 million) being set aside in 2000. In March 2000, the COA decided to increase funding to a total of NT$100 billion (US$3.2 billion) to offset potential losses.

The livestock industry has already suffered since livestock imports have been allowed since 1998 in accordance with a precondition for WTO membership. So far, the COA has offered a total of NT$9.6 billion (US$310 million) to 684 poultry farmers and 5,070 hog farmers on the condition that they leave the agricultural sector. Some hog farmers plan to relocate overseas. A Central Livestock Foundation was established in January 2000 to assist farmers in this transition period. The COA will continue eliminating inferior players in the farming industry to improve the sector's international competitiveness.

Other major agricultural policies include institutional reform—upgrading the COA to the ministry level; environmental protection—promoting biodiversity and national reserves; regulatory reform—revising outdated laws and regulations to meet current needs; and rural community reconstruction.

The new minister of COA recently announced his first policy priority, which is to restructure the farmers' associations. These politically important organizations, which function as cooperatives, play a crucial role in the rural financial market, but political interference has become a serious problem since local politicians regard them as important channels for fun-

neling campaign funds. During 1995 and 1996, many large-scale farmers' associations filed for bankruptcy because of bad loans to real estate developers who had good connections with local politicians. The search for a balance between stability and efficiency has become a major challenge for administrative authorities seeking to promote rural economic development.

Another policy priority is to integrate farmers into a more efficient food production/marketing/sales system. This policy is aimed at helping farmers become more competitive internationally. It will also help to maintain the balance in rural-urban development. The transformation of traditional agriculture into a service-based industry will provide the country with multifunctional and consumer-oriented farming services. How to achieve this goal is, of course, another great challenge for the new government.

New Food System Technologies

Biotechnology. In 1982, Chinese Taipei chose biotechnology as one of eight targeted technological development areas. Earlier agricultural R&D focused on traditional fermentation technology, enzymes, and antibiotic products. Chinese Taipei's development strategy is based on the "planning mode" as in Japan where the government initiates projects and provides funding. In 1984, a Biotechnology Development Center was established by the government with development of pharmaceuticals as the major goal. By 1992, there were 18 biotech companies producing pharmaceutical products. Although private companies are producing biotech products, biotech R&D is still mostly conducted by government-funded research organizations and academic institutions.

In 1995, the government listed biotechnology among the ten industries that qualified for special government assistance. Since then, a special task force in the Ministry of Economic Affairs has helped the private sector invest in 42 projects in the biotech and pharmaceutical fields, for a total investment of US$700 million (NT$23.1 billion). Of the 42 projects, 21 involve development, five are in the pharmaceutical industry, four are in the herbal medicine field, nine are new businesses related to biotech, and three are in other areas.

The government launched a biotech industry initiative in August 1995 that was renewed in 1997 and 1999. This program aims to support core R&D projects and infrastructure development such that Chinese Taipei will become a regional center for biotech R&D, manufacturing, and operations in the Asia Pacific. The program consists of the following seven tasks:

Task 1.
Completing related laws and regulations
- Establish rigorous evaluation systems for new drugs and biotech products to reinforce the capabilities and efficiency of government officials.
- Amend laws and regulations relating to the development of the biotech and pharmaceutical industries.
- Amend laws and regulations regarding the development of biocides.

Task 2.
Promoting investment
- Promote government and private sector investment in biotech businesses.
- Study and plan the establishment of Biotech Industrial Zones to expedite the development of biotech industries.

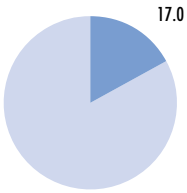
Task 3.
Research and development
- Strengthen the study of basic biotechnology and its application to biotech industries.
- Establish competitive and efficient peripherals for the development of biotech pharmaceuticals.
- Strengthen state-owned and private enterprise biotech R&D.

Task 4.
Technology transfer
- Improve the application and extension of biotech R&D results to biotech industries.
- Improve the introduction and transfer of technology.

Task 5.
Education and recruitment of professionals
- Improve the education of multidisciplinary professionals and the recruitment of overseas professionals to enhance biotech education and foster the introduction of biotechnology from abroad.

Task 6.
Intellectual property rights (IPRs) protection
- Improve safeguards on biotech IPRs through training programs, consultation on IPRs management, and research on patentable technology.

Task 7.
International certification and information
- Promote accreditation for international



SHARE OF POPULATION USING THE INTERNET
(PERCENT)

Good Manufacturing Practices (GMP).
- Build up academic and industry databases for biotechnology.

Academia Sinica is one of the many government agencies in charge of Task 3 and Task 4. In July 1994, Academia Sinica established a Biotechnology Promotion Committee. In June 1996, the academy's institutional management teams suggested that the academy should first establish an Institute of Bioagricultural Science (IBS) and then transform it into a biotech center. The IBS has since received very high-level support, both financially and administratively, and has inaugurated mission-oriented research programs. Its prime mission is to develop prioritized and coordinated research activities to generate IPRs for technology systems or novel product lines and to produce publication-quality journal papers. Therefore, the IBS provides networking opportunities for the agricultural and business sectors.

Within the academy, the IBS has linked up with the five life-science institutes, namely botany, zoology, molecular biology, biochemistry, and biomedical sciences, aiming to establish programmatic research projects on transgenic plants, vaccines for animals and marine aquaculture, Chinese herbal medicines, and industrial enzymes. An international rice genome sequencing project was initiated recently in which Chinese Taipei took on the task of sequencing chromosome five. The Academia Sinica Plant Genome Center began conducting pilot work on the genome project in 1999.

Outside the academy, the IBS has made alliances with the R&D departments of various organizations, including National Taiwan University, Taiwan Sugar Company, Domestic Animal Health Research Institute, Agricultural Research Institute, National Chinese Herbal Medicine Program, Flower Biotechnology Co., China Investment Fund, Scino Pharm Taiwan, Ltd., Yung-Shin Pharma IND Co., Ltd., and several young biotech companies. These alliances are designed to establish R&D programs on subtropical flowers and fruits, herbal medicines, infectious diseases of pigs, animal feed—supplemented and industrial enzymes, and stress-tolerant fruits and vegetable products such as a chilling-tolerant tomato. Despite government efforts to promote the biotech industry in Chinese Taipei, several bottlenecks remain, including the following:

- Lack of manpower—few job opportunities for biotech researchers in the private sector and insufficient basic training programs.
- Lack of technology and IPRs—few contracted research organizations and no ownership of IPRs by government-financed research institutes.
- Lack of technology transfer—few chances for technology transfer from researchers to manufactures and lack of OTT (operate-to-transfer) specialists to promote the transfer of biotechnology from research institutes to consumers.
- Lack of management—current managers have little expertise in biotechnology and there are too few biotech experts to help experienced managers switch to the biotech field.
- Lack of investment capital—there has been almost no successful private biotech investment in Chinese Taipei, making venture capitalists and bankers wary, and the related biotech industry for such products as microtiter plates and enzymatic reagents is very weak.

Nevertheless, the following strengths boost the potential for developing a biotech industry in the future:

- Manpower and technology—the country has a strong biotech promotion program to support the training of biotech specialists and it has many experienced researchers, some of whom are world leaders in their specialties.
- Capital—the government has allocated sufficient funds for promoting biotechnology and has sufficient national cash reserves for biotech investment in the private sector.
- Management—the country has many experienced managers in high-tech industries who are interested in biotechnology as a way to promote diversification.
- Market—the country is strategically located to market products to the Asia Pacific region and has many experienced merchants familiar with foreign markets.

Precision Farming. This technology is still in the early planning stages. At the end of 1998, the government announced a five-year project to invest NT$15 billion (US$500 million) in agricultural R&D, including precision farming technology. On-going related projects include:

- Using remote sensing and related technologies to replace aerial photography in crop acreage surveys;
- Constructing a nationwide geographic information system (GIS) database and eight

satellite stations;
- Integrating field data and satellite information to be applied in a precision farming management system;
- Integrating GIS, global positioning systems (GPS), and remote sensing technology to monitor crop production; and
- Applying precision farming techniques to crop growth and disaster monitoring systems.

The major strategy for the precision farming program is for the agricultural experiment station to choose a ten-hectare farm as the experiment site and establish a research team. Experiments focus on surveying crop acreage, estimating production, investigating natural disaster damage, and monitoring infectious crop disease outbreaks. After the earthquake, remote sensing was applied in a real-time data collection process.

The appropriate economic scale for use of this technology is one of the major concerns in the adoption and experimentation process. While the current international standard for farm size is about 200 to 5,000 hectares, the average farm size in Chinese Taipei is only one hectare. Therefore, the government must provide strong incentives to encourage farmers to form group cultivation teams so that the average farm size can be enlarged to 100 to 150 hectares. This is a very important and challenging step toward making precision farming profitable.

Internet. According to a survey by the Network Wizard Co., Internet use in Chinese Taipei grew rapidly during the past two years. The installation of web servers in Chinese Taipei ranked ninth worldwide and second (next to Japan) in Asia in 1999. Of companies with more than 1,000 employees, 50 percent have their own websites. The liberalization of the telecommunications services industry has accelerated the growth of Internet commerce as well as business-to-consumer electronic commerce (B2C EC) and business-to-business electronic commerce (B2B EC).

In its five-year development plan (2000–04), the COA allotted NT$1.5 billion (US$50 million) to build an agricultural marketing system on the Internet. The first year is devoted to constructing a global price and local transaction database on the Web to allow agribusiness and consumers electronic access to this market information. The database is divided into six categories: floral, vegetable, fruit, poultry, meat, and fishery products.

In addition, the COA selected five agricultural marketing companies or farmers' cooperatives in the Taipei metropolitan area to set up a Web-based extranet wholesale system. This system will become the model for e-commerce development in the future.

A NT$3 billion (US$100 million) project to establish a special agricultural products' logistics center in the Taipei area will be implemented in 2000. This project will improve the efficiency of the country's food marketing system by providing central storage facilities to meet today's consumer demand and by promoting e-commerce. This logistics center is considered a revolutionary food marketing system innovation. At present, however, agricultural e-commerce is still limited to large-scale enterprises and cooperatives.

Thailand

In 1999, the Thai economy clearly appeared to be rebounding. The economy expanded at 4 percent, a considerably higher rate than was anticipated, and the growth rate is expected to rise to 4.5 percent in 2000. The main factors jump-starting the Thai economy include the deficit fiscal policy and the recovery of exports.

In the agricultural sector, output expanded by 2 percent in 1999, with rice and other crops flowing in large amounts onto the market as a result of favorable weather conditions. Falling prices for agricultural products on the global market saw the value of agricultural exports decline by 6.6 percent compared with 1998. Furthermore, the ongoing sluggish domestic economy resulted in a 5 to 10 percent decline in domestic demand for farm goods. In response, the government provided various mechanisms to shore up farm prices.

Fishery production fell because of rising prices for diesel oil and the closure to Thai fishermen of waters belonging to neighboring countries. As world oil prices continued rising into first-quarter 2000, more problems for this sector were anticipated.

Poultry exports continued to rise to meet world market demand. However, livestock production overall expanded slowly. In the face of weak domestic purchasing power, pork consumption remained sluggish owing to short supply and high prices caused by an outbreak of foot and mouth disease and swine fever and a rise in feed prices. In addition, an outbreak of swine influenza virus (SIV) in neighboring countries caused pork consumption in southern Thailand to be cut in half in 1999, although consumption levels are expected to rebound in 2000.

In 2000, the agricultural sector is expected to expand by about 1.8 percent with a further 1 to 2 percent growth in 2001.

Food Prices and Consumption

The wholesale price index fell by 6.5 percent in 1999, reflecting a sharp decline in producer income, particularly that of farmers. Prices in the agriculture and food product categories of the WPI dropped by as much as 12.6 percent.

The consumer price index increased by only 0.3 percent in 1999 and inflation remained low. Inflation measured only 1.2 percent for the first half of the year as abundant agricultural output forced down prices. Moreover, energy prices were down, the value-added tax was cut from 10 to 7 percent, and the currency (baht) strengthened. In the second half of the year, the increase in world oil prices fueled a slight uptick in inflation. This indicated that domestic purchasing power had not yet strengthened sufficiently to allow producers to pass on production costs entirely to consumers.

In 2000, prices are expected to increase by 3 percent owing to strengthening domestic demand. Food prices will rise as agricultural output decreases in the wake of lower farm-gate prices in 1999. Production costs rose in tandem with the increase in world oil prices. Moreover, the baht is expected to weaken slightly in 2000, putting pressure on prices. The consumer price index dropped by about 0.4 percent for both food and nonfood items from March 2000 to April 2000.

Food Processing and Marketing

The development of Thailand's food industry is associated with the country's entry into international trade, which began in 1970. Between 1970 and 1980, processed food products were introduced for local consumption and production surpluses were exported. Exports increased after producers and processors learned how to improve product quality to meet importers' requirements.

Food products—mostly canned, frozen, and chilled products—accounted for 28 percent of the country's total exports in 1990. Since then, the world market has become more competitive. The government and the industry must also work to surmount trade barriers in various non-tariff guises, such as labeling requirements, genetic modification prohibitions, and animal welfare regulations. Among the new developments in 2000 will be the emergence of a commodities market in Thailand to make trade more systematic and, hopefully, to improve earnings.

Since Thailand has begun moving toward industry-based agriculture, and the export of value-added commodities instead of raw materials, the development of handling and processing technology has required the support of government, private enterprise, and farmers' groups. Thailand is among the largest exporters of processed food products with world leadership in the production and export of canned pineapple, canned tuna, frozen shrimps, and frozen chicken. The country is further known for its wide selection of tropical fruits and vegetables, which are processed into fruit and vegetable juice concentrates, dehydrated and frozen fruit products, and vegetable products.

The total value of food exports in 1999 was about US$10.2 billion. According to a Business Economic Department report on export earnings of prepared foods, the 1998 total reflected increases over 1997 of 37.8 percent for canned fish, 10.5 percent for canned fruit, 5.2 percent for processed seafood, and 9.5 percent for canned vegetables.

In first-quarter 1999, Thai chicken exports rose by 3.4 percent to 87,841 tons and were valued at US$78.7 million. Cooked and processed chicken meat accounts for 21 percent of chicken export volume and 35 percent of total value. Exports are expected to increase in 2000 with government support to remove quotas and tariffs on many animal feed ingredients helping bring down domestic chicken prices and improve export competitiveness.

Pineapple production in 1999–2000 increased by 38 percent over 1998–99 with a production total of 2,403 tons. At the beginning of 2000, the government provided price supports for pineapple because factories had overstocked pineapple products from the previous year. The government reported in January 2000 that total exports of pineapple products (canned, concentrated juice, and frozen) were expanding in volume and value since August 1999.

Agricultural Production and Trade

Because of more attractive prices and more favorable weather conditions, production of rice, rubber, pineapple, sugarcane, cassava, and palm oil is expected to rise in 2000. In the past, falling prices of these key agricultural commodities caused Thai farmers to pressure the government to provide price supports to subsidize farm income.

The competition in the world market will be intense in 2000, with countries trying to find non-tariff barriers to protect their domestic producers. The failure of WTO negotiations in 1999 has created more difficulties and delayed attempts by members, including Thailand, to liberalize agricultural trade.

Trade liberalization in the ASEAN Free Trade Area (AFTA) has slashed import tariffs to a maximum of 5 percent for 85 percent of all trade lines starting in 2000. Unprocessed agricultural goods will be included by 2003.

A five-year project to make farm products more competitive has been launched with a US$600 million loan from the Asian Development Bank. Agricultural products will be classified into three groups, each with specific production and marketing plans. The first group includes export crops such as rice, cassava, rubber, coffee, vegetables, livestock, prawns, and poultry. The second comprises products that are produced in insufficient quantities to meet domestic demand, such as soybeans and maize. The third consists of crops for which there is no domestic supply, such as cotton.

The plans will focus on curbing oversupplies, reducing production costs, and improving production efficiency. As part of its restructuring plans, the government will introduce the country's first commodities market. Initially, four products will be traded: rice, rubber, cassava, and prawns. Eventually, high-value-added products will be added.

Food and Agricultural Policy

In the face of surpluses on the world market, a stronger baht caused prices of Thai agricultural commodities to be less competitive in 1999. Both local consumption and exports of agricultural products started declining, requiring government intervention to stabilize prices.

Agricultural policy includes both short- and long-term strategies to stabilize prices. Matching production to demand for both local consumption and export is one strategy that has been investigated for problem commodities. The goal is to meet local demand and earn revenue from export without overtaxing farmers' resources. Plans to control production fall into three categories: 1) maintain production of rice, sorghum, cassava, cotton, soybean, mungbeans,

peanuts, rubber, coffee, pineapple, orchids, pigs, beef, chickens, and eggs; 2) increase production of sugarcane, palm oil, potatoes, durians, and cow's milk; and 3) reduce production of corn, garlic, red onions, jute, and black tiger prawns.

Other strategies for restructuring production and marketing systems include plans to

- Develop farm product quality and improve logistics for delivering farm goods to local and foreign markets more quickly and efficiently,
- Promote agro-industrial goods and farm product processing,
- Create a center for developing future agricultural products and technology and to promote agricultural professions, and
- Develop agricultural product export zones and reduce tariffs on farm and agro-industrial products.

During the financial crisis of 1997-99, the budget allocation for the Ministry of Agriculture and Cooperatives was cut by about US$584.2 million. A loan of about US$1.4 billion was provided by Japan under the Miyazawa Fund, which allowed some farm production programs to move forward. In 1999, another US$600 million from the Asian Development Bank was secured to fund programs to improve the production and quality of agricultural products.

Securing adequate water resources for irrigating farmland is a key factor in crop production in Thailand. The Irrigation Department has had difficulty providing sufficient water volume from its reservoirs nationwide. Currently, only 45 percent of total reservoir capacity is available to agricultural production. The government plans to invest about US$210 million, possibly from the external fund, to develop more effective irrigation systems.

The Bank for Agriculture and Agricultural Cooperatives (BAAC), the major source of financing for farmers, has 4.8 million members. Since the economic crisis in 1997, the bank has extended debt payment periods by five years and reduced interest rates for farmers by 1.5 percent to assist them in effectively managing production and marketing of their products. The government has injected US$158 million to strengthen BAAC and help farmers purchase low-priced fertilizer and farm facilities.

The government has implemented a fuel price reduction plan for the farm and fishery sectors. In addition, it removed import quotas and tariffs on many animal feed ingredients to help improve the competitiveness of livestock exports.

New Food System Technologies

Thailand is moving toward industry-based agriculture by developing technologies to handle and process commodities into value-added products rather than merely exporting raw materials. Currently, however, new agro-food products encounter trade barriers in various non-tariff guises. The industry needs to keep abreast of requirements such as stricter hygiene standards for food production and storage, labeling requirements concerning genetically modified ingredients, and animal welfare regulations. The application of genetic technology to food production clearly necessitates a comprehensive national strategy and adequate regulatory framework regarding food safety concerns, environmental impacts, and trade facilitation.

New technologies, such as modern biotechnology, provide powerful tools for sustainable development of agriculture, fishery, and forestry as well as the food industry. There are concerns about potential risks posed by some aspects of biotechnology. These risks fall into three basic categories: the effects on humans, on animal health concerns, and on environmental consequences. Given current trends in the application of genetic technology, particularly in the form of GMOs and genetically modified foods, countries urgently need to develop comprehensive national strategies and an adequate regulatory framework to assure safety and facilitate trade. One starting place would be a comprehensive review of the existing international norms and regulatory guidelines of international organizations, of international standard-setting bodies, and of countries with advanced experience.

Concurrently, countries may also consider establishing or strengthening internal coordination among agencies, institutes, and authorities with the aim of pooling resources and streamlining efforts. The focus should be on formulating national strategies and an adequate regulatory framework and developing short- and medium-term master plans. Such plans should incorporate major activities such as R&D, technology transfer, information exchange and networking. Active participation in the work of relevant international standard-setting bodies is also encouraged.

Under the WTO Agreement on Sanitary and Phytosanitary (SPS) Regulations, WTO members are bound to provide scientific justification and risk assessments for any SPS measure used. At the same time, these restrictions should be transparent (notification requirement) and should not be maintained without scientific evidence. More importantly, the measure should

not be applied in a way that would constitute arbitrary or unjustifiable discrimination.

The government of Thailand has called for safety evaluations of genetically modified plants and stressed the importance of a progressive and science-based exchange of views on the controversial problem areas. At their October 1999 meeting, ASEAN agricultural ministers agreed to establish a regulatory framework for foods derived from biotechnology and urged individual member countries to set up their own national authorities on genetic modification.

In January 2000, Thailand decreed that genetically modified seed could be planted for research purposes only and not on a commercial scale. Genetically modified cotton is being grown in field trials in Thailand.

Export certification or labeling regarding genetically modified ingredients is still voluntary depending on the agreement between the buyer and the seller. The Thai Food and Drug Administration needs more information before it will mandate labeling. The food safety and labeling committee of the Thai FDA is responsible for compiling the information concerning labeling requirements.

Grain for food and feed uses needs to be assessed for biosafety. The National Biosafety Committee has established a safety network to evaluate genetically modified foods derived from plants, microorganisms, and animals.

The National Center for Genetic Engineering and Biotechnology at the Ministry of Science, Technology and Environment is responsible for developing methods, training techniques, and equipment used for GMO detection as required by importing countries. Specific guidelines are being developed on transparency and the involvement of all stakeholders, particularly consumers, in the decision making process.

Canned tuna packed in soybean oil from Thailand has faced objections from importing countries because of claims that the oil is derived from genetically modified soybeans. In fact, the modified genes in the soybeans decompose and no longer exist after the oil is refined. Similarly, chicken meat obtained from chickens fed with genetically modified corn and soybean meal from genetically modified soybeans have been barred from importation into some countries. Again, no scientific evidence has proven a difference between chicken meat from chickens fed with genetically modified versus non-modified grains. Several scientific studies suggest that the modified genes in corn and soybeans are degraded in processing. To overcome trade barriers placed on foods derived from biotechnology, product lists must be developed on the basis of scientific information. There are several processed food products shipped from developing countries that raise issues regarding GMOs. Environmental and health measures may need to be introduced in the new round of negotiations on trade under the WTO for processed food and agricultural products containing GMOs.

United States

Real economic growth remained at a robust 4.2 percent in 1999 and is expected to increase to 4.6 percent in 2000 then slow slightly to 3.6 percent in 2001. Rising labor productivity, particularly during the past four years, has fueled much of this growth. Food prices are expected to increase by 2.2 percent in 2000 and then rise by less than 2 percent in 2001. The percentage of disposable income spent on all food will likely fall to 11 percent by 2001. Food and agricultural exports declined for the third straight year, but are expected to grow moderately in both 2000 and 2001. Food and agricultural imports set new records in 1998 and 1999 and will continue to do so in 2000. Merger activity remained strong among agribusiness firms in 1999, second only to the record set in 1998. Information and communications technology and biotechnology are two areas driving fundamental changes in agriculture and agribusiness. The number of farms with Internet access has doubled in two years, while business-to-business Web-based marketplaces are proliferating. Breakthroughs in biotechnology continue, though not without controversy over food safety and environmental issues.

Macroeconomic Situation and Outlook

Strong productivity growth will continue to drive robust US economic growth in 2000 and 2001. As an economic recovery ages, economic growth normally slows as employment growth and especially productivity growth slow. In contrast, growth in this expansionary cycle has continued to accelerate. Real GDP growth in the first five years of the current economic expansion (1991–1996) averaged 3 percent while over the last four years (1996–2000), real annual GDP growth has accelerated to an average 4.5 percent. Average annual employment growth picked up in the last four years to 1.9 percent compared with 1.3 percent for the first five years of the economic recovery. Labor productivity growth (real output per hour worked) has picked up even more dramatically, rising to an average of 2.8 percent per year over the last four years as compared with 1.9 percent for the first five years of the current expansion. In addition, higher real economic growth over this period has been accomplished with declining inflation.

US growth (on a year-over-year basis) is expected to average 4.6 percent in 2000 and 3.6 percent in 2001. Existing tight labor markets indicate that growth in employment and overall hours worked should slow in 2000 and 2001. Fortunately, productivity growth should remain very strong, generating continued strong overall economic growth.

From an aggregate supply perspective, labor productivity may rise for numerous reasons: (1) higher-quality labor (because of training and education), (2) higher-quantity or -quality of the capital stock per worker, (3) more efficient management techniques, and (4) lower costs for nonlabor and capital inputs (for example, falling energy or materials prices). Higher aggregate demand for goods and services also will raise measured productivity by causing existing labor and capital to be used more intensively.

In the last four years, measured productivity has been boosted by favorable supply and demand factors. The ratios of real business fixed investment to GDP and real trade to real GDP reached new historical highs in 1999. The strong business investment in the late 1990s has increased the quantity and quality of the US private capital stock, thus boosting labor productivity. The Internet has reduced product search time and costs for consumers and business firms. Businesses have less need to stockpile inventory and labor resources to meet unexpected

increases in aggregate demand. This has allowed both real and financial resources to be allocated more efficiently. The increasing share of real GDP devoted to trade has increased competition and allowed increased economic specialization, thus further boosting productivity. Falling import and materials prices further raised output and productivity by increasing competition and lowering overall input costs. Extremely strong consumer and business demand for goods and services in the second half of the 1990s generated a labor shortage that intensified labor and capital usage and further raised measured labor productivity. Most of these favorable factors are expected to continue in 2000 and 2001, generating productivity growth of 3 percent in 2000 and 2.3 percent in 2001.

Growth should gradually slow over 2000 and 2001 on a quarterly basis because of tight labor markets, higher real interest rates, and significantly slower growth in residential construction and consumer spending. Nonfarm labor hours worked grew by 3.1 percent in 1997, by 2.6 percent in 1998, and by 2 percent in 1999. Growth in nonfarm labor hours is projected to fall to 1.6 percent in 2000 and 1.3 percent in 2001.

Additional expected tightening of monetary policy through the first half of 2001, coupled with the effects of monetary policy tightening since summer 1999, should further moderate economic growth in 2001. The high expected returns on many business investment projects coupled with excellent business investment fund availability indicates that business capital spending will remain strong and continue growing in 2000 and 2001, despite higher real funds costs. Stronger expected foreign growth in 2000 and 2001 will boost US economic growth and partially offset slower growth in domestic US demand. US inflation should pick up only modestly in 2000 and 2001, primarily owing to continued strong productivity growth.

Food Prices and Consumption

Food prices are projected to rise by 2.2 percent in 2000 and by 1.7 percent in 2001, after a 2.1 percent increase in 1999. In 2000, food at home costs are projected to rise by less than 2 percent. The strongest price increases are expected for beef and pork, fresh vegetables, and highly processed foods such as cereals and bakery products. Also, processing and marketing costs, which particularly affect prices for highly processed foods, are expected to rise faster than the cost of farm commodities.

The CPI is expected to increase by 2.5 percent in 2000 and 2.3 percent in 2001, after a 2.2 percent increase in 1999. Four factors contributing to moderate retail food prices are (1) low overall inflation, which keeps costs related to food production and marketing from rising substantially (labor, packaging, transportation, and advertising); (2) stable farm value of the food dollar (about $.19 by 2001); (3) a trend toward economies of scale in the agricultural and food processing sector, which will slow the increase in per-unit production costs; and (4) a competitive environment in the food processing, food service, and retail markets. Although consolidation and concentration in the US meat sector has raised concerns, research has shown that consumers have benefited from lower per-unit processing costs while price competition remains strong.

Prices for food away from home, which contains a large service component and is influenced by developments in the nonfarm markets, are expected to rise faster than prices for food at home, increasing by around 2.3 percent in 2000 and 2 percent in 2001. Continued strong competition in the food service industry prevents complete pass-through of higher wage and raw material costs to consumers.

The percent of the consumer food dollar spent away from home has risen from 39 percent in 1968 to 45 percent in 1978 to 47 percent in 1998, where it remained in 1999. The percentage of disposable income spent on all food is expected to decline, from 11.7 percent in 1990 to 11 percent in 2000 and 2001. Rising household income should cause per-capita food expenditures to climb from $6.21 per day in 1990 to an estimated $7.67 in 2001.

Per-capita caloric intake is expected to increase to 3,750 calories a day in 2001 from 3,457 in 1990, an increase of over 8 percent. About 27 percent of caloric intake comes from animal products with the remaining 73 percent from vegetable products.

FOOD PRICES
(PERCENT CHANGE)

Food Processing and Marketing

The food marketing system continues to be one of the largest sectors in the US economy, accounting for a tenth of the value added to the GDP and directly employing 10 percent of the nation's labor force. By 2001, the food marketing system is expected to earn $.81 of every $1 spent by consumers on food, up from $.76 in 1990.

After a long-term decline, the number of US food processing establishments has stabilized at about 20,000. These establishments had estimated sales of $504 billion in 1999, with sales projected to reach $530 billion in 2001. Major

food processors such as Campbell Soup, Quaker Oats, and H.J. Heinz continue to spin off brands and noncore operations to reduce costs and refocus marketing efforts. Still, the number of new food and beverage product introductions reached a record 14,695 in 1999, up from 13,823 in 1998.

Merchant food wholesalers buy products from manufacturers and distribute them to retailers and the food service industry. Wholesalers' sales totaled $363 billion in 1999 and are projected to reach $385 billion in 2001. Rapid consolidation continues in this industry with sales of the largest general-line grocery wholesaler reaching over $22 billion in 1999.

Food store sales reached $462 billion in 1999 and are projected to expand to $500 billion in 2001. This total does not include grocery sales from supercenters operated by mass merchandisers such as Wal-Mart or from warehouse clubs. After remaining fairly flat for many years, the share of total US grocery store sales controlled by the four largest firms has increased sharply since 1997. From 1996 to the end of 1998, the largest four retailers' share of sales rose from 17.8 to 26.8 percent, while the share of sales controlled by the top 20 retailers rose from 40 to 48.2 percent.

Sales of meals and snacks in the food service industry reached an estimated $330 billion in 1999 and are projected to rise to $340 billion in 2000 and $354 billion in 2001. Takeout food is the fastest-growing segment, increasing by 7 percent in 1998 to $110 billion in sales and projected to reach $135 billion in 2001. Fast-food restaurants currently account for 70 percent of takeout sales, but full-service restaurants and supermarkets represent a significant and growing share.

Merger and divestiture activity remains strong. There were 753 acquisitions and divestitures in 1999, second only to the record 813 in 1998. Food processing firms accounted for the largest portion with restaurants the second most-active food industry group.

The US foreign direct investment position in food processing affiliates abroad continued to grow steadily reaching $34 billion in 1998 from $32 billion in 1997. Sales of these US-owned affiliates totaled $128 billion in 1997 and are projected to top $150 billion in 2001. US exports of processed food peaked at $31 billion in 1997, then declined by 6 percent in 1998 and by another 2.6 percent in 1999 to $28.7 billion.

Foreign direct investment in the US food processing sector declined sharply to $18.1 billion in 1998 from $26.7 billion in 1997. In contrast, processed food imports into the United States grew by 5.8 percent in 1998 and by another 8.4 percent in 1999 to a record $34.7 billion.

Agricultural Production and Trade

US agricultural exports declined in 1999 for the third consecutive fiscal year (ending September 30), but are expected to rise slightly in FY 2000 and show a little more growth in FY 2001. The recovery of global economic growth after the crisis in Asia will be primarily responsible for the expected export gains in 2000 and 2001. Some decline in the US dollar's value, reflecting higher inflation in the rest of the world, also should support growth in US agricultural exports in 2000 and 2001. Continued progress toward freer trade through ongoing policy reforms also is expected to contribute to export growth. And prices of some commodities, particularly livestock products, already are showing slight gains, which are expected to help boost export value.

In FY 1999, US agricultural exports dropped sharply to $49 billion, nearly 9 percent less than the $53.6 billion total in FY 1998. Agricultural imports continued rising, reaching $37.5 billion, $500 million more than in FY 1998.

Bulk commodities exports (wheat, rice, coarse grains, soybeans, cotton, and tobacco) accounted for about half of the export decline in 1999, falling by $2.3 billion to $17.8 billion. Most of the decline was in soybeans and cotton, off by more than $1 billion each, as both prices and demand remained low. High-value product exports also fell by $2.4 billion to $31.2 billion in FY 1999, the second consecutive annual decline after rising steadily since 1991.

FY 1999 exports to Asia as a whole continued lower due to lingering effects of the financial crisis there, declining by a further $1.3 billion from FY 1998. Exports to Canada stagnated in 1999, while exports to Mexico slipped by nearly $300 million. Exports to the EU fell by nearly 19 percent from FY 1998.

In FY 2000, US agricultural exports are forecast to reach $50.5 billion, up by $1.5 billion from FY 1999 (this estimate does not include the 3 million tons of food aid announced in February 2000 valued at about $500 million). US agricultural imports are forecast at $39 billion, $1.5 billion above 1999. The forecast US agricultural trade surplus remains at $11.5 billion, the same as in FY 1999 and the lowest since FY 1987. Gains in value and volume of livestock and poultry products, horticulture products, and cotton primarily account for the overall 2000 export increase.

Continued low prices and strong foreign

competition are preventing overall recovery in 2000 grain and oilseed exports. With anticipated larger foreign production and increased export competition from a number of countries, grain supplies still are expected to be ample and prices continue to be pressured lower. Prospects for smaller 2000 US soybean supplies, however, have pushed US soybean prices up slightly.

Exports to Canada and Mexico are forecast to rise by 6 to 8 percent over 1999.

Exports to Asia forecast for 2000 are little changed from 1999. Exports of US beef to South Korea are projected to rise, but competition from China will limit gains in US corn exports to Korea. Exports to Japan in 2000 are projected to be higher than 1999.

For imports, the robust US economy and strong dollar continue driving demand. Horticultural products lead the expected growth. US demand for fruits, juices, vegetables, and wine is expected to continue rising, driven partly by the dollar's high purchasing power.

New Food System Technologies

Information and communications technology and biotechnology are the new keys to progress in agriculture. Both sectors have large, established firms and a myriad of startups with great earnings potential but highly uncertain futures. Most startups in both sectors have yet to earn positive returns on their investments and have experienced wild swings in stock market valuation. The large traditional firms, such as long-distance phone companies (information and communications) and pharmaceutical and seed companies (biotechnology), have increasingly invested in emerging technology as a way to increase, or maintain, their presence in the market.

Personal computer use for farm business increased by 20 percent between 1997 and 1999. Roughly a quarter of all farms in the United States now use personal computers in their operations, though 40 percent of farms either own or lease computers. Fifty-three percent of farms with sales greater than $100,000 used personal computers in 1999.

The Internet has an evolving role in all aspects and sectors of the agriculture industry, from agricultural production to food safety and nutrition. The breadth and depth of the role, however, is greatly in flux and the ultimate effect on agricultural markets is far from certain. Often in the past, new technology has meant fewer farmers were needed to meet market demand. The Internet will have a profound impact on the farm, but it will not necessarily mean fewer farmers. It will bring new efficiencies, but also increased market opportunities.

The Internet makes information ranging from weather forecasts to commodity prices readily available to the farm. This information brings new power and precision to decisions farmers must make such as what crops to plant and which seed to use.

The number of farms with Internet access doubled between 1997 and 1999. As much as 43 percent of farms with sales of over $100,000, and 85 percent of farmers between the ages of 25 and 45, already have Internet access.

Auctions are now being tried on the Internet. These sites bring purchasers and sellers into a virtual marketplace. Purchasers offer a price for a product and the seller can decide whether to accept. Livestock was the first sector to experience virtual market activity.

Farmers with Internet access have expressed an interest in purchasing agricultural inputs on-line and major agricultural companies and cooperatives are rushing to meet this demand. Some companies have established on-line sites and advertise through directories and other sites. Others are developing more complex systems called business-to-business (B2B) sites.

Unlike some other developments on the Internet, B2B is already a proven business model. The first B2B developments were in the old-line manufacturing industries, such as the automotive industry. These dedicated systems connecting manufacturers with their suppliers are now being moved to the Internet thanks to very recent developments in software technology. Major agribusiness firms are developing B2B models at all levels of the vertical supply chain.

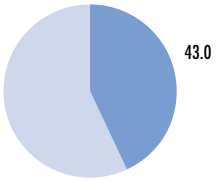
A number of sites also are being established as comprehensive Web-based marketplaces. These are similar in concept to B2B sites, but are more inclusive, bringing together local farm retailers, cooperatives, and manufacturers. Just now starting to come online, the comprehensive sites are being designed to make it easier for farmers to do business on the Internet. These sites will be two-way virtual electronic malls for the agriculture industry that will be open seven days a week, 24 hours a day.

The virtual marketplaces are being designed to allow farmers not only to purchase farm supplies and equipment, but also to market their livestock and crops and to purchase crop protection products and fertilizers. Product information, prices, and delivery options from participating suppliers, cash grain bids from competing buyers, and other lines of business will be organized into user-friendly, secure systems. These sites are being organized by major agriculture companies, such as Cargill and

Dupont, as well as by local farmer cooperatives.

Revolutionary developments also are taking place in the consumer marketplace. Supermarkets in some areas have been recruited by Internet companies to market some of their retail goods in online auctions. For example, a consumer accesses a bid site and determines whether he would like to purchase the retail items offered, such as cola. The consumer submits a bid and the supermarket decides whether to accept or reject it. If it accepts the bid, the supermarket can decide which manufacturer's product (for example, which company's cola product) it will sell at that price.

Consumers also have begun to search for niche products online. Wine and organic foods are two product lines that have been somewhat successfully marketed directly to consumers via the Internet. Nurseries also have begun to get involved in the Internet. The major Internet issues still unresolved include privacy concerns, tax regimes, and international commerce.



INTERNET USE (PERCENT) BY FARMS WITH SALES OVER $100,000, 1999

Biotechnology also has been gaining ground in the food industry, but not without controversy concerning food safety and environmental issues. The need for biotech solutions has arisen because of the rising demand for food resulting from continuing world population growth at the same time returns from traditional plant breeding programs are diminishing.

Through biotechnology, great strides have been made in developing pest-resistant crops that reduce input costs and raise yields. US farmers now are cutting back on these crops, however, since the market for genetically modified crops has become increasingly uncertain. Some companies are declining genetically modified crops in response to protests. Food safety is an increasingly contentious issue, especially in some international markets. Environmental issues also exist, though mechanisms are in place to review environmental safety when introducing new plants.

Genome research is the next breakthrough in biotechnology. Genomes are the chemical sequences that make up the DNA in every cell of a given plant or animal. In 1999, the fruit fly became the second animal species to have its genome nearly completely identified after almost all of the 165 million chemical letters that make up its DNA were determined. The knowledge gained in genome research could one day help agricultural researchers to develop healthier and more nutritious crops and livestock.

Australia

	Units	1996	1997	1998	1999	2000*E*	2001*F*
FOOD CONSUMPTION PATTERNS *a*							
Per-capita caloric intake	Cal/day	3,066	3,063	3,059	3,056	3,053	3,050
From animal products	Cal/day	1,039	1,034	1,028	1,023	1,018	1,013
From vegetable products	Cal/day	2,027	2,029	2,031	2,033	2,035	2,037
Protein (% of calories)	%	13.9	13.9	13.9	13.9	14.0	14.0
Fat (% of calories)	%	31.5	31.4	31.3	31.2	31.2	31.1
Carbohydrates (% of calories) b,c	%	49.9	50.0	50.1	50.2	50.3	50.4
INCOME AND FOOD PRICES							
Per-capita income *d,e,f,g*	US$/capita	12,444	12,637	12,892	13,108	13,296	13,628
% of disposable income spent on food *d,h*	%	14.6	14.5	14.3	14.5	14.6	14.2
% spent eating out *d,h*	%	2.1	2.1	1.8	2.2	2.0	1.9
Food price index *i*	1990=100	116.0	119.0	122.2	127.1	130.4	133.8
General price index (CPI) *i*	1990=100	116.1	116.4	117.4	119.1	122.3	125.3
POPULATION *e*							
Total population	Million	18.3	18.5	18.8	19.0	19.2	19.2
Urban *j*	Million	14.9	15.1	15.3	15.5	15.7	15.7
Nonurban	Million	3.4	3.4	3.5	3.5	3.5	3.5
Share of population in the following age groups *b,k*							
0–4 years	%	7.6	7.6	7.5	7.5	na	na
5–14 years	%	15.3	15.4	15.5	15.5	na	na
15–19 years	%	7.5	7.6	7.7	7.8	na	na
20–44 years	%	41.4	41.7	41.9	42.1	na	na
45–64 years	%	22.5	23.2	23.9	24.7	na	na
65–79 years	%	10.1	10.2	10.3	10.5	na	na
80–over years	%	2.8	2.9	3.0	3.1	na	na
Median age of population	Years	34.0	34.3	34.6	34.9	na	na
Female labor force participation *l*	%	53.8	53.7	53.9	53.6	na	na
LIFE EXPECTANCY *m*							
Males	Years	75.4	75.4	75.4	76.0	75.4	75.4
Females	Years	81.2	81.2	81.2	81.0	81.2	81.2
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports *n*	1,000 Tons	20,199	24,536	20,369	22,330	22,330	22,430
Grain imports *b,n*	1,000 Tons	104	43	51	45	45	40
Total food and agricultural trade *o*	Million US$	14,209	16,178	15,571	16,753	14,725	14,725
Total food and agricultural exports *o,p*	Million US$	11,990	13,823	13,027	14,203	12,125	12,125
Perishable products *o,p*	Million US$	4,621	5,458	5,715	6,336	6,297	6,297
Fishery exports *p*	Million US$	1,008	1,112	898	1,148	992	1,185
Total food and agricultural imports *q*	Million US$	2,219	2,355	2,544	2,550	2,600	2,600
Perishable products *q*	Million US$	556	541	596	600	650	650
Fishery imports *r*	Million US$	394	390	378	na	na	na
Port capacity *r,s*	1,000 TEUs	1,868	2,060	na	na	na	na
Power generation *b,t*	Gigawatts	177,596	182,988	194,380	199,435	203,769	208,961
Percent of population with refrigerators	%	100.0	100.0	100.0	100.0	100.0	100.0
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP *d*	%	2.9	2.6	2.7	2.7	2.7	2.7
Self-sufficiency in grains *b,u*	%	296.0	388.0	299.0	311.0	336.0	317.0
Self-sufficiency in horticultural products *b,p,q*	%	171.0	195.0	182.0	na	na	na
POLICY TRANSFERS *v*							
Consumer subsidy equivalents	%	–6.0	–4.0	–3.0	–3.0	na	na
Total transfers (subsidy/tax)	Million US$	–288.0	na	na	na	na	na
Total transfers per capita	US$/capita	–16.0	na	na	na	na	na
MACROECONOMIC INDICATORS *b*							
GDP growth	%	4.5	3.8	4.8	4.3	4.0	3.5
Interest rate	%	10.8	9.7	8.4	8.0	8.4	8.7
Exchange rate	AU$/US$	0.76	0.78	0.68	0.63	0.64	0.65

na = not available E = estimate F = forecast

a. FAO database.
b. Data on a financial year (July--June) basis (1990=1989--90).
c. ABS, Apparent Consumption of Foodstuffs and Nutrients Australia, cat. no. 4306.0. Data beyond 1992 have been extrapolated from historical trend.
d. ABS, National Income, Expenditure and Product, cat. no. 5206.0.
e. ABS, Australian Demographic Statistics, cat. no. 3101.0.
f. Data expressed in average 1989--90 prices.
g. Series has changed from that reported in previous years, for example now includes investment income from retirement funds.
h. ABS, Retail Trade, cat. no. 8501.0.
i. ABS, Consumer Price Index, cat. no. 6401.0.
j. Defined as sum of persons in population centers greater than 30,000 residents.
k. ABS, Estimated Resident Population of Australia, cat. no. 3201.0.
l. ABS, Labour Force, cat. no. 6202.0.
m. United Nations, World Population Prospects 1994 revision.
n. ABS, Foreign Trade: Magnetic Tape Service, cat. no. 5464.0.
o. Data expressed in chain volume measures. Reference year is 1996--97. Balance of payments basis.
p. ABS, Merchandise Exports - Australia, cat. no. 5432.0.
q. ABS, Merchandise Imports - Australia, cat. no. 5433.0.
r. Total of major Australian ports of Brisbane, Sydney, Melbourne, Adelaide, and Freemantle.
s. Bureau of Transport and Communication Economics, Waterline, issue no. 14.
t. ABARE, Australian Energy Market Developments and Projections to 2014--15, 1999.
u. ABARE, Australian Commodity Statistics, 1998; ABARE, Australian Commodities, March 1999.
v. OECD, Agricultural Policies in OECD Countries, 1997.

Canada

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake *a*	Cal/day	3,056	3,127	3,114	3,110	3,127	3,130
From animal products	Cal/day	849	906	896	894	906	890
From vegetable products	Cal/day	2,207	2,221	2,218	2,217	2,221	2,220
Protein (% of calories)	%	14.7	14.5	14.3	14.1	14.1	14.1
Fat (% of calories)	%	33.6	33.3	33.1	32.9	32.9	33.0
Carbohydrates (% of calories)	%	51.8	52.2	52.6	53.0	53.4	53.4
INCOME AND FOOD PRICES							
Per-capita income *b*	US$/capita	12,596	11,600	11,490	11,805	12,160	12,500
% of disposable income spent on food c	%	13.6	13.7	13.7	13.7	13.6	13.6
% spent eating out *c*	%	4.3	4.3	4.3	4.3	4.4	4.4
Food price index *c*	1992=100	106.0	108.2	109.7	111.0	112.9	114.8
General price index (CPI) *d*	1992=100	105.9	107.8	109.8	112.1	114.6	117.1
POPULATION							
Total population *e*	Million	30.0	30.3	30.6	30.9	31.4	31.9
Urban	Million	23.0	23.2	23.5	23.8	24.3	24.7
Nonurban	Million	7.0	7.0	7.1	7.1	7.1	7.2
Share of population in the following age groups							
0–4 years	%	6.6	6.4	6.3	6.0	5.8	5.7
5–14 years	%	13.6	13.6	13.5	13.4	13.3	13.3
15–19 years	%	6.8	6.8	6.8	6.8	6.7	6.7
20–44 years	%	39.6	39.3	39.0	38.6	38.2	37.9
45–64 years	%	21.3	21.7	22.2	22.7	23.3	23.8
65–79 years	%	9.4	9.4	9.5	9.6	9.6	9.6
80–over years	%	2.7	2.8	2.8	2.9	3.0	3.0
Median age of population *e*	Years	35.2	35.6	36.0	36.4	36.8	37.1
Female labor force participation *f*	%	57.6	57.4	58.1	58.1	58.2	58.3
LIFE EXPECTANCY *g*							
Males	Years	75.5	75.8	75.9	76.0	76.1	76.1
Females	Years	81.2	81.4	81.6	81.8	81.9	81.9
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports *h*	1,000 Tons	25,580	24,434	18,375	21,808	22,400	23,000
Grain imports *h*	1,000 Tons	940	1,557	786	1,009	2,200	2,300
Total food and agricultural trade *h*	Million US$	24,484	26,958	25,186	24,760	26,000	27,000
Total food and agricultural exports *h*	Million US$	14,748	16,164	14,135	13,600	14,300	14,800
Fishery exports *i*	Million US$	2,184	2,201	2,162	2,177	2,200	2,300
Total food and agricultural imports *h*	Million US$	9,866	10,341	11,051	11,160	11,700	12,200
Perishable products *h*	Million US$	4,091	4,211	4,550	4,830	5,120	5,376
Fishery imports *i*	Million US$	1,177	1,143	1,213	1,283	1,400	1,450
Port capacity *j*	Million tons	407	410	413	417	420	420
Road access *k*	1,000 Kms	905	908	912	915	918	920
Rail access *k*	1,000 Kms	77	77	76	75	74	74
Telecommunications *l*	Lines	18,051	18,051	18,051	18,051	18,051	18,051
Power Generation *m*	Billion Kwh	551	551	543	547	552	552
Percent of population with refrigerators *n*	%	99.6	99.6	99.6	99.6	99.6	99.6
FOREIGN INVESTMENT IN THE FOOD SECTOR *o*							
Inward FDI in the food sector, total	Million US$	13,138	14,449	15,000	13,000	14,000	14,000
From other PECC economies	Million US$	6,324	6,379	6,000	6,200	6,200	6,200
Outward FDI in the food sector, total	Million US$	6,085	5,956	5,800	7,400	7,000	7,500
To other PECC economies	Million US$	3,319	3,115	3,100	3,200	3,200	3,600
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP *p*	%	1.8	1.7	1.6	1.6	1.6	1.7
Self-sufficiency in grains	%	2.1	1.7	1.8	1.8	1.8	1.8
Self-sufficiency in horticultural products	%	0.9	0.9	0.9	0.9	0.9	0.9
POLICY TRANSFERS							
Consumer subsidy equivalents *q*	%	–12.3	–14.4	–14.0	–17.0	–17.0	–14.0
Total transfers (subsidy/tax) *q*	Million US$	5,237	4,329	4,300	4,700	4,700	4,300
Total transfers per capita	US$/capita	175	143	141	152	150	145
MACROECONOMIC INDICATORS *R*							
GPD (Real at 1992 market prices) growth	%	1.2	3.8	3.0	4.2	3.2	2.8
Interest rate	%	6.1	5.0	6.6	6.7	7.0	7.1
Exchange rate	CAN$/US$	1.36	1.39	1.48	1.50	1.45	1.43

na = not available E = estimate F = forecast

a. Food and Agricultural Organization.
b. Conference Board for Forecasts, Statistics Canada.
c. Catalogue No. 62-555-SPE (Household Surveys Division) and CANSIM Matrix 9957 Agriculture and Agri-Food Canada, Statistics Canada.
d. CANSIM Matrices 6544 and 9957, Conference Board for Forecasts, Statistics Canada.
e. CANSIM Matrices 6367-6379, 6231, 6900, Statistics Canada.
f. CANSIM Matrix 3472 and Catalogue No. 71 F0004-XCB, Statistics Canada.
g. Catalogue No. 82-221-XDE, Statistics Canada.
h. Agriculture and Agri-Food Canada, Agri-Food Trade Highlights, Statistics Canada.
i. Department of Fisheries and Oceans, Statistics Canada.
j. Canadian Transportation Agency, Statistics Canada.
k. Transport Canada, Canada Yearbook 1999, Statistics Canada.
l. CANSIM series D462222, Statistics Canada.
m. CANSIM series D372136, Statistics Canada.
n. CANSIM series D339998, D339999, Statistics Canada.
o. CANSIM Label: D79320, Statistics Canada.
p. CANSIM Matrix 3571, 6548, 6549, 9015-9026, Agriculture and Agri-Food Canada, Medium-Term Policy Baseline, Statistics Canada.
q. OECD Monitoring and Evaluation, Agriculture and Agri-Food Canada.
r. Bank of Canada, Statistics Canada, Conference Board.

Chile

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake	Cal/day	2,810	na	na	na	na	na
From animal products	Cal/day	605	na	na	na	na	na
From vegetable products	Cal/day	2,205	na	na	na	na	na
Protein (% of calories)	%	11.0	na	na	na	na	na
Fat (% of calories)	%	26.0	na	na	na	na	na
Carbohydrates (% of calories)	%	63.0	na	na	na	na	na
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	4,621	5,113	4,815	4,400	4,600	na
% of disposable income spent on food	%	27.7	27.0	27.0	26.8	27.1	na
% spent eating out	%	3.7	3.7	3.5	3.5	3.5	na
Food price index	1990=100	189.1	206.6	208.0	215.0	224.0	230.0
General price index (CPI)	1990=100	188.6	200.0	209.4	214.4	221.0	na
POPULATION							
Total population	Million	14.4	14.6	14.7	15.0	15.2	na
Urban	Million	12.2	12.4	12.5	12.8	13.0	na
Nonurban	Million	2.2	2.2	2.2	2.2	2.2	na
Share of population in the following age groups							
0–4 years	%	10.2	10.0	9.8	9.6	9.4	na
5–14 years	%	19.1	19.1	19.1	19.0	19.0	na
15–19 years	%	8.4	8.4	8.4	8.4	8.4	na
20–44 years	%	39.4	39.3	39.1	38.9	38.7	na
45–64 years	%	16.1	16.4	16.6	17.0	17.2	na
65–79 years	%	5.5	5.6	5.7	5.7	5.8	na
80–over years	%	1.2	1.2	1.2	1.2	1.3	na
Median age of population	Years	27.3	27.5	27.8	28.3	30.6	na
Female labor force participation	%	31.9	32.3	32.7	33.0	33.2	na
LIFE EXPECTANCY							
Males	Years	72.2	72.3	72.3	72.4	72.6	na
Females	Years	78.2	78.3	78.3	78.4	78.6	na
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports	1,000 Tons	91	99	136	137	na	na
Grain imports	1,000 Tons	1,421	1,304	1357	2137	na	na
Total food and agricultural trade	Million US$	5,621	5,539	5,575	5,799	5,860	na
Total food and agricultural exports	Million US$	4,324	4,218	4,314	4,643	4,830	na
Perishable products	Million US$	1,487	1,429	1,482	1,547	na	na
Fishery exports	Million US$	1,772	1,873	1,673	1,806	1,900	na
Total food and agricultural imports	Million US$	1,297	1,321	1,261	1,156	1,030	na
Perishable products	Million US$	260	272	283	312	na	na
Fishery imports	Million US$	33	30	24	na	na	na
Port capacity	1,000 Tons	30,959	30,917	28,212	na	na	na
Road access	Kms	79,068	79,077	79,144	79,353	na	na
Rail access	Kms	5,998	na	na	na	na	na
Telecommunications	1,000 Lines	2,151	2,354	2,753	2,942	na	na
Power generation	Gigawatts	30,261	32,332	34,886	38,019	na	na
Percent of population with refrigerators	%	54.6	54.6	77.8	77.8	77.8	na
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total	Million US$	37.7	26.0	21.1	22.1	na	na
From other PECC economies	Million US$	19.7	13.3	na	na	na	na
Outward FDI in the food sector, total	Million US$	26.6	1.4	101.3	20.4	na	na
To other PECC economies	Million US$	0	0	89.6	20.9	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP	%	6.5	6.0	5.9	5.7	5.8	na
Self-sufficiency in grains	%	66.0	71.2	61.2	54.1	na	na
Self-sufficiency in horticultural products	%	100.0	100.0	100.0	100.0	100.0	na
POLICY TRANSFERS							
Total transfers (subsidy/tax)	Million US$	173.9	228.2	268.4	na	na	na
Total transfers per capita	US$/capita	12.1	15.6	18.8	na	na	na
MACROECONOMIC INDICATORS							
GDP growth	%	7.2	7.1	3.4	–1.1	5.5–6.0	na
Interest rate	%	7.3	6.8	9.6	6.0	5.7	na
Exchange rate	CLPeso/US$	412.30	419.30	460.29	508.78	534.00	na

na = not available E = estimate F = forecast

Sources:
Central Bank
FAO
INE
ODEPA
MOP
CASEN
PROCHILE
SONAPESCA

China

	Units	1996	1997	1998	1999	2000*E*	2001*F*
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	582	623	654	707	757	na
% of disposable income spent on food	%	39.3	37.6	35.5	31.0	30.0	na
% spent eating out	%	3.9	4.0	4.0	4.0	4.0	na
Food price index	1990=100	222.0	221.8	204.1	195.5	196.5	198.4
General price index (CPI)	1990=100	198.6	204.2	187.9	185.3	186.4	na
POPULATION							
Total population	Million	1,223.9	1,236.3	1,248.1	1,259.1	1,270.4	na
Urban	Million	359.5	369.9	379.4	388.9	392.4	na
Nonurban	Million	864.4	866.4	868.7	870.2	878.0	na
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports	1,000 Tons	1,240	8,330	8,890	7,580	na	na
Grain imports	1,000 Tons	10,890	4,170	3,880	7,720	na	na
Total food and agricultural trade	Million US$	34,570	26,960	22,170	21,750	na	na
Total food and agricultural exports	Million US$	16,000	15,160	13,840	13,540	na	na
Fishery exports	Million US$	1,734	1,881	1,730	1,940	na	na
Total food and agricultural imports	Million US$	18,570	11,800	8,330	8,210	na	na
Fishery imports	Million US$	na	na	1,020	1,290	na	na
Port capacity	1,000 Tons	483,210	801,660	922,370	1,051,620	na	na
Road access	1,000 Kms	1,186	1,226	1,279	1,352	na	na
Rail access	1,000 Kms	57	58	58	58	na	na
Telecommunications	1,000 Lines	112	736	1,577	1,760	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GNP	%	20.7	19.4	18.9	17.6	na	na
Self-sufficiency in grains	%	98.1	100.9	100.5	100.8	na	na
MACROECONOMIC INDICATORS							
GDP growth	%	9.7	8.8	7.8	7.1	7.0	na
Interest rate	%	7.5–11.0	5.7–7.5	4.8–5.7	4.0	4.0	na
Exchange rate	Yuan/US$	8.31	8.29	8.30	8.30	8.30	na

na = not available E = estimate F = forecast

Sources:
China Statistics Yearbook, various issues (1996–2000)
Customs Statistics Yearbook, various issues (1996–2000)
China Rural Statistics Yearbook, various issues (1966–2000)

Colombia

	Units	1996	1997	1998	1999	2000*E*	2001*F*
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake	Cal/day	2,742	na	2,777	na	na	na
From animal products	Cal/day	433	na	439	na	na	na
From vegetable products	Cal/day	2,309	na	2,338	na	na	na
Protein (% of calories)	%	8.6	na	8.7	na	na	na
Fat (% of calories)	%	29.0	na	29.0	na	na	na
Carbohydrates (% of calories)	%	62.4	na	62.8	na	na	na
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	2,264	2,279	2,256	2,261	2,306	2,090
% of disposable income spent on food	%	33.2	32.8	31.0	28.0	28.0	30.0
% spent eating out	%	1.8	1.6	2.5	6.0	6.0	6.0
Food price index	1990=100	329.7	389.0	450.1	508.6	559.4	609.7
General price index (CPI)	1990=100	363.8	429.3	501.0	576.1	633.8	696.9
POPULATION							
Total population	Million	39.4	40.1	40.7	41.4	42.2	43.6
Urban	Million	29.9	30.7	31.2	31.9	32.7	33.8
Nonurban	Million	9.5	9.4	9.5	9.5	9.5	9.8
Share of population in the following age groups							
0–4 years	%	na	11.8	na	11.8	na	11.1
5–14 years	%	na	21.1	na	21.1	na	21.7
15–19 years	%	na	11.6	na	11.6	na	12.0
20–44 years	%	na	36.2	na	36.2	na	36.9
45–64 years	%	na	14.8	na	14.8	na	14.6
65–79 years	%	na	3.3	na	3.3	na	3.2
80–over years	%	na	1.2	na	1.2	na	1.0
Median age of population	Years	na	22.0	na	22.0	na	23.1
Female labor force participation	%	22.2	22.3	22.3	22.5	23.0	25.0
LIFE EXPECTANCY							
Males	Years	69.9	70.1	70.3	70.7	70.9	68.6
Females	Years	72.9	73.2	73.5	73.7	73.9	74.9
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports	1,000 Tons	5	0	0	0	0	0
Grain imports	1,000 Tons	2,708	2,903	1,841	1,951	2,049	1,800
Total food and agricultural trade	Million US$	5,263	6,260	6,040	6,240	6,511	6,600
Total food and agricultural exports	Million US$	3,370	4,239	3,992	4,152	4,318	4,400
Perishable products	Million US$	966	917	986	1,035	1,139	1,120
Fishery exports	Million US$	196	140	151	175	210	230
Total food and agricultural imports	Million US$	1,893	2,021	2,048	2,089	2,193	na
Perishable products	Million US$	728	757	720	795	875	na
Fishery imports	Million US$	29	30	29	32	36	na
Port capacity	1,000 Tons	65	66	74	82	na	na
Road access	Kms/Million People	na	363	363	399	na	na
Rail access	Kms	na	3,395	3,395	3,395	na	na
Power generation	Million Kwh	45,000	na	na	na	na	na
Percent of population with refrigerators	%	na	54.4	na	na	na	na
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total	Million US$	220	178	200	240	na	na
From other PECC economies	Million US$	164	160	185	200	na	na
Outward FDI in the food sector, total	Million US$	9	10	32	30	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP	%	19.0	18.3	16.5	14.0	14.0	15.0
Self sufficiency in grains	%	74.0	70.0	70.0	73.0	74.0	76.0
MACROECONOMIC INDICATORS							
GDP growth	%	2.1	3.1	0.6	–4.4	3.0	4.0
Interest rate	%	42.2	34.3	42.2	30.0	14.0	16.0
Exchange rate	COPeso/US$	1,037.0	1,140.0	1,536.0	1,782.0	1,874.0	2,160.0

na = not available E = estimate F = forecast

Sources:
FAO
CEPAL
Departmento Nacional de Estadistica (DANE), Columbia
Banco de la Republica, Columbia
Ministerio de Transporte, Columbia
Ministerio de Minas y Energia, Columbia

Indonesia

	Units	1996	1997	1998	1999	2000*E*	2001*F*
FOOD CONSUMPTION PATTERNS *a*							
Per-capita caloric intake	Cal/day	2,020	2,031	2,042	na	na	na
From animal products	Cal/day	338	346	354	na	na	na
From vegetable products	Cal/day	1,682	1,685	1,688	na	na	na
INCOME AND FOOD PRICES *b*							
Per-capita income	US$/capita	1,128	1,030	487	693	912	998
% of disposable income spent on food	%	41.0	32.8	24.6	na	na	na
Food price index	1996=100	na	na	263.2	249.5	246.2	na
General price index (CPI)	1996=100	na	na	198.6	202.5	205.5	na
POPULATION *c*							
Total population	Million	198	202	204	na	na	na
Urban	Million	73	77	80	na	na	na
Nonurban	Million	125	125	124	na	na	na
Female labor force participation	%	44.6	31.0	32.5	39.8	39.9	na
LIFE EXPECTANCY *c*							
Males	Years	63.0	62.3	62.6	na	na	na
Females	Years	67.0	66.1	66.5	na	na	na
FOOD INFRASTRUCTURE							
Trade capacity *b*							
Grain exports	1,000 Tons	8.0	7.1	20.2	na	na	na
Grain imports	1,000 Tons	37.2	1.9	na	na	na	na
Total food and agricultural trade	Million US$	4,505	3,975	4,821	na	na	na
Total food and agricultural exports	Million US$	2,913	3,133	3,654	na	na	na
Perishable products	Million US$	86	71	58	na	na	na
Fishery exports	Million US$	375	381	358	na	na	na
Total food and agricultural imports	Million US$	1,593	843	1,167	na	na	na
Perishable products	Million US$	363	411	218	na	na	na
Fishery imports	Million US$	137	165	182	na	na	na
Port capacity *d*	1,000 Tons	523	9,715	75	na	na	na
Road access	1,000 Kms	336	341	na	na	na	na
Telecommunications *d*	1,000 Subscribers	4,113	na	na	na	na	na
Power generation	Gigawatts	65,738	77,065	na	na	na	na
Percent of population with refrigerators	%	na	na	13.3	na	na	na
FOREIGN INVESTMENT IN THE FOOD SECTOR *e*							
Inward FDI in the food sector, total	Million US$	19,884	24,857	na	na	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY *d*							
Agriculture as a share of GDP	%	15.5	16.0	18.8	19.4	19.3	19.1
MACROECONOMIC INDICATORS *b*							
GDP growth	%	8.0	4.6	–13.2	0.2	3.8	4.0–5.0
Interest rate	%	17.3	25.0	50.0	14.2	12.1	10.3
Exchange rate	Rupiah/US$	2,364	3,000	10,299	7,699	7,000	6,500–7,500

na = not available E = estimate F = forecast

a. National Socio-Economic Survey, Central Bureau of Statistics.
b. Economic Indicators, March 1999, Central Bureau of Statistics.
c. Data Collection of Population and Family Planning, Ministry for Population/NFPCB.
d. Central Bureau of Statistics.
e. The World Bank

Japan

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS* *a*							
Per-capita caloric intake	Cal/day	2,638	2,619	2,571	2,640	2,640	2,640
From animal products	Cal/day	589	566	553	620	620	620
From vegetable products	Cal/day	2,049	2,053	2,018	2,020	2,020	2,020
Protein (% of calories)	%	13.5	13.3	13.4	13.5	13.5	13.5
Fat (% of calories)	%	28.7	28.8	28.8	30.0	30.0	30.0
Carbohydrates (% of calories)	%	57.8	57.9	57.8	56.6	56.6	56.6
INCOME AND FOOD PRICES *b*							
Per-capita income	US$/capita	36,539	33,237	30,046	35,300	35,700	36,500
% of disposable income spent on food	%	16.0	16.0	16.2	16.1	16.2	16.0
% spent eating out	%	2.9	2.9	2.9	2.7	2.9	2.9
Food price index	1995=100	99.9	101.7	103.1	103.1	103.1	104.2
General price index (CPI)	1995=100	100.1	101.9	102.5	102.0	102.3	103.8
POPULATION							
Total population *b*	Million	125.9	126.0	126.5	126.7	126.9	127.0
Urban *c*	Million	na	82.0	na	na	na	na
Nonurban *c*	Million	na	44.0	na	na	na	na
Share of population in the following age groups *b*							
0–14 years	%	15.6	15.4	15.1	14.8	14.7	14.5
15–64 years	%	69.3	69.0	68.7	68.5	68.1	67.8
65–over years	%	15.1	15.7	16.2	16.7	17.2	17.5
Female labor force participation	%	50.0	50.4	50.1	49.6	50.1	50.5
LIFE EXPECTANCY *b*							
Males	Years	77.0	77.2	77.2	77.4	77.4	77.5
Females	Years	83.6	83.8	84.0	84.1	84.2	84.3
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports *d*	1,000 Tons	0	36	358	144	0	0
Grain imports *d*	1,000 Tons	26,946	27,871	26,995	27,812	26,700	27,000
Total food and agricultural trade *d*	Million US$	73,289	67,090	55,111	59,073	60,100	61,000
Total food and agricultural exports *d*	Million US$	2,905	3,134	2,797	2,994	2,800	2,700
Fishery exports	Million US$	1,230	1,403	1,162	1,246	1,100	1,100
Total food and agricultural imports *d*	Million US$	76,194	70,224	57,908	62,067	57,300	59,000
Fishery imports	Million US$	17,587	16,107	13,337	15,332	14,000	14,500
Road access *e*	1,000 Kms	1,142	1,146	1,150	1,159	1,165	1,170
Rail access *f*	Kms	272,340	27,397	27,453	27,600	2,770	27,500
Telecommunications *g*	1,000 subscribers	61,526	60,447	58,474	55,550	109,700	115,200
Power generation *h*	Gigawatts	873	880	890	900	910	920
Percent of population with refrigerators *b*	%	98.4	98.7	98.1	98.1	99.2	99.2
FOREIGN INVESTMENT IN THE FOOD SECTOR* *i*							
Inward FDI in the food sector, total	Million US$	3	18	201	10	10	20
Outward FDI in the food sector, total	Million US$	730	572	1,268	500	500	700
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY *d*							
Agriculture as a share of GDP	%	1.3	1.2	1.2	1.2	1.1	1.1
Self-sufficiency in grains	%	29.0	28.0	27.0	28.0	28.0	28.0
POLICY TRANSFERS *j*							
Consumer subsidy equivalents	%	–47.0	–46.0	na	na	na	na
Consumer support estimate	%	na	na	–51.0	–53.0	–51.0	–51.0
Total transfers (subsidy/tax)	Million US$	80,400	67,300	na	na	na	na
Total transfers (subsidy/tax, from 1998)	Million US$	na	na	66,408	71,442	66,000	65,000
Total transfers per capita	US$/capita	638	533	na	na	na	na
Total transfers per capita (subsidy/tax, from 1998)	US$/capita	na	na	527	567	519	512
MACROECONOMIC INDICATORS							
GDP growth (real)	%	5.1	1.4	2.8	0.5	1.0	3.0
Interest rate	%	0.5	0.5	0.5	0.5	0.5	0.7
Exchange rate	Yen/US$	115.98	129.92	115.20	102.08	110.00	105.00

*na = not available E = estimate F = forecast * = fiscal year*

a. MAFF, Food Balance, supplied calorie base.
b. Statistics Bureau, Pocket Statistical Information.
c. Statistics Bureau, Population Census.
d. MAFF estimate.
e. Ministry of Construction.
f. Ministry of Transportation.
g. Ministry of Posts and Telecommunications, including cellular phones.
h. Agency of Natural Resources and Energy.
i. JETRO, Agrotrade Handbook.
j. OECD, Monitoring Report (in 1998, the "Consumer Subsidy Equivalents" index was renamed the "Consumers Support Estimate").

Korea

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake	Cal/day	2,948	2,956	2,799	2,960	2,960	na
From animal products	Cal/day	453	431	399	433	433	na
From vegetable products	Cal/day	2,495	2,525	2,400	2,527	2,527	na
Protein (% of calories)	%	13.3	13.1	13.1	13.1	13.1	na
Fat (% of calories)	%	23.7	24.3	23.4	24.3	24.3	na
Carbohydrates (% of calories)	%	63.0	62.6	63.5	62.6	62.6	na
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	11,380	10,307	6,742	8,581	9,027	9,162
% of disposable income spent on food	%	28.7	28.7	27.8	27.8	27.8	na
% spent eating out	%	9.6	10.4	9.3	10.4	10.4	11.0
Food price index	1995=100	103.9	107.9	117.3	120.6	121.9	123.2
General price index (CPI)	1995=100	104.9	109.6	117.8	119.4	122.3	125.2
POPULATION							
Total population	Million	45.5	46.0	46.4	46.8	47.3	47.7
Urban	Million	40.5	40.9	41.0	42.0	43.8	na
Nonurban	Million	5.0	5.1	5.4	4.8	3.5	na
Share of population in the following age groups							
0–4 years	%	7.9	7.9	7.7	7.6	7.6	7.4
5–14 years	%	15.0	14.6	14.3	14.1	13.5	14.2
15–19 years	%	8.7	8.7	8.7	8.5	8.5	7.6
20–44 years	%	44.5	44.5	44.3	44.1	44.2	43.6
45–64 years	%	17.8	18.1	18.5	18.8	19.1	19.8
65–79 years	%	5.2	5.4	5.6	5.9	6.0	6.4
80–over years	%	0.9	0.9	0.9	1.0	1.0	1.1
Median age of population	Years	31.5	31.9	32.3	32.6	33.0	31.1
Female labor force participation	%	40.4	40.9	41.0	41.0	41.3	41.5
LIFE EXPECTANCY							
Males	Years	70.6	71.6	72.2	72.7	73.6	73.6
Females	Years	77.6	77.9	78.2	78.5	78.8	78.8
FOOD INFRASTRUCTURE							
Trade capacity							
Grain imports	1,000 Tons	13,136	13,731	14,353	15,003	14,815	na
Total food and agricultural exports	Million US$	1,424	1,753	1,635	1,680	1,800	2,100
Perishable products	Million US$	1,415	1,471	1,357	1,463	1,507	na
Fishery exports	Million US$	1,635	1,493	1,364	1,364	1,220	na
Total food and agricultural imports	Million US$	8,152	7,619	6,406	7,388	8,000	na
Perishable products	Million US$	4,909	5,051	3,596	3,978	4,000	na
Fishery imports	Million US$	1,080	1,045	1,015	1,015	1,083	na
Port capacity	1,000 Tons	299,228	313,948	329,392	345,595	359,959	na
Road access	Kms	82,342	87,621	93,238	99,216	105,587	na
Rail access	Kms	6,559	6,579	6,600	6,621	6,635	na
Telecommunications	1,000 Lines	22,789	23,795	25,346	26,998	28,078	na
Power generation	Million Kwh	205,493	224,444	215,300	215,300	220,204	na
Percent of population with refrigerators	%	100.0	100.0	100.0	100.0	100.0	100.0
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP	%	5.8	5.4	5.0	5.0	4.5	4.5
Self-sufficiency in grains	%	26.8	31.7	33.0	31.0	30.0	30.0
MACROECONOMIC INDICATORS							
GDP growth	%	6.8	5.0	–5.8	10.2	8.6	5.5
Interest rate	%	11.9	13.4	15.0	8.9	8.5	8.5
Exchange rate	Won/US$	844.20	1,415.20	1,207.80	1,145.40	1,100.00	1,050.00

na = not available E = estimate F = forecast

Sources:
Ministry of Agriculture and Forestry, Handbook of Agricultural Statistics, 1999
National Statistical Organization, http://www.nso.kr
Ministry of Financial Economy, Major Economic Indicators, 2000
Korea Rural Economic Institute, Food Balance Sheet, 1999

Malaysia

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS *a*							
Per-capita caloric intake	Cal/day	2,813	2,818	2,822	2,834	2,842	2,850
From animal products	Cal/day	524	533	539	549	557	565
From vegetable products	Cal/day	2,289	2,285	2,283	2,280	2,277	2,278
Protein (% of calories)	%	7.9	7.9	7.8	7.8	7.8	7.8
Fat (% of calories)	%	33.4	32.5	33.6	33.6	33.7	33.8
Carbohydrates (% of calories)	%	58.7	58.6	58.6	58.6	58.5	58.5
INCOME AND FOOD PRICES *b*							
Per-capita income	US$/capita	4,446	4,377	3,093	3,248	3,393	3,541
% of disposable income spent on food	%	34.9	34.9	34.9	34.9	34.9	34.9
% spent eating out	%	9.8	9.8	9.8	9.8	9.8	9.8
Food price index	1990=100	133.5	138.9	151.3	158.3	167.5	177.2
General price index (CPI)	1990=100	125.6	129.0	135.8	139.6	144.1	148.7
POPULATION *c,d*							
Total population	Million	21.2	21.7	22.2	22.7	23.3	23.8
Urban	%	55.6	56.5	57.3	58.1	58.8	59.6
Nonurban	%	44.4	43.5	42.7	41.9	41.2	40.4
Share of population in the following age groups							
0–4 years	%	12.0	11.8	11.6	11.5	11.3	11.1
5–14 years	%	23.0	22.7	22.4	22.0	21.7	21.4
15–19 years	%	10.0	10.0	10.1	10.2	10.3	10.3
20–44 years	%	38.6	38.8	38.9	39.0	39.2	39.3
45–64 years	%	12.7	13.0	13.2	13.5	13.7	14.0
65–79 years	%	3.1	3.1	3.2	3.2	3.2	3.2
80–over years	%	0.6	0.6	0.6	0.6	0.6	0.6
Median age of population	Years	22.2	22.5	22.8	23.0	23.3	23.6
Female labor force participation *c,e*	%	46.7	46.4	44.2	44.2	44.4	44.4
LIFE EXPECTANCY *d,e*							
Males	Years	69.6	69.7	69.7	69.8	69.9	69.9
Females	Years	74.2	74.4	74.7	74.8	75.0	75.0
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports *f,g*	1,000 Tons	253	251	316	372	377	383
Grain imports *f,g*	1,000 Tons	3,930	4,392	3,569	3,615	3,922	4,306
Total food and agricultural exports	Million US$	14,118	13,240	12,286	11,827	12,667	13,706
Total food and agricultural exports *h,i,j*	Million US$	8,703	8,312	8,386	7,691	7,799	7,924
Perishable products *k*	Million US$	349	347	275	325	330	335
Fishery exports *h,i*	Million US$	320	330	301	295	299	304
Total food and agricultural imports *i,,j,l*	Million US$	5,415	4,928	3,900	4,136	4,488	4,928
Perishable products *k*	Million US$	1,078	1,040	761	864	937	1,029
Fishery imports *i,l*	Million US$	331	326	221	253	275	302
Port capacity *c*	Million Tons	174	174	257	286	314	314
Road access *c,e*	Kms	62,436	63,748	64,949	66,699	68,449	68,449
Rail access *c,e*	Kms	2,227	2,227	2,262	2,265	2,444	2,444
Telecommunications *c*	Lines/100 People	24.2	28.5	29.9	30.4	40.0	44.1
Power generation *m*	Gigawatts	52,819	58,674	60,471	62,546	68,421	74,847
Percent of population with refrigerators	%	92.0	92.0	93.0	93.0	93.0	95.0
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total *n*	Million US$	50.8	61.9	93.1	104.4	137.0	179.8
From other PECC economies *o*	Million US$	40.6	43.6	75.1	63.7	81.9	105.2
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY *b,c,d,n*							
Agriculture as a share of GDP	%	12.7	11.9	12.3	12.1	11.6	11.1
Self-sufficiency in grains	%	35.8	32.8	38.0	37.6	37.2	36.7
Self-sufficiency in horticultural products	%	78.1	79.0	83.7	81.0	78.2	75.5
MACROECONOMIC INDICATORS *b*							
GDP growth	%	8.6	7.7	–7.5	5.4	5.8	6.0
Interest rate *p,q*	%	9.2	9.5	10.6	7.3	6.8	6.8
Exchange rate	Ringgit/US$	2.52	2.81	3.92	3.80	3.80	3.80

na = not available E = estimate F = forecast

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c. Malaysia, "Mid-term Review of the Seventh Malaysia Plan 1996–2000."
d. Department of Statistics Malaysia. "Yearbook of Statistics," various issues.
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f. http://apps.fao.org
g. Cereals and cereal preparations.
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i. Department of Statistics Malaysia. "Monthly External Trade Statistics, December 1999."
j. Excludes agricultural requisites, forestry and fishery products.
k. Fresh and frozen fruits, vegetables, meats and poultry, dairy products and eggs.
l. Department of Statistics Malaysia, "Import Malaysia," various issues.
m. Department of Statistics Malaysia, "Monthly Statistical Bulletin, March 1999."
n. Ministry of Finance Malaysia, "Economic Report 1999/2000."
o. Includes Australia, Hong Kong, Indonesia, Japan, Philippines, Singapore, South Korea, Chinese Taipei, and United States.
p. http://www.bnm.gov.my/pubmsblatest/v_o1.pdf
q. Average base lending rates at end period.

Mexico

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake	Cal/day	3,137	na	na	na	na	na
% of disposable income spent on food	%	35.8	na	na	na	na	na
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	1,278	4,214	4,355	4,928	5,062	na
Food price index a	1990=100	296.0	352.0	436.0	466.0	na	na
General price index (CPI)	1990=100	302.0	364.0	422.0	492.0	541.0	na
POPULATION *b*							
Total population	Million	93.2	94.7	96.7	98.1	99.6	na
Urban	Million	68.8	70.3	72.1	73.6	na	na
Nonurban	Million	24.4	24.4	24.6	24.5	na	na
Share of population in the following age groups							
0–4 years	%	11.9	12.1	12.3	12.5	10.8	na
5–14 years	%	23.7	24.1	24.4	24.8	22.4	na
15–19 years	%	11.2	11.4	11.6	11.7	10.6	na
20–44 years	%	34.7	35.2	35.8	36.4	39.0	na
45–64 years *c*	%	11.5	11.7	11.9	12.1	12.4	na
65–79 years	%	3.3	3.4	3.4	3.5	3.8	na
80–over years	%	1.0	1.0	1.0	1.0	1.0	na
Median age of population	Years	25.4	25.8	26.2	26.6	27.4	na
Female labor force participation	%	32.7	33.9	32.0	na	na	na
LIFE EXPECTANCY							
Males	Years	69.6	69.8	70.2	70.3	na	na
Females	Years	76.7	76.7	77.4	77.6	na	na
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports	1,000 Tons	202	568	481	416	na	na
Grain imports	1,000 Tons	5,886	6,259	7,261	12,447	na	na
Total food and agricultural trade *c*	Million US$	13,533	14,077	15,501	20,327	na	na
Total food and agricultural exports	Million US$	5,782	6,379	6,868	7,323	na	na
Fishery exports *d*	Million US$	798	784	542	175	na	na
Total food and agricultural imports	Million US$	7,752	7,698	8,633	13,003	na	na
Fishery imports *d*	Million US$	104	138	133	91	na	na
Road access	1,000 Kms	312	322	322	na	na	na
Rail access	1,000 Kms	27	27	27	27	na	na
Telecommunications	1,000 lines	8,826	9,254	9,927	10,703	na	na
Power Generation (domestic sales)	Million US$	5,101	6,759	6,795	7,887	na	na
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total *d*	Million US$	469	2,786	701	936	na	na
From other PECC economies	Million US$	421	1,133	622	794	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP	%	6.3	5.2	4.9	4.5	na	na
POLICY TRANSFERS							
Consumer subsidy equivalents	%	8.0	–9.0	–10.0	–18.0	na	na
Total transfers (subsidy/tax)	Million US$	1.2	2.8	5.8	6.7	na	na
Total transfers per capita	US$/capita	12.0	28.0	60.2	68.2	na	na
MACROECONOMIC INDICATORS							
GDP growth	%	5.2	6.8	4.8	3.7	4.5	na
Interest rate	%	31.3	19.8	24.7	21.4	16.4	na
Exchange rate	MXPeso/US$	7.60	7.92	9.30	9.56	10.40	na

na = not available E = estimate F = forecast

a. Index for food, beverages, and tobacco.
b. Population increase rate of 2.06 percent.
c. Includes food and agricultural results.
d. Data for 1999, until October.

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3er. Informe de Gobierno, 1998
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Monitoring and Outlook, 1998 OECD
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Banco de Mexico (BANXICO)

New Zealand

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake *a*	Cal/day	3,405	3,411	3,425	3,420	3,429	3,450
From animal products	Cal/day	2,173	2,155	2,136	2130	2,165	2,200
From vegetable products	Cal/day	1,233	1,256	1,289	1290	1,264	1,250
Protein (% of calories)	%	12.3	15.0	15.0	16.0	15.0	15.0
Fat (% of calories)	%	34.6	36.0	37.0	35.0	36.0	36.0
Carbohydrates (% of calories)	%	53.1	49.0	48.0	49.0	49.0	50.0
INCOME AND FOOD PRICES							
Per-capita income *b*	US$/capita	16,975	16,813	13,490	13,827	14,242	14,100
% of disposable income spent on food *c*	%	12.4	12.3	12.0	12.1	12.3	12.5
% spent eating out	%	2.8	2.7	2.7	2.9	3.0	3.0
Food price index *d*	1990=100	104.5	106.7	110.2	111.8	114.2	116.0
General price index (CPI) *d*	1990=100	113.4	114.7	116.2	116.1	120.8	122.0
POPULATION *e*							
Total population	Million	3.7	3.8	3.8	3.8	3.8	3.8
Urban	Million	3.1	3.2	3.3	3.3	3.3	3.3
Nonurban	Million	0.6	0.6	0.5	0.5	0.5	0.5
Share of population in the following age groups							
0–4 years	%	7.3	na	na	na	7.6	7.4
5–14 years	%	15.2	na	na	na	15.2	15.2
15–19 years	%	7.3	na	na	na	7.0	6.7
20–44 years	%	38.3	na	na	na	37.2	31.5
45–64 years	%	20.0	na	na	na	21.6	20.7
65–79 years	%	9.0	na	na	na	8.9	12.5
80–over years	%	2.6	na	na	na	2.8	3.0
Median age of population	Years	33.0	na	na	na	34.3	34.5
Female labor force participation	%	45.7	na	na	na	45.9	46.0
LIFE EXPECTANCY							
Males	Years	74.3	74.3	75.1	75.1	75.1	75.1
Females	Years	79.6	79.6	80.1	80.1	80.1	80.1
FOOD INFRASTRUCTURE							
Trade capacity							
Grain exports *f*	1,000 Tons	4	7	54	24	26	na
Grain imports	1,000 Tons	284	224	150	231	270	na
Total food and agricultural exports *g*	Million US$	6,282	6,471	5,526	5,954	6,401	na
Fishery exports *h*	Million US$	843	749	598	626	651	na
Total food and agricultural imports *i*	Million US$	962	941	844	965	1,047	na
Road access *j*	1,000 Kms	92	92	na	na	na	na
Rail access *k*	1,000 Kms	4	4	4	4	4	4
Telecommunications	1,000 Lines	1,719	1,785	1,862	na	na	na
Power generation *l*	Million Kwh	35,272	35,759	36,301	na	na	na
Percent of population with refrigerators	%	100.0	100.0	100.0	100.0	100.0	100.0
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP *m*	%	5.5	5.1	5.1	4.9	4.8	na
Self-sufficiency in grains *n*	%	76.0	83.0	90.0	81.0	83.0	na
POLICY TRANSFERS							
Consumer subsidy equivalents	%	–6.0	–6.0	–4.0	–5.0	na	na
Total transfers (subsidy/tax)	Million US$	–65.0	na	na	na	na	na
MACROECONOMIC INDICATORS							
GDP growth *o*	%	3.2	2.0	3.0	2.3	3.4	2.0
Interest rate *p*	%	8.9	7.9	4.6	5.9	8.3	9.0
Exchange rate *q*	NZ$/US$	0.69	0.66	0.54	0.53	0.52	0.49

na = not available E = estimate F = forecast

a. FAO AGROSTAT; author's projections for 1997–2001.
b. Nominal Expenditure GDP; March years at current average exchange rate for the year; Statistics New Zealand, NZIER.
c. Note, this is the percent of total regular and recurring income spent from "Household Economy Survey" Statistics New Zealand and author's projections for 2000–2001.
d. Computed as quarterly averages of quarterly indices, indices, 1993(4)=1,000.
e. Statistics New Zealand, NZIER projections.
f. Wheat, barley, maize, and oats; Statistics New Zealand, MAF forecasts.
g. Dairy, meat, other food and beverages, and wool; Statistics NZ and NZIER forecasts.
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j. Transfund cited in NZ Yearbook; 1999.
k. Transrail.
l. Energy Data File 1997–2000, Ministry of Commerce.
m. Statistics New Zealand, NZIER forecasts.
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o. Expenditure Real GDP, December year, annual average percent change; Statistics New Zealand and NZIER forecasts.
p. 90-day bank bill average for December quarter, NZIER.
q. New Zealand dollar quarterly average NZIER forecasts.

Peru

	Units	1996	1997	1998	1999	2000*E*	2001*F*
FOOD CONSUMPTION PATTERNS *a*							
Per-capita caloric intake	Cal/day	2,462	2,348	na	na	na	na
From animal products	Cal/day	370	391	na	na	na	na
From vegetable products	Cal/day	2,092	1,957	na	na	na	na
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	1,322.0	1,724.0	na	na	na	na
% of disposable income spent on food *b*	%	44.7	45.6	na	na	na	na
Food price index	1990=100	1,716.6	1,818.8	1,925.4	1,909.9	1,967.2	2,026.2
General price index (CPI)	1990=100	2,106.5	2,242.6	2,377.2	2,469.1	2,580.2	2,683.4
POPULATION							
Total population	Million	23.9	24.4	24.8	25.2	25.6	26.1
Urban	Million	17.1	17.5	17.8	18.1	18.4	18.8
Nonurban	Million	6.8	6.9	7.0	7.1	7.2	7.3
Share of population in the following age groups							
0–4 years	%	12.1	11.9	11.7	11.5	11.3	11.1
5–14 years	%	23.3	23.0	22.7	22.4	22.1	21.8
15–19 years	%	10.9	10.8	10.7	10.6	10.5	10.4
20–44 years	%	36.6	36.9	37.3	37.6	37.9	38.2
45–64 years	%	12.7	12.8	13.0	13.2	13.4	13.6
65–79 years	%	3.8	3.9	4.0	4.0	4.1	4.2
80–over years	%	0.6	0.7	0.7	0.7	0.7	0.7
Median age of population	Years	20.3	20.3	20.4	20.4	20.5	20.5
Female labor force participation	%	40.8	41.3	41.9	42.5	43.1	na
LIFE EXPECTANCY *b*							
Males	Years	65.5	65.8	66.1	66.3	66.6	66.9
Females	Years	70.4	70.7	71.0	71.3	71.6	72.0
FOOD INFRASTRUCTURE *c*							
Trade capacity							
Grain exports	1,000 Tons	14	15	130	170	na	na
Grain imports	1,000 Tons	2,296	2,485	2,798	2,432	na	na
Total food and agricultural trade	Million US$	1,708	1,807	1,712	1,467	na	na
Total food and agricultural exports	Million US$	621	793	596	657	na	na
Perishable products	Million US$	49	68	89	126	na	na
Fishery exports	Million US$	1,121	1,403	634	791	na	na
Total food and agricultural imports	Million US$	1,087	1,014	1,116	810	na	na
Perishable products	Million US$	132	118	121	91	na	na
Road access	Kms	73,766	na	na	na	na	na
Rail access	Kms	1,992	na	na	na	na	na
Telecommunications *d*	Telephone lines	1,765	1,950	2,012	na	na	na
Power generation	Gigawatts	17,000	na	na	na	na	na
Percent of population with refrigerators	%	70.0	na	na	na	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY *c*							
Agriculture as a share of GDP	%	12.3	12.6	12.4	12.1	na	na
Self-sufficiency in horticultural products	%	100.0	100.0	na	na	na	na
POLICY TRANSFERS *e*							
Total transfers (subsidy/tax)	Million US$	123	218	na	na	na	na
Total transfers per capita	US$/capita	18	32	na	na	na	na
MACROECONOMIC INDICATORS *f*							
GDP growth	%	2.8	7.2	0.7	3.8	4.0	4.7
Interest rate	%	27.4	31.1	33.2	28.0	22.0	20.0
Exchange rate	New Sol/US$	2.58	2.72	3.13	3.48	3.71	3.85

na = not available E = estimate F = forecast

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b. Webb, Richard and Fernandez Baca, Gracicla (1977). "Anauario Estadistico, Peru en umeros 1997," Instituto CUANTO S.A.
c. Ministerio de Agricltura-Oficina de Information Agraria. Superintendencia Nacional de Aduanas (SUNAD).
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e. Ministerio de Agricltura-Oficina de Planificaion AgrariaOPP.
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The Philippines

	Units	1996	1997	1998	1999	2000*E*	2001*F*
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake	Cal/day	1,934	1,956	1,977	1,999	2,020	2,135
From animal products	Cal/day	231	246	248	257	262	272
From vegetable products	Cal/day	1,703	1,710	1,729	1,741	1,758	1,863
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	1,133	1,216	908	1,046 *a*	1,096 *b*	1,151 *b*
% of disposable income spent on food *c*	%	52.9	51.1	50.1	49.2	52.5	51.5
% spent eating out	%	4.5	4.7	4.8	4.9	5.0	4.9
Food price index *d*	1994=100	120.4	124.5	135.5	142.6	145.5	152.7
General price index (CPI) *d*	1994=100	117.8	124.8	136.9	146.0	155.5	163.3
POPULATION							
Total population	Million	69.9	71.5	73.1	74.7	76.3	77.9
Urban	Million	34.8	35.6	36.4	37.2	38.0	39.5
Nonurban	Million	35.1	35.9	36.7	37.5	38.3	38.3
Share of population in the following age groups							
0–4 years	%	13.6	13.3	13.1	12.8	12.6	12.3
5–14 years	%	24.2	24.1	23.9	23.7	23.6	23.4
15–19 years	%	10.5	10.5	10.4	10.4	10.4	10.4
20–44 years	%	36.0	36.2	36.4	36.5	36.7	36.9
45–64 years	%	12.1	12.3	12.5	12.7	12.8	13.1
65–79 years	%	3.1	3.2	3.3	3.3	3.3	3.4
80–over years	%	0.6	0.6	0.6	0.6	0.6	0.6
Median age of population	Years	21.0	21.5	22.0	23.0	24.0	25.0
Female labor force participation	%	34.5	36.3	37.0	37.0	37.0	37.0
LIFE EXPECTANCY *e*							
Males	Years	65.1	65.4	65.7	66.0	66.3	66.6
Females	Years	70.3	70.7	71.0	71.3	71.6	71.9
FOOD INFRASTRUCTURE							
Trade capacity							
Grain imports *f*	1,000 Tons	1,400	865	2,170	836	600	na
Total food and agricultural trade *g*	Million US$	5,402	5,440	5,119	4,638	1,910	na
Total food and agricultural exports	Million US$	2,307	2,338	2,224	1,760	2,060	na
Perishable products	Million US$	694	693	593	699	700	na
Fishery exports	Million US$	319	291	313	372	380	na
Total food and agricultural imports	Million US$	3,095	3,102	2,895	2,878	2,875	na
Perishable products	Million US$	283	333	246	440	450	na
Fishery imports	Million US$	69	70	57	74	75	na
Port capacity	Number	1,425	1,454	1,483	1,512	1,519	na
Road access	1,000 Kms	27	28	29	30	30	na
Telecommunications	Million Telephones	3.34	4.36	5.45	6.54	6.6	na
Power generation	Gigawatts	36,609	39,880	41,870	43,960	46,153	na
Percent of population with refrigerators	%	30.0	33.1	33.9	na	na	na
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total *h*	Million US$	3.35	11.42	11.00	25.71	20.00	21.00
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY *i*							
Agriculture as a share of GDP *d*	%	21.1	19.8	18.5	19.1	19.0	18.5
Self-sufficiency in grains *j*	%	88.0	90.0	72.0	89.0	90.2	na
Self-sufficiency in horticultural products	%	80.0	80.0	80.0	80.0	80.0	na
MACROECONOMIC INDICATORS *k*							
GDP growth	%	5.8	5.2	–0.5	3.2	5.0	5.5
Interest rate	%	12.0	12.8	12.7	9.0	10.0	10.0
Exchange rate	PHLPeso/US$	26.22	29.44	40.86	39.08	43.00	43.00

na = not available E = estimate F = forecast

a. Per-capita GNP in current Philippine pesos at average exchange rate of US dollar to the Philippine peso, National Accounts, NSCB, February 2000.
b. 1999 base plus the estimated incremental growth in 2000 and 2001.
c. Food Consumption and Production at current prices, NSCB.
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e. Technical Advisory Group and NSO Population Project Unit
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h. Foreign Direct Investment, 1999. NSCB.
i. National Accounts, various issues, NSCB.
j. Refers only to rice self-sufficiency.
k. National Accounts and Economic Indicators, NSCB.

Singapore

	Units	1996	1997	1998	1999	2000E	2001F
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	26,136	24,880	22,807	23,436	24,819	26,357
% of disposable income spent on food	%	15.5	14.9	14.3	13.8	na	na
Food price index	1990=100	108.5	110.7	111.0	112.0	113.7	115.4
General price index (CPI)	1990=100	106.9	109.0	108.8	109.2	110.8	112.5
POPULATION							
Total population	Million	3.0	3.1	3.2	3.2	na	na
Urban	Million	3.0	3.1	3.2	3.2	na	na
Nonurban	Million	0	0	0	0	na	na
Share of population in the following age groups							
0–4 years	%	8.0	8.0	7.6	7.3	na	na
5–14 years	%	14.8	14.9	14.9	15.0	na	na
15–19 years	%	6.7	6.6	6.6	6.5	na	na
20–44 years	%	45.0	44.5	44.0	43.4	na	na
45–64 years	%	18.6	19.3	19.8	20.5	na	na
65–74 years	%	4.3	4.4	4.4	4.5	na	na
75–over years	%	2.6	2.6	2.7	2.8	na	na
Median age of population	Years	32.2	32.6	32.9	33.2	na	na
Female labor force participation	%	51.5	51.1	51.3	52.7	na	na
LIFE EXPECTANCY							
Males	Years	74.6	75.0	75.2	75.5	na	na
Females	Years	79.0	79.2	79.3	79.5	na	na
FOOD INFRASTRUCTURE							
Trade capacity							
Total food and agricultural trade	Million US$	5,923	5,344	na	na	na	na
Total food and agricultural exports	Million US$	2,264	2,038	na	na	na	na
Fishery exports	Tons	116,396	10,247	104,549	na	na	na
Total food and agricultural imports	Million US$	3,659	3,306	na	na	na	na
Fishery imports	Tons	156,077	150,257	119,810	na	na	na
Port capacity	1,000 Tons	314	328	312	na	na	na
Road access	Kms	3,072	3,101	3,122	na	na	na
Rail access	Kms	na	83	83	na	na	na
Telecommunications	1,000 Lines	1,531	1,656	1,751	na	na	na
Power generation	Gigawatts	23,458	26,188	28,283	na	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GDP	%	0.18	0.15	0.14	0.14	na	na
MACROECONOMIC INDICATORS							
GDP growth	%	7.5	8.4	1.5	5.4	5.9	6.2
Interest rate	%	6.3	7.0	5.9	5.8	na	na
Exchange rate	SG$/US$	1.41	1.48	1.67	1.69	1.71	na

na = not available E = estimate F = forecast

Sources:
Statistical Yearbook of Singapore, Department of Statistics, Singapore, various years
Report on the Census of Industrial Production, Department of Statistics, Singapore, various years
FAO, Food Balance Sheets
Food and Nutrition Department of the Ministry of Health

Chinese Taipei

	Units	1996	1997	1998	1999	2000*E*	2001*F*
FOOD CONSUMPTION PATTERNS *a*							
Per-capita caloric intake	Cal/day	3,076	3,129	2,891	3,038 *b*	3,083	3,128
From animal products	Cal/day	822	726	709	798 *b*	801	805
From vegetable products	Cal/day	2,252	2,403	2,182	2,240 *b*	2,281	2,305
Protein (% of calories)	%	12.6	13.2	13.2	13.1 *b*	13.2	13.4
Fat (% of calories)	%	39.7	38.4	38.0	37.9 *b*	37.6	37.4
Carbohydrates (% of calories)	%	47.8	48.5	48.8	49.1 *b*	49.3	49.3
INCOME AND FOOD PRICES							
Per-capita income *c*	US$/capita	11,635	11,950	10,918	12,163	13,380	14,750
% of disposable income spent on food	%	18.8	18.3	19.1	18.5 *b*	18.4	18.0
% spent eating out	%	4.4	4.5	4.8	5.1 *b*	5.3	5.8
Food price index *d*	1996=100	100.0	99.1	103.5	103.0	103.2	103.7
General price index (CPI) *d*	1996=100	100.0	100.9	102.6	102.8	104.8	105.3
POPULATION *e*							
Total population	Million	21.5	21.7	21.9	22.1	22.3	22.5
Urban	Million	16.6	16.7	16.4	16.5	16.6	16.7
Nonurban *a*	Million	4.9	5.0	5.5	5.6	5.7	5.8
Share of population in the following age groups							
0–4 years	%	7.4	7.4	7.1	6.8	6.6	6.6
5–14 years	%	15.8	15.3	14.9	14.6	14.3	14.3
15–19 years	%	9.3	9.3	9.1	8.8	8.6	8.5
20–44 years	%	42.8	42.6	42.6	42.6	42.5	42.5
45–64 years	%	16.9	17.5	18.1	18.7	19.3	19.8
65–79 years	%	6.8	6.9	7.1	7.2	7.3	7.4
80–over years	%	1.1	1.2	1.2	1.3	1.4	1.4
Median age of population	Years	30.3	30.7	31.2	32.0	32.2	32.4
Female labor force participation	%	45.8	45.6	45.6	46.0	46.9	47.2
LIFE EXPECTANCY *e*							
Males	Years	71.9	71.9	72.1	72.2	72.3	72.4
Females	Years	77.8	77.8	77.9	78.1	78.2	78.5
FOOD INFRASTRUCTURE							
Trade capacity *b*							
Grain exports	1,000 Tons	131	114	96	155	72	42
Grain imports	1,000 Tons	7,380	7,202	6,262	6,274	6,200	6,300
Total food and agricultural exports	Million US$	5,485	3,985	3,155	4,116	4,338	4,500
Perishable products	Million US$	313	250	215	311	280	290
Fishery exports	Million US$	1,317	1,271	1,092	1,373	1,618	1,800
Total food and agricultural imports	Million US$	9,987	9,919	7,794	10,251	10,957	11,500
Perishable products	Million US$	545	603	552	738	744	780
Fishery imports	Million US$	682	730	541	805	1,140	1,250
Port capacity	1,000 Tons	891,963	962,185	988,886	1,014,420	1,036,654	1,045,000
Road access *f*	Kms	32,778	33,433	34,102	35,765	36,080	36,480
Rail access *f*	Kms	1,156	1,156	1,156	1,156	1,156	1,156
Telecommunications *f*	Million US$	10,011	10,862	11,500	12,040	127,854	13,500
Power generation *g*	Gigawatts	126,956	133,448	147,141	153,027	175,217	200,600
Percent of population with refrigerators *h*	%	99.2	99.2	99.3	99.4	99.4	99.5
FOREIGN INVESTMENT IN THE FOOD SECTOR *i*							
Inward FDI in the food sector, total	Million US$	108	48	60	na	na	na
From other PECC economies	Million US$	106	121	21	na	na	na
Outward FDI in the food sector, total	Million US$	170	460	152	na	na	na
To other PECC economies	Million US$	163	416	103	na	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY *j*							
Agriculture as a share of GDP	%	3.3	2.7	2.7	2.6	2.5	2.4
Self-sufficiency in grains	%	18.6	20.9	19.8	19.2	19.0	18.7
Self-sufficiency in horticultural products	%	80.9	87.7	86.7	83.5	80.0	78.0
MACROECONOMIC INDICATORS							
GDP growth	%	6.1	6.7	4.6	5.7	6.4	6.0
Interest rate	%	5.9	6.8	6.9	5.1	6.0	6.0
Exchange rate	NT$/US$	27.54	32.60	32.26	31.39	30.62	31.50

na = not available E = estimate F = forecast

a. Council of Agriculture, Food Balance Sheet.
b. Council of Agriculture, Monthly Statistics of Agriculture.
c. Directorate-General of Budget, Accounting and Statistics, Report on the Survey of Family Income and Expenditure.
d. Directorate-General of Budget, Accounting and Statistics, Commodity-Price Statistics Monthly.
e. Council of Economic Planning & Development, Urban and Regional Development Statistics.
f. Ministry of Transportation and Communications, Statistics Abstract of Transportation and Communications.
g. Energy Commission, Ministry of Economic Affairs, Monthly Statistics of Energy.
h. Council of Agriculture, Basic Agricultural Statistics.
i. Directorate-General of Budget, Accounting and Statistics, Quarterly National Economic Trends.
j. Directorate-General of Budget, Accounting and Statistics, Monthly Statistics.

Thailand

	Units	1996	1997	1998	1999	2000*E*	2001*F*
FOOD CONSUMPTION PATTERNS							
Per-capita caloric intake	Cal/day	1,751	1,751	1,751	1,751	1,751	na
Protein (% of calories)	%	13.2	13.2	13.2	13.2	14.0	na
Fat (% of calories)	%	22.2	22.2	22.2	22.2	22.0	na
Carbohydrates (% of calories)	%	64.3	64.3	64.3	64.3	64.0	na
INCOME AND FOOD PRICES							
Per-capita income	US$/capita	2,943	2,488	1,930	2,023	2,033	na
% of disposable income spent on food	%	32.0	32.0	31.8	31.8	31.8	na
% spent eating out	%	6.1	6.1	6.3	6.3	6.3	na
Food price index	1994=100	117.7	130.1	139.2	146.2	150.1	na
General price index (CPI)	1994=100	112.0	122.8	129.0	129.4	133.3	na
POPULATION							
Total population	Million	60.6	61.2	61.9	62.4	63.3	na
Urban	Million	23.7	24.2	25.0	25.7	26.5	na
Nonurban	Million	36.9	37.0	36.9	36.7	36.8	na
Share of population in the following age groups							
0–4 years	%	9.9	8.8	8.7	8.5	8.5	na
5–14 years	%	18.2	17.9	17.6	17.4	17.4	na
15–19 years	%	9.7	9.6	9.4	9.3	9.3	na
20–44 years	%	41.5	41.6	41.7	41.7	41.7	na
45–64 years	%	16.2	16.6	17.0	17.4	17.4	na
65–74 years	%	3.6	3.7	3.8	4.0	4.0	na
75–over years	%	1.6	1.6	1.7	1.7	1.7	na
Median age of population	Years	26.5	26.7	26.9	27.4	27.4	na
Female labor force participation	%	71.4	71.0	70.9	70.8	70.8	na
LIFE EXPECTANCY							
Males	Years	67.4	67.4	67.4	67.4	67.4	na
Females	Years	71.7	71.7	71.7	71.7	71.7	na
FOOD INFRASTRUCTURE							
Trade capacity	1,000 Tons	6,618	6,423	6,880	7,060	na	na
Grain exports	1,000 Tons	5,541	5,560	5,956	6,071	na	na
Grain imports	1,000 Tons	1,077	863	924	989	na	na
Total food and agricultural trade	Million US$	16,211	15,794	13,592	14,955	na	na
Total food and agricultural exports	Million US$	11,511	10,803	9,295	10,197	na	na
Perishable products	Million US$	2,166	2,220	1,968	2,183	na	na
Fishery exports	Million US$	4,145	4,189	3,595	3,954	na	na
Total food and agricultural imports	Million US$	4,700	4,992	4,297	4,758	na	na
Perishable products	Million US$	241	243	225	277	na	na
Fishery imports	Million US$	754	812	825	864	na	na
Road access	Kms	51,242	51,476	51,762	51,957	51,957	na
Rail access	Kms	4,084	4,124	4,166	4,207	4,207	na
Power generation	Gigawatts	87,467	93,250	96,330	96,000	106,700	na
Percent of population with refrigerators	%	58.7	59.0	59.2	59.5	na	na
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total	Million US$	3,958	5,292	2,401	na	na	na
Outward FDI in the food sector, total	Million US$	1,679	1,525	1,065	na	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GNP (Real)	%	9.4	9.5	9.0	9.0	10.0	na
Self-sufficiency in grains	%	65.1	64.5	64.8	72.8	72.0	na
Self-sufficiency in horticultural products	%	94.0	93.0	92.0	90.0	90.0	na
MACROECONOMIC INDICATORS							
GDP growth	%	5.5	–0.4	–8.0	4.0	4.5	na
Interest rate	%	13.00–13.25	15.25	15.25–15.50	9.00–10.50	8.00–9.00	na
Exchange rate	Baht/US$	25.39	31.48	39.33	37.00	38.00	na

na = not available E = estimate F = forecast

United States

	Units	1996	1997	1998	1999	2000E	2001F
FOOD CONSUMPTION PATTERNS *a*							
Per-capita caloric intake	Cal/day	3,642	3,699	3,725	3,750	3,750	3,750
From animal products	Cal/day	998	994	1,010	1,025	1,025	1,025
From vegetable products	Cal/day	2,644	2,705	2,715	2,725	2,725	2,725
Protein (% of calories)	%	11.6	11.5	11.5	11.5	11.5	11.5
Fat (% of calories)	%	36.3	36.1	36.1	36.1	36.1	36.1
Carbohydrates (% of calories)	%	52.1	52.4	52.4	52.4	52.4	52.4
INCOME AND FOOD PRICES							
Per-capita income *b*	US$/capita	21,112	22,005	23,233	24,305	25,458	26,475
% of disposable income spent on food *c*	%	11.1	11.1	11.0	11.0	11.0	11.0
% spent eating out *c*	%	4.4	4.4	4.4	4.4	4.4	4.4
Food price index *d*	1990=100	115.8	118.8	121.4	123.9	126.6	128.8
General price index (CPI) *d*	1990=100	120	122.8	124.7	127.5	130.8	133.8
Agriculture's share of retail food dollar *e*	%	23.0	22.0	20.0	20.0	20.0	19.0
POPULATION							
Total population *f*	Million	265.2	267.6	270.3	272.8	275.3	277.8
Urban *g*	%	75.2	75.2	75.2	75.2	75.2	75.2
Nonurban *g*	%	24.8	24.8	24.8	24.8	24.8	24.8
Share of population in the following age groups *f*							
0–4 years	%	7.3	7.2	7.0	7.0	7.0	6.8
5–14 years	%	14.5	14.5	14.5	14.5	14.5	14.3
15–19 years	%	7.0	7.1	7.2	7.2	7.2	7.2
20–44 years	%	38.2	37.8	37.4	36.8	36.8	36.3
45–64 years	%	20.3	20.6	21.2	21.7	21.7	22.8
65–79 years	%	9.6	9.6	9.5	9.5	9.5	9.2
80–over years	%	3.1	3.2	3.2	3.3	3.3	3.4
Median age of population *f*	Years	34.6	34.9	35.2	35.3	35.3	36.0
Female labor force participation *f*	%	59.3	59.8	59.8	60.0	60.2	60.4
LIFE EXPECTANCY *g*							
Males	Years	73.0	73.6	73.7	73.8	73.9	74.0
Females	Years	79.0	79.2	79.4	79.5	79.6	79.7
FOOD INFRASTRUCTURE							
Trade capacity *h*							
Grain exports	1,000 Tons	92,359	76,679	77,801	90,495	84,700	na
Grain imports	1,000 Tons	4,030	5,515	4,964	5,164	5,000	na
Total food and agricultural trade	Million US$	92,464	93,177	91,007	87,000	na	na
Total food and agricultural exports	Million US$	60,445	57,245	51,829	48,299	50,500	51,500
Perishable products *i*	Million US$	10,742	10,970	10,287	10,178	na	na
Fishery exports	Million US$	3,014	2,739	2,303	2,889	na	na
Total food and agricultural imports	Million US$	33,654	36,300	37,073	37,867	38,067	na
Perishable products *i*	Million US$	7,418	7,885	8,884	9,787	na	na
Fishery imports	Million US$	6,658	7,686	8,053	8,832	na	na
Port capacity *j*	Million Short Tons	2,284	2,333	na	na	na	na
Road access *k*	1,000 Miles	3,934	3,945	na	na	na	na
Rail access *l*	1,000 Miles	136	133	na	na	na	na
Percent of population with refrigerators *m*	%	99.7	99.7	99.7	99.7	99.7	99.7
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total *n*	Million US$	28,098	26,710	18,112	na	na	na
From other PECC economies *o*	Million US$	8,985	na	na	na	na	na
Outward FDI in the food sector, total *p*	Million US$	36,179	na	na	na	na	na
To other PECC economies *q*	Million US$	14,088	na	na	na	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GNP (GDP)	%	1.1	1.1	1.1	1.1	1.1	1.1
Self-sufficiency in grains *r*	%	151.0	147.0	145.0	na	na	na
Self-sufficiency in horticultural products *s*	%	105.0	105.0	105.0	na	na	na
POLICY TRANSFERS							
Consumer subsidy equivalents *t*	%	–9.0	3.0	–4.0	–2.0	na	na
Total transfers (subsidy/tax) *t*	Million US$	10,500	na	na	na	na	na
Total transfers per capita	US$/capita	40	na	na	na	na	na
MACROECONOMIC INDICATORS							
GDP growth u	%	3.6	4.2	4.3	4.2	4.6	3.6
Interest rate v	%	8.3	8.4	8.4	8.0	9.2	9.8

na = not available E = estimate F = forecast

a. *Food and Agriculture Organization of the United Nations.*
b. *US Department of Commerce, Bureau of Economics Analysis, "Economic Indicators." Data for 2000 and 2001 are ERS estimates.*
c. *USDA's Economic Research Service estimates food expenditures by families and individuals. Food expenditures include purchases from grocery stores and other retail outlets, including purchases with food stamps and Women, Infants and Children (WIC) Supplemental Feeding Program vouchers, and food produced and consumed on farms (valued at farm prices). Expenditures also include purchases of meals and snacks by families and individuals, and food furnished to employees. These estimates exclude government-donated food and food paid for by government and business, such as food donated to schools, meals in prisons and other institutions, and expense-account meals. Data for 1999–2001 are ERS estimates.*
d. *US Department of Commerce, Bureau of Labor Statistics, 2000 and 2001 are ERS estimates.*
e. *Farm value percentage of consumer expenditures. ERS' marketing bill series. 2000 and 2001 are estimates.*
f. *US Bureau of Census, "Current Population Reports" and unpublished data. 2000 and 2001 resident population data are estimates.*
g. *US Social Security Administration, Office of Actuary, "Trustees Report to Congress."*
h. *Comtrade database of UN Statistics Division.*
i. *Excludes nursery products.*
j. *US Army Corps of Engineers, "Waterborne Commerce of the United States," annual.*
k. *US Federal Highway Administration, "Highway Statistics," annual.*
l. *Association of American Railroads, Washington, D.C., "Railroad Facts, Statistics of Railroads of Class 1," annual and "Analysis of Class Railroads," annual.*
m. *US Census Bureau, American Housing Survey for the United States in 1993 (H-150-93). 1990 through 1992 and 1994 through 1998 are ERS estimates.*
n. *Survey of Current Business, US Department of Commerce, Bureau of Economic Analysis. September 1997 and September 1993. Foreign direct investment position in the US food processing sector on a historical-cost basis.*
o. *Canada and all countries of Asia and the Pacific.*
p. *Survey of Current Business, US Department of Commerce, Bureau of Economic Analysis. September 1997 and August 1994. Foreign direct investment position in the US food processing sector on a historical-cost basis.*
q. *Canada, Chile, Colombia, Peru, Mexico, and all countries of Asia and the Pacific.*
r. *ERS supply and use estimates. Includes wheat, rice, rye, corn, oats, barley and sorghum. 1996 through 1998 are expected to exceed 100 percent.*
s. *ERS supply and use estimates. Includes only fresh fruits and vegetables.*
t. *OECD, "Agricultural Policies, Markets and Trade in OECD Countries: Monitoring and Evaluation 1996."*
u. *Chained 1992 dollars. US Bureau of Economic Analysis, "National Income and Product Accounts of the United States", and "Survey of Current Business."*
v. *Prime rate charged by banks. Board of Governors of the Federal Reserve System, "Federal Reserve Bulletin, "monthly, and "Annual Statistical Digest."*

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Economic Research Service

http://www.econ.ag.gov

The Economic Research Service (ERS) is the main source of economic information and research in the US Department of Agriculture. ERS economists and social scientists develop and distribute a broad range of economic and other social science information and analysis to inform public and private decision making on agricultural, food, environmental, and rural issues.

The ERS's timely reports are distributed to public and private decision makers to assist them in conducting business, formulating policy, and learning about the farm, rural, and food sectors. ERS publications are available to the public and the news media in both print and electronic form.

The agency's three divisions—Food and Rural Economics, Market and Trade Economics, and Resource Economics—conduct research, perform commodity market and policy analysis, and develop economic and statistical indicators. The executive and legislative branches of the US federal government use ERS information to help develop, administer, and evaluate farm, food, rural, and resource policies and programs. In addition to research reports and commodity analyses, ERS publishes several nationally recognized periodicals that communicate the findings of the agency's research program: *Agricultural Outlook*, *Food Review*, *Rural Development Perspectives*, and *Rural Conditions and Trends*.

Farm Foundation

http://www.farmfoundation.org

Farm Foundation is a nonprofit organization founded in 1933 to improve US agriculture and the well being of rural people. Farm Foundation acts as a catalyst to increase knowledge about agricultural and rural issues. Program activities stimulate the research agenda, improve educational programming through extension and other outreach education, and sponsor forums to foster policy dialogue on important issues facing agriculture and rural people. Its linkages to agricultural economists and social scientists bring disciplinary knowledge to bear on priority areas. The foundation's programs promote the interaction of business and policy leaders, government officials, and educators in exploring strategies and policy options. The results provide a solid basis for informed private and public sector decisions.

Perdue Farms

http://www.perdue.com

Headquartered in Salisbury, Maryland, Perdue Farms is the largest poultry producer in the northeastern United States and fifth largest in the country. Its branded chicken and turkey products are sold in retail supermarkets, grocery stores, and quality butcher shops from Maine to Florida and as far west as Chicago and St. Louis—-a market area encompassing almost 40 percent of the nation's population. Food service chicken and turkey products are sold nationwide, and Perdue's international operations export to more than 50 countries around the world.

The company was founded by Arthur W. Perdue in 1920 as a table-egg poultry farm. Frank Perdue joined his father's company in 1939 as the third full-time employee. He built it into an industry leader and, as spokesperson for the company, launched a television and radio advertising campaign that made the Perdue® brand a household name as well as market-share leader.

Perdue is a vertically integrated agribusiness, operating 20 hatcheries, 12 poultry feedmills, a specialty feedmill, and two ingredient blending operations, live production and breeder operations, and 20 processing/further-processing plants that produce more than 46 million pounds of chicken products and nearly 4 million pounds of turkey products each week. The company's Grain & Oilseed Division operates two soybean crushing plants, three protein conversion plants, one edible oil refinery, and a network of grain storage elevators. Primary breeder farms supply proprietary breeding stock and pursue breed enhancements; research labs seek improvements in processes and prod-

ucts; and the truck fleet is satellite-linked to dispatching and distribution centers to assure customer deliveries around the clock.

World Perspectives, Inc. (WPI)

http://www.worldperspectives.com

World Perspectives, Inc., (WPI) is a Washington, DC-based firm providing a wide range of market and policy strategic services to the private and public sectors. Established in 1980, WPI serves a global client base operating in the agri-food and related industries. The WPI team provides support in a variety of areas, including production, processing/manufacturing, training, transportation and handling, and marketing and promotion.

The company serves clients by means of studies and analyses, project consulting, policy seminars, and intelligence regarding all factors affecting the agri-food system, including production, trade, and investment. WPI provides marketing and advertising services, including public relations, communications, and market and consumer survey work through International Food Strategies, a joint venture company operated with True North Communications, the sixth largest advertising agency in the world

Pacific Economic Cooperation Council

The Pacific Economic Cooperation Council (PECC) is an independent, policy-oriented organization devoted to promoting economic cooperation in the Pacific Rim. PECC brings together senior government, academic, and business representatives from 25 economies to share perspectives and expertise in search of broad-based answers to economic problems in the Asia Pacific region.

Founded in 1980, PECC now comprises member committees from the economies of Australia; Brunei; Canada; Chile; China; Colombia; Ecuador; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Mexico; New Zealand; Peru; the Philippines; Russia; Singapore; Chinese Taipei; Thailand; the United States; and Vietnam as well as the South Pacific Forum. France (Pacific Territories) and Mongolia were admitted as associate members in April 1997 and October 1999, respectively. The Pacific Basin Economic Council (PBEC) and Pacific Trade and Development Conference (PAFTAD) are institutional members of PECC.

PECC's governing body is the Standing Committee, which meets twice a year and consists of the chairs of PECC committees in each member economy. The day-to-day administrative and coordinating functions are carried out by an International Secretariat based in Singapore. Each member committee sends a high-level tripartite delegation from government, business, and academia to the PECC general meeting held approximately every two years.

In addition, PECC establishes task forces, forums, and working groups to concentrate on particular policy areas. These groups meet periodically, organize seminars and workshops, conduct studies, and publish their conclusions and recommendations for the benefit of the Pacific community. Task force topics include capital and financial markets, energy, fisheries development and cooperation, human resource development, Pacific Island Nations, telecommunications and information industries, transportation, and science and technology. PECC also supports regional forums on trade policy, food and agriculture, minerals, energy, telecommunications, and transportation and publishes annual editions of *Pacific Economic Outlook* and *Pacific Food Outlook*.

At the regional level, PECC's most important link with government is through APEC. PECC is the only nongovernmental organization among the three official APEC observers. PECC representatives attend APEC ministerial meetings, senior officials meetings, and working group meetings. PECC also works with other international organizations such as the World Trade Organization, the Organization for Economic Cooperation and Development, the Asian Development Bank, the World Bank, and United Nations' agencies.

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The *Pacific Food Outlook* represents the first regionwide coordinated effort to provide the short-term outlook for the Pacific food system. The food system includes not just production agriculture, but also the whole complex of economic relationships and linkages that tie the region's food consumers to producers. The goal of the *Pacific Food Outlook* is to help increase knowledge about the diverse components of this vital segment of the global economy.