China Faces Challenges in Reshaping Its Agricultural Economy
Demand for U.S. agricultural products on the world market will remain strong in 1993, spurred by population growth and economic expansion in a number of countries, particularly in East Asia and North Africa. The value of U.S. agricultural exports in fiscal 1993 (October 1, 1992-September 30, 1993) is forecast at $41.5 billion, within 2 percent of the fiscal 1992 level and the third highest total ever.

That's the appraisal James R. Donald, chair of USDA's World Agricultural Outlook Board, gave at the department's annual Agricultural Outlook Conference last December.

"On the domestic front, the 1993 outlook calls for further modest growth in the farm economy," Donald says. "Cash farm income could increase slightly, perhaps 1 or 2 percent from the $60 billion estimated for 1992. However, there remains considerable uncertainty about the 1993 outlook, and cash income could vary from $58 to $64 billion."

Net farm income (net cash income, less depreciation, plus the value of inventory change and nonmonetary income) in 1993 will likely range from $42 to $48 billion. "In 1992, net farm income will be close to 1990's record $51 billion, well above earlier expectations because of larger commodity output and lower expenses," Donald says. "Also, the buildup in crop stocks is boosting 1992 net farm income, while sales from these stocks will augment 1993 net cash income."

Total farm output in 1992 exceeded that of the previous year by 5 percent, and will likely decline only slightly in 1993, since lower crop production will be nearly offset by increased animal product output. "We anticipate that this large output, coupled with moderate increases in inflation and marketing costs, will limit the increase in retail food prices to between 2 and 4 percent," Donald says.

USDA analysts expect that this year, U.S. agricultural commodities will find expanded markets at home and stronger demand abroad. "Domestic use of crops will likely rise between 4 and 5 percent, led by a more than 5-percent gain in feed use to support the expanded animal output and generally lower prices," Donald explains. "Food use of crops and demand for animal products will increase with population growth and continued economic recovery."

In the longer term, agricultural exports will continue to be a growth market for U.S. farmers and for the economy as a whole. "Exports will rise in response to reforms in farm and trade policies and worldwide economic growth, particularly in less developed countries," Donald says.

— Priscilla B. Glynn
FEATURES

China Faces Challenges in Reshaping Its Agricultural Economy Doug Martinez
The 1990's could well be the decade in which China begins to realize the kind of economic success enjoyed by Hong Kong, South Korea, Taiwan, and Singapore. The reforms needed for rapid economic growth have apparently taken root—but China will have to rely on trade and a market orientation to ensure prosperity.

U.S. Hog Production Continues To Expand Martha R. Evans
Contrary to many industry analysts' expectations, U.S. hog producers continued to expand breeding herds in 1992, spurred by lower feed costs and a comparatively strong market. This trend will likely continue as long as producers' cash receipts exceed cash costs.

U.S., Mexico Building on History of Cooperation In Agriculture Priscilla B. Glynn
Regardless of the final provisions of the recently signed North American Free Trade Agreement, Mexico and the United States will continue joint efforts to protect agriculture and consumers. Although adjusting sanitary regulations to ease agricultural trade can be difficult, the two countries have a long history of cooperation in this area.

The United States Shines in Apple Production, Exports Carol Lee Morgan
The United States produces 10-15 percent of the world's apple supply and usually ranks as the second largest exporter. U.S. grower prices and exports are expected to slip in the 1992/93 marketing year from the record highs of 1991/92. But over the long term, U.S. apples will likely find strong export markets.

DEPARTMENTS

Farmline Trends: Monthly Price Monitor

SPECIAL IN THIS ISSUE

1993 Reports Calendar
This is your handy guide to winter and spring release dates for situation and outlook reports and updates of the Economic Research Service, crop and livestock reports of the National Agricultural Statistics Service, and supply and demand estimates of the World Agricultural Outlook Board.
China Faces Challenges in Reshaping Its Agricultural Economy

Temporary grain storage facility

In the 1990's, China appears poised to begin enjoying the kind of economic success experienced over the past four decades by its Asian neighbors—Hong Kong, South Korea, Taiwan, and Singapore.

But firing up the economy of the world's most populous nation to match the performance of the "four dragons" will depend on Chinese leadership in building on its recent economic reforms.

"The changes that have taken place in China over the past decade indicate that the reforms necessary for rapid economic development have taken root," says economist Alan Webb of USDA's Economic Research Service (ERS). "However, the transformation associated with such development presents new challenges and difficulties for China and the world."

To begin with, Webb says, sustaining economic growth will entail tremendous changes—both social and financial—for China's 1.17 billion people. Moreover, the country's transformation carries with it major implications for how the world economy will operate in the future.

For China—and other low-income countries—agriculture dominates the national economy. Agricultural activities provide income for 60 percent of the labor force, and more than half of consumer expenditures are devoted to food and beverages. In countries with higher incomes and more diversified economies, of course, agriculture's economic role is somewhat less important: in middle-income countries, food expenditures average 38 percent of consumer budgets. In high-income countries, food expenditures average less than 15 percent of consumer budgets, and agriculture accounts for less than 3 percent of gross domestic product (GDP), on average.

Impact on Agriculture

Webb says that China's agricultural sector, more than any other part of its economy, will feel the impact of economic reform.

"We should see a structural transformation of the agricultural economy," he says. "This means a boost in labor efficiency (based on greater use of technology and improved management techniques) and growth of higher paying jobs outside agriculture. Consequently, people would move out of agriculture, taking up non-farm jobs in rural areas."

Sustaining economic growth will bring tremendous social and financial changes.
The second major consequence of development for the agricultural sector will be a change in consumption patterns. "This is a result of consumers' desire to change the mix of goods they purchase with their additional earnings," says Webb. "When this occurs, consumers tend to decrease purchases of basic food staples and increase purchases of fish, meat, poultry, and other livestock products."

Webb, along with fellow ERS economists Shwu-Eng Webb and William Coyle, recently examined what impact these effects would have on Chinese agriculture and society.

Alan Webb says that changes in China's agricultural markets—although subject to government policy shifts—will be driven by changes in consumer food consumption patterns which are largely tied to income growth.

"In contrast, changes in production practices—structural change—will depend in large measure on government policy and the institutions which emerge as part of the development process," says Webb. "But market effects—the changes in China's consumer food demand—will have stronger and more direct implications for the rest of the world than will the structural changes."

In other words, he says, the policy choice for China is whether to rely on trade to fill the gap between food demand and availabilities, or whether to impose procurement policies to encourage grain production.

"The first choice puts China in the role of having to rely on world markets for some of its food supplies and as an outlet for its surpluses," says Webb. "The second alternative forces a self-sufficiency solution, possibly at the expense of economic growth."

**Favoring Self-Sufficiency**

Over the past 40 years, China has favored the self-sufficiency model.

In fact, China's ability to meet the food and clothing needs of its vast population during the last four decades, with very little reliance on foreign imports, is a remarkable achievement, says Webb. China has 22 percent of the world's population, which it must feed and clothe with an arable land base of slightly less than 100 million hectares, roughly 6.5 percent of the world's total. (A hectare equals 2.47 acres.)

Before 1979, China was able to maintain a high level of self-sufficiency through strict controls on both consumption and production.

"The adoption of the Household Production Responsibility System in 1979, however, loosened those controls and stimulated agricultural productivity by linking peasants' rewards directly to the total value of their output," Webb says. "This, coupled with reforms encouraging investment in township and village enterprises for the production of export goods, such as textiles, caused real per capita incomes to grow at an average 5.6 percent per year between 1979 and 1989."

This kind of economic growth, if continued, suggests that food consumption patterns may undergo fundamental shifts, and that the proportion of personal income spent on food may decrease. As per capita income rises, consumers typically upgrade their diets by substituting meat, poultry, and fish for traditional staples like grains, beans, and tubers. This shift accelerates growth in demand for agricultural commodities because direct human consumption of grains is replaced by indirect consumption in the form of livestock and poultry products.

"In addition to changes in China's food consumption," says Webb, "an acceleration in the rate of its per capita income growth will likely put further pressures on its food production capacity as its 1.17 billion citizens demand more diversified, higher quality diets."

**The Taiwan Model**

Webb adds that development in Taiwan—and the resulting impact on food demand—

![Vegetables being delivered to market](image)
can be a useful measure in projecting China's food consumption patterns by the year 2001. At the moment, Taiwan and China are at opposite ends of the development spectrum. Economic growth in China is just beginning to accelerate, while growth in Taiwan is beginning to slow slightly as it becomes a more developed economy.

"Using Taiwan as a model for examining the changes ahead for China is appropriate for two reasons," says Webb. "First, Taiwan's development path has been one of the most spectacular in the world over the last three decades: it represents an example that China would like to replicate—or even surpass."

Second, he says, Taiwan has close cultural links to China. These cultural similarities are pronounced in food consumption, and therefore make Taiwan's economic transformation a guide to the changes which may take place in China.

"China's food consumption pattern in the 1980's bears a strong resemblance to that of Taiwan in the 1950's and 1960's," says Webb.

The per capita income level and food consumption pattern in 1965 for Taiwan was comparable to that of China in 1988, when China's per capita income was about $290 a year. Adjusted for inflation, Taiwan's per capita income in 1965 was about $300 a year.

One example involves grain and potatoes. In the late 1980's, China's per capita consumption of grain and potatoes averaged 220 kilograms a year, about that of Taiwan in the 1950's and 1960's. Per capita meat consumption (excluding fish) was about 19 kilograms in 1965 in Taiwan, and per capita meat consumption was about 18 kilograms in 1988 in China.

Since 1984, more than 50 percent of Taiwan's per capita protein intake has come from meat products, and, in recent years, annual per capita meat consumption has reached a plateau of about 57 kilograms. The meat portion of protein sources has leveled off at 55 percent.

Webb says that assuming an annual per capita income growth rate of 5 percent and consumption patterns similar to those in Taiwan over the past three decades, it will take China 27 years to reach Taiwan's current level of per capita meat consumption.

**Poultry Gains**

During Taiwan's early economic development, pork made up more than 80 percent of its meat consumption, just as it did in China in the 1980's. But by 1988, the pork share of meat consumption in Taiwan had declined to about 50 percent. In both countries, poultry consumption rose as economic development progressed. Per capita poultry consumption in Taiwan has increased about tenfold over the past 40 years, while China's tripled between 1978 and 1989. Without higher poultry consumption, demand pressures for feed grains would be ever greater, because pork's feed-to-meat ratio is about twice that of poultry.

Webb says that future production of grain and livestock products in China will likely follow a pattern similar to that of other countries in the region when they were at a comparable stage of development.

"If the demand for livestock products begins to outstrip the country's ability to support adequate poultry and livestock herds from domestically produced feed rations," says Webb, "China will likely choose to meet its demand for livestock products from domestic sources and import the grains and oilseeds it needs to support that production."
He notes that, for the most part, China's livestock production sector remains in an early developmental stage. The amount of factory-processed feed has increased rapidly since 1985 but still accounts for less than 20 percent of total livestock feed. Most meat comes from backyard production in rural areas, or areas close to big cities.

"With economic development, backyard livestock production will decline," says Webb. "In our projections, we're assuming that growth in livestock production is based on increased use of least-cost, high-quality, factory-processed feed."

**Higher Yields Needed**
China has very limited arable land, and the amount of arable land it has in crops has fallen in recent years. As a result, China's ability to meet future feed and oilseed demand for livestock production will depend on higher yields. Trends in grain yields in China have undergone some significant shifts in the past two decades.

"The household contract system significantly changed the production structure from the old commune system by giving peasants the incentive to increase agricultural productivity," says Webb. "Under this system, peasant farmers contract with the government to farm a particular piece of land and are required to give the government only a portion of the expected output. Peasant farmers can use the rest of the land to grow either the same crop or another commodity and then sell that output on the private market or to the government."

Average annual yield increases for grains, which were a respectable 3.5 percent from 1963 to 1978, jumped to 6 percent from 1979 to 1984, then fell off to less than 2 percent for the latter half of the decade.

From 1988 to 1991, yield growth averaged less than 1 percent for rice, wheat, and soybeans, and was only 2.4 percent for corn. Yield growth rates are expected to remain low because China's wheat and corn yields are already above the world average. Rice yields are likely to increase slowly because farmers are expected to emphasize enhanced quality over yield gains.

For China, food staple grains are the key to meeting its food needs. China will likely continue to be a major importer of wheat for the next decade. China is also likely to become a significant importer of soybeans for animal feed in the next 10 years. And if labor and land are not significantly shifted away from growing rice, China will likely have large quantities of rice available for export.

"The key policy issue facing China's leadership in the next decade will be how and to what extent to carry out realignment of production activities," says Webb. China's leadership must decide to what extent it will allow market forces in its domestic agricultural sector to shift production toward those commodities in greatest demand.

"If China is to follow the path of the 'four dragons' and duplicate their successes," says Webb, "it will have to rely on trade as a source of economic growth, and on a market orientation to help meet the needs of its food and agricultural sector."

Based primarily on information provided by economists Alan Webb, Shwu-Eng Webb, and William Coyle. Agriculture and Trade Analysis Division, Economic Research Service.

"However, expansion continued at a modest pace as producers' returns continued above cash costs in 1992 because of a bumper corn crop and a stronger than previously expected hog market," says Southard.

Pork production in 1992 is expected to have reached a record 17.2 billion pounds (carcass weight). The previous record, 16.4 billion pounds, was set in 1980. Production in 1993 may set another record—17.8 billion pounds.

"The 1993 projection will go even higher if producers increase the number of sows farrowing in March through May," says Southard.

As of Sept. 1, 1992, producers were continuing to expand their herds. Hog breeding herds increased by 7 percent from 1990 to 1991, and by 2 percent between 1991 and 1992.

Producers have indicated that during September 1992-February 1993, they intend to have 6.05 million sows farrow. This would be a 3-percent increase in sows farrowed from 1 year earlier, and an 8-percent gain from 2 years earlier.

Iowa, the leading hog producing State, expanded its inventory by 7 percent from a year earlier to 16.9 million head by September 1992. Illinois, the second largest producer, held steady with 6.2 million head. And North Carolina is now emerging as a major hog producer: that State's inventory jumped by 26 percent to 4.3 million, primarily because several large contractors expanded their herds.

"As long as cash receipts exceed cash costs, operators will continue either to keep producing at the same level, or to expand—depending on the degree to which receipts outstrip costs," says Southard.

Total costs of production include capital costs such as general farm overhead, taxes, insurance, and interest. Cash costs include feed, veterinary care, fuel and electricity, machinery and building repairs, and hired labor.

When receipts drop below cash costs, producers begin trimming production, and some may go out of business, Southard says.

Large hog enterprises may be more financially viable than small ones because economies of size enable them to have a lower cost structure. "The advantages of economies of size include more intensive use of facilities to produce hogs year-round, and more effective marketing techniques," Southard says.

Small hog producers and those with marginal income, on the other hand, can be forced out of business because of competition from larger operators with lower costs, says Southard. The rate of exit depends to a large degree on hog and corn prices, he notes.

**Feed Costs Favorable**

Hog production is closely tied to the corn crop, and the United States reaped a bumper crop in 1992, effectively lowering...
hog producers' feed costs. "The substantially larger crop will likely keep corn prices substantially below those of a year earlier through mid-1993 at least, because of the record 9.33-billion bushel harvest," Southard says. "These lower prices will hold cash costs for hog producers near $36-$37 per cwt."

As competition from large producers has intensified, some operators have switched from independent production to contracting, Southard says. "By contracting, a producer can avoid the risks associated with frequent shifts in prices and input costs," Southard adds. Contractors supply hogs, feed, and veterinary services, while producers furnish the buildings and labor.

Because contractors usually have premium breeding stock, producers may have access to improved lines of stock that can produce larger litters and leaner meat.

"Hog producers have enhanced production efficiency in recent years, partly through bigger litters," says Southard. The national average in the 1970's was 7.17 pigs per litter, during the 1980's it was 7.55, and so far for the 1990's it is 7.92. "These increases are the result of better management and improved genetics," Southard explains.

**U.S. Imports Down**

Now that U.S. supplies are plentiful and prices have declined, U.S. hog producers have taken back part of the domestic pork market once filled by imports. Total value of U.S. pork imports fell about 28 percent in fiscal year 1992 (Oct. 1, 1991-Sept. 30, 1992) to about $625 million.

On a carcass weight basis, U.S. import volume from various East European countries dropped 40-50 percent in fiscal 1992 from a year earlier. Imports from Denmark fell 32 percent, imports from the Netherlands 11 percent, and those from Canada 5 percent.

U.S. imports declined despite higher pork production in several countries.

Economist Shayle Shagam, also of ERS, says that low U.S. pork prices have made the U.S. market less attractive to foreign pork exporters. "For example," he says, "Danish exporters are finding it more profitable to sell pork in Germany than to ship it to the United States."

Through the late 1980's, the United States imported large quantities of pork from Eastern Europe, but agricultural restructuring in those countries, low U.S. prices, and recent political unrest in Yugoslavia have led to reduced U.S. imports from that region.

"Poland used to be our second or third largest supplier of pork imports, but it has slipped to fifth or sixth place because more of its pork production is being consumed domestically," Shagam says.

Based primarily on information provided by economists Leland Southard and Shayle Shagam, Commodity Economics Division, Economic Research Service.

**Hog Breeding Herds Increased 9 Percent Between 1990 and 1992**

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As of September 1. Source: USDA, National Agricultural Statistics Service.

**Breeding hogs on an Illinois farm**
### 1993 Reports Calendar
#### January-June

**JANUARY**

**MONDAY**
- 4 Cotton & Wool Update
- 11 World Agricultural Supply & Demand
  - Cotton Ginnings
  - Crop Production, Annual
  - Grain Stocks
  - Rice Stocks
  - Winter Wheat & Rye Seedings

**TUESDAY**
- 5 Dairy Products
- 6 Poultry Slaughter
- 12 Broiler Hatchery

**WEDNESDAY**
- 7 U.S. Agricultural Trade Update
- 13 Milk Production
- 14 Potato Stocks
- 15 Turkey Hatchery

**THURSDAY**
- 8 Livestock & Poultry
- 14 Turkeys
- 15 Vegetables
- 15 Vegetables, Annual

**FRIDAY**

**FEBRUARY**

**MONDAY**
- 1 Catfish Production
- 2 Cotton & Wool Update
- 3 Broiler Hatchery

**TUESDAY**
- 8 Egg Products
- 9 World Agricultural Supply
- 10 Cotton Ginnings
- 10 Crop Production

**WEDNESDAY**
- 15 Milk Production
- 16 World Agricultural Supply
- 17 Broiler Hatchery
- 17 Cotton Ginnings

**APRIL**

**MONDAY**
- 5 Cotton & Wool Update
- 6 Crop Progress
- 7 Poultry Slaughter
- 8 Broiler Hatchery

**TUESDAY**
- 6 Dairy Products
- 7 Hatchery Production, Annual
- 8 Broiler Hatchery

**WEDNESDAY**
- 7 Cotton Ginnings
- 8 Crop Progress
- 9 Milk Production
- 10 Livestock & Poultry

**THURSDAY**
- 10 Pork Production
- 10 Broiler Hatchery
- 10 Feeds
- 10 Eggs

**FRIDAY**

**MAY**

**MONDAY**
- 3 Crop Progress
- 4 Cotton & Wool Update
- 5 Broiler Hatchery

**TUESDAY**
- 10 World Agricultural Supply & Demand
- 11 Broiler Hatchery
- 11 Cotton Ginnings

**WEDNESDAY**
- 12 Crop Progress
- 12 Former USSR Farm Labor
- 12 Agricultural Outlook

**FRIDAY**

**1** Agricultural Resources series include: February 12, Inputs; April 19, Agricultural Land Values Summary; May 13, Cropland, Water, & Conservation

The World Agricultural Supply Estimates reports, the World Agricultural Outlook reports, and the World Agricultural Survey reports are also shown in bold. They are issued in their entirety at 3 p.m. ET on the indicated dates.
Titles of reports issued by the National Agricultural Statistics Service are printed in lightface. Complete reports are released, usually at 3 p.m. ET, on the dates shown.

To request subscription information on any of these reports, write ERS-NASS, 341 Victory Drive, Herndon, VA 22070, or call 1-800-999-6779. For details on electronic access to reports of the Economic Research Service or National Agricultural Statistics Service, call 202-720-5505.

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FARMINE • December/January 1993
he United States and Mexico are continuing longstanding efforts to safeguard their people and food supplies from risks associated with food and agricultural products, independent of the negotiations surrounding the recently signed North American Free Trade Agreement (NAFTA).

The agreement in principle, reached in August 1992, will lower trade barriers among Mexico, the United States, and Canada, and is scheduled to take effect on Jan. 1, 1994.

"Regardless of the specific content of the NAFTA provisions, cooperative efforts between the United States and Mexico to protect agriculture and consumers from pests, diseases, and other contaminants will continue," says economist Ken Forsythe of USDA's Economic Research Service.

Sanitary and phytosanitary (S&P) regulations are designed to protect human, animal, and plant life and health from risks arising from additives, contaminants, toxins, diseases, and pests in or on agricultural products. (The term phytosanitary refers to plant health.)

"NAFTA discussions focused on S&P regulations that limit agricultural trade between the United States and Mexico," Forsythe explains. "Adjusting S&P regulations in any international agreement to allow freer flow of food and agricultural products is difficult for two reasons."

First, every nation has the right to use S&P regulations to protect the health and safety of its people and food supply.

Second, S&P risk assessment methodologies are highly technical and cover a wide range of disciplines—animal science, veterinary medicine, agronomy, chemistry, and biology, to name a few.

"Their technical nature means S&P regulations are more complex and more difficult to evaluate than other trade measures, such as tariffs or quotas," Forsythe explains. "It also heightens the chances of questions arising over whether they are truly intended to protect human, animal, or plant health—or to substitute for more overt forms of trade restriction."

To expand trade substantially, nations must resolve disparities in product safety certification, inspection systems, treatment procedures, and production practices that affect end products—in addition to lowering tariffs and removing quotas.

On the other hand, not all S&P regulations constrain trade: some may actually enhance it. "Many of them involve routine inspections or certifications that limit risks, thereby increasing a nation's confidence in the safety of its agricultural imports," Forsythe says.

The GATT's Role

Over the past 45 years, many countries have negotiated reductions in import tariffs and other trade barriers under the auspices of the General Agreement on Tariffs and Trade (GATT, the organization that sets the rules for most international commerce). Over the same period, however, S&P regulations, which can greatly influence agricultural and food trade, have increased markedly.

"Most countries design their national food safety and quality inspection systems to meet their own domestic needs rather than the import requirements of other countries," Forsythe explains. "Legitimate reasons exist for different nations to have different S&P regulations, based on their individual circumstances."

In the current GATT negotiations, known as the Uruguay Round, countries are trying to establish guidelines, disciplines, and dispute settlement procedures that will help resolve trade issues that arise from inconsistent S&P regulations. "Consequently, some features of the proposed GATT agreement could well have a direct bearing on S&P issues between the United States and Mexico," Forsythe says.

The proposed GATT S&P agreement requires signatories to recognize pest- and disease-free zones. Countries establish such zones based on geographical features, ecosystems, epidemiological surveillance, and effectiveness of the S&P control measures already in place.

The proposed GATT S&P agreement also would require signatories to accept imports from other signatories having different S&P measures—provided that the exporting nation can show that its measures assure the importing nation a level of protection equivalent to that of the importer's own S&P measures.

In addition, allowances have been incorporated into the proposed GATT S&P agreement to help developing countries expand their agricultural trade. "Developing nations, such as those in Latin America, may receive deferential treatment under the terms of the GATT proposal, such as extended time frames for compliance with new S&P measures on certain products," Forsythe says. The proposal may also grant developing countries temporary exemptions from meeting S&P regulations to prevent disruption of their finances, trade, and development—as long as their exports do not heighten risks for importing nations.

"The GATT proposal would permit countries to use S&P measures to safeguard human, animal, and plant health, provided that such measures are not used to curtail trade to a greater extent than is required for such protection," Forsythe explains. "If countries base their S&P regulations on internationally accepted standards, guidelines, or recommendations, it will help minimize disputes between trading partners."

Pesticide Tolerances Vary

Consumers rely on their governments to regulate pesticide residue levels in food,
whether domestic or imported. But, as is the case with S&P measures generally, standards and regulations on acceptable pesticide residues vary among nations.

The United States and Mexico have different criteria for registering pesticides and setting tolerance levels due to their different climates, crops, and national diets.

Like many other developing nations, Mexico uses the international maximum residue levels (known as tolerance levels) developed by the Codex Alimentarius Commission. The Codex is a scientific organization of representatives from 143 countries that brings together individuals with technical expertise on food additives, pesticide residues, contaminants, animal drugs, packaging, and food quality.

In the United States, on the other hand, tolerance levels are set by the Environmental Protection Agency (EPA), and these often differ from Codex levels for technical reasons. "The Codex focuses on international standards and must account for wide variations in agricultural practices, consumption patterns, and data collection methods," Forsythe explains. "EPA of course focuses on the United States and therefore uses different databases, different scientific assumptions, and so on."

Mexican exporters have strong financial incentives to ensure that products meet U.S. regulations for pesticide residues on agricultural imports—the Food and Drug Administration (FDA) enforces EPA tolerance levels and will refuse entrance to food shipments that fail to meet them. Moreover, if an exporter's shipment is found to be in violation of EPA regulations, future shipments from that exporter may be earmarked for detention and inspection.

"Most violations on imported produce occur in cases involving the use of pesticides for which the United States has no established tolerance level," Forsythe says. (A pesticide may have no tolerance level because it is not used in the United States, or because EPA has denied U.S. registration.)

Mexico still uses several pesticides for which EPA has suspended or cancelled registration. The removal of EPA tolerances for these pesticides will help prevent any products with residues of these pesticides from entering U.S. markets: such action would in effect reduce the tolerance...
Defining the Terms

Sanitary and phytosanitary (S&P) measures are used to eradicate, eliminate, or control pathogens or hazards. A pathogen can be any component of the environment (a pest, micro-organism, virus, chemical, or extraneous substance) that presents a hazard to a living organism (human, animal, or plant). A hazard may be eliminated without necessarily eradicating the pathogen that causes it.

- **Eradication** is the deliberate extinction of a pathogen—for example, through the destruction of infected animals. Hog cholera was eradicated from the United States in 1978 after systematic diagnosis and destruction of the infected herds.
- **Elimination** extinguishes a hazard, but not the causative pathogen—for example, by vaccinating animals against disease. Mexico vaccinates hogs for cholera but—since the pathogen remains in the environment—the possibility of new outbreaks remains.
- **Control** prevents the regeneration of a hazard by treating imports for exotic pests or diseases to eliminate the hazard or eradicate the pathogen. Cold treatment of citrus imports to kill Mexican fruit flies is one such method.

levels to zero, so that no residues of those pesticides would be allowed on agricultural products shipped to the United States. However, Mexican producers may still use these pesticides on products for domestic consumption or export to another country.

A History of Joint Effort

Although S&P regulations are in place on both sides of the border to prevent the spread of pests and diseases, the possibility of cross-border contamination remains. But Forsythe points out that Mexico and the United States are making this possibility ever more remote through cooperative programs that control pests and diseases in Mexico.

"The eradication of foot-and-mouth disease in 1954 up through the more recent eradication of screwworm in Mexico demonstrate the two nations' ability to cooperate in these areas," Forsythe says. "Such programs are likely to continue, regardless of NAFTA provisions."

Two outbreaks of foot-and-mouth disease (an acute viral disease of cattle and other cloven-hoofed animals) in Mexico in 1946 and 1952 spread rapidly and took 8 years for the two nations to eradicate. They established a Joint Commission for the Prevention of Foot-and-Mouth Disease, still in operation. The United States, free of the disease since 1929, prevents its reintroduction through stringent controls on imports of fresh, chilled, and frozen meat and live animals.

Over the past 20 years, the United States and Mexico also have worked together to eradicate screwworm, a parasitic larva that breeds in the living tissue of mammals and can cause serious injury or death in livestock. The United States has been free of screwworm since 1982, and formally recognized Mexico as free of it in 1991—although recent outbreaks there are causing concern. It is estimated that the eradication program has cost $750 million so far, but that it saves U.S. livestock producers as much as $376 million annually.

U.S.-Mexican efforts to eradicate the Mediterranean fruit fly (or Medfly) have been ongoing since the pest was discovered in Mexico in 1977. The effort eradicated the Medfly from Mexico and set up a Medfly barrier zone at the Mexican-Guatemalan border.

Yet Medfly eradication efforts have been threatened recently by outbreaks of the pest near the Mexican-Guatemalan border. "New outbreaks in Mexico's interior could disrupt its fresh fruit and vegetable exports," Forsythe says.

Recent appearances of the Medfly in California could pose a threat to Mexican fruit and vegetable production if the pest were to travel south on U.S. cargo. Medflies were captured in southern California a number of times between 1986 and 1990—but strict domestic quarantines are in place to prevent any spread to other U.S. areas or to Mexico.

The Mexican fruit fly limits the quantity of fresh fruit Mexico can export to the United States, since the pest poses a risk to citrus crops in California, Texas, Arizona, and Florida.

"USDA's Animal and Plant Health Inspection Service is working with the Mexican Secretariat of Agriculture to prevent fruit flies from entering the United States," Forsythe says. Their efforts include fly-free zones in the Mexican state of Sonora that are continually surveyed for the pest, strict quarantine inspection at major U.S. points
of entry, and rapid response to any outbreak.

Disease-Free Zones Could Boost Trade

The establishment of disease-free zones offers an alternative to eradicating a pathogen throughout an entire country. The establishment of such zones could serve as an interim step toward nationwide eradication of certain diseases in Mexico, and could help boost animal products trade.

Mexico has proposed the northwestern state of Sonora as a zone free of hog cholera (a viral disease characterized by fever, diarrhea, and exhaustion) and Newcastle disease (a viral disease of poultry and other birds that can cause pneumonia and inflammation of the brain and spinal column). Sonora is the largest producer of pork and second largest producer of poultry meat of Mexico's border states. It has a long common border with the United States, so its products do not have to cross other pork or poultry producing regions to reach the border.

The United States eradicated hog cholera in 1978, and its only occurrences of Newcastle disease in recent years have been among the pet bird population. The United States prevents reintroduction of these diseases by prohibiting imports of pork and poultry products from Mexico and other countries where the diseases are present—unless the imports are boned and cooked, dried, or canned. Imports of live swine must undergo a 90-day quarantine.

"A disease-free zone such as that proposed for Sonora would increase Mexico's access to U.S. seaports, which would in turn help it ship its meat products to other markets, such as Japan," Forsythe explains.

U.S. officials are working with international and regional animal health organizations to develop internationally accepted standards and criteria for recognizing disease-free zones. The United States does not wish to consider specific country requests to establish such zones, preferring instead to develop a system, in cooperation with involved industries, which would be applicable to all countries requesting recognition of a disease-free zone.

In general, establishing a disease-free zone requires:

- adequate surveillance in the field and at slaughter demonstrating absence of disease,
- controls to prevent movement of animals and animal products from infected areas into free areas,
- prohibition of vaccination in free areas, since vaccination produces antibodies that interfere with detection of actual viral infection,
- destruction of infected animals and disposal of carcasses, and
- disinfection or destruction of materials that have come in contact with infected animals.

Vaccination for hog cholera has been discontinued in Sonora, but the issues of surveillance and movement control have yet to be resolved, Forsythe notes. Moreover, although Newcastle disease is more of a problem in wild birds in Mexico than in the country's poultry industry, the potential exists for the poultry to be infected by other bird species. Adequate surveillance and movement control must be in place before the United States could verify that Sonora is free of Newcastle disease.

The extreme difficulty of controlling the movement of wild birds and eradicating the disease in them makes verification very difficult. "There is a greater risk of Newcastle disease crossing from Mexico to the United States from smuggling in parrots and other exotic birds for sale in pet stores than there is from the Mexican poultry industry," Forsythe says.

Consensus on Food Safety?

Many nations now negotiating trade agreements are considering moving away from border inspections of agricultural products to reduce the possibility that food safety regulations will be used as trade barriers. Point-of-origin inspection systems cost less than border inspections and do not delay or reject shipments at the border.

"Shipments that fail inspection at the point of origin, such as a processing plant, can be more easily reconditioned there than at a remote border station," Forsythe explains. "But when a shipment fails inspection at the border, the exporter is much more likely to dispose of it than go to the expense of transporting it back to the point of origin, reconditioning it, and reshipping it to the border."

Acceptance of point-of-origin systems depends on confidence in the equivalence of food safety inspections of the importing and exporting nations. The United States is helping to strengthen Mexico's food safety regulations and wants to increase their clarity. Under the U.S.-Mexican Standards Agreement of 1987, the Mexican Secretariat of Health and the United States' FDA agreed to coordinate food product safety regulations.

Forsythe expects that in the long term, a growing convergence of food processing technology could increase each nation's confidence in the safety of the other's products. "Moreover, cooperation in developing regulations and training inspection staff could boost confidence in both nations' inspection systems," he says. "This confidence, along with clearer and more widely understood regulations, is an essential prerequisite to the introduction of a borderless point-of-origin inspection system."

Based on information provided by economist Ken Forsythe, Agriculture and Trade Analysis Division, Economic Research Service.
In 1991/92, U.S. fresh apple exports surged to 1.1 billion pounds, up 38% from the previous record.

In 1992, U.S. apple producers harvested their second largest crop ever, 10.3 billion pounds, reports economist Dennis Shields of USDA’s Economic Research Service.

This is just under the record high of 10.7 billion pounds set in 1987, and up 4 percent from 1991.

Shields attributes 1992's bumper crop to the mild winter in the West, which produces over half of the U.S. crop. Washington, the top apple producing State, has an ideal climate for production—relatively dry in spring and summer, with plenty of sunshine. Apples are also grown in California, Michigan, New York, Pennsylvania, Virginia, and a number of other States.

Prices Boosted Production

U.S. apple production averaged 8.9 billion pounds a year in the 1980's, up 30 percent from the preceding decade.

"Rising prices in the late 1970's prompted growers in the West to establish new orchards," Shields explains. It can take 9 years for apple trees to reach their full bearing potential.

"Growing demand in the United States and other countries for certain types of U.S. apples has boosted grower prices for such varieties as Gala and Fuji, especially in the past several years," says Shields.

Gala apples originated in New Zealand, and Fuji apples in Japan. U.S. growers began producing them in the mid-1980's, primarily in California and Washington.

Shields notes that U.S. Gala apples have found a market in Taiwan, where consumers reportedly enjoy the sweet taste. Fuji apples are favored by East Asian consumers, also for their sweetness.

But Red Delicious, an American standby, still leads in sales to Taiwan and most other foreign markets.

Exports To Grow

The United States produces 10 to 15 percent of the world's apple supply and usually ranks as the second largest exporter, after France.

U.S. fresh apple exports for the 1991/92 marketing year (Aug. 1, 1991-July 31, 1992) surged to a new height of 1.1 billion pounds, up 38 percent from the record set the previous year. Exports have been on the upswing since 1986/87.
Although Many States Grow Apples, Production Is Concentrated in the Northwest

*2.35 million tons
250,000-600,000 tons
45,000-185,000 tons
Less than 45,000 tons*

"Some of the rise in 1991/92 exports occurred because the United States doubled its exports to the European Community at a time when freezes had damaged the EC crop," Shields says. "Moreover, since 1988, the lowering of trade barriers by Sweden, Mexico, Venezuela, the Philippines, Indonesia, and Thailand also has boosted U.S. exports."

Shields points out that increased foreign demand for U.S. apples in 1991/92 diverted supplies from the domestic market, an important reason grower prices for fresh apples climbed to an average 25 cents a pound from the previous crop year. This price was a new record for growers, up 4 cents from the previous record, set in 1990/91.

"Prices will likely slip in 1992/93, under pressure of large 1992 supplies here and in the EC," Shields says.

EC production will likely climb more than 50 percent from last year's freeze-reduced level, with French output up 72 percent. U.S. apple exports to the EC are likely to decline in 1992/93, Shields continues.

Over the long term, however, he expects sales to markets in Mexico and Southeast Asia to continue expanding as per capita incomes rise. In addition, U.S. apple exporters are working to build demand for their products through sales kit development, in-store tasting demonstrations, and advertisements in foreign magazines.

Based primarily on information provided by economist Dennis Shields, Commodity Economics Division, Economic Research Service.

Canada, the EC, and Taiwan Were the Biggest Markets for U.S. Apples in 1991

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<thead>
<tr>
<th>Country</th>
<th>Import Value, $ million</th>
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<tr>
<td>Canada</td>
<td>60</td>
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<td>EC</td>
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<td>Taiwan</td>
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<td>Mexico</td>
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USDA's December 1992 inflation-adjusted index of farm prices, from the National Agricultural Statistics Service's Agricultural Prices report, was 1.5% above November and 0.7% above a year earlier. Yearend 1991-1992 comparisons and 1992 averages of wholesale market prices follow. Corn fell 36¢ to $2.06 per bushel between December 1991 and December 1992, while its 1992 average was $2.33. Wheat dropped 27¢ to $3.77 per bushel and averaged $3.86. Soybeans rose 5¢ to $5.58 per bushel and averaged $5.63. Cotton fell 2¢ to 51.9¢ a pound and averaged 53.9¢. Iceberg lettuce climbed 3.04 to $7.76 per carton and averaged $5.87. Oranges fell $1.87 to $6.48 per carton and averaged $6.30. Among meat animals, choice steers rose $8.45 to $77.34 per cwt and averaged $75.35. Barrows and gilts rose $3.39 to $43 per cwt and averaged $43.23. Broilers climbed 1.3¢ to 51.8¢ per pound and averaged 53.8¢.
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