Chapter 10

Agriculture

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SUMMARY

The agricultural and food processing sectors of the United States and Mexico complement and compete, depending in part on static factors such as climate, rainfall, and arable land, and in part on dynamic factors including technology, labor costs, capacity utilization, transportation costs, and government policies (subsidies, trade restrictions). Agricultural imports from Mexico compete primarily with products from warm-weather States, and Florida more than California or Texas.

Today, many of Mexico's agribusiness establishments, some of which are foreign-owned, have relatively low costs and high yields and productivity levels. But their yields—if much higher than in Mexico's small-scale, traditional farming sector—lag well behind those routinely achieved in the United States, depending on the crop and location. This lag reflects a broadbased deficit in agricultural technology-including cultivation practices, mechanization, and seed varieties and agricultural chemicals (fertilizers, herbicides, pesticides) suited to Mexican conditions. With a few exceptions where Mexico's climate creates large advantages, Mexican farmers and food processors, like their counterparts in manufacturing, rely on low labor costs to compete.

Fruits and vegetables—particularly those that require picking, trimming, and packing by hand rather than machine-are much more labor intensive than other agricultural products. These are the products—tomatoes, cucumbers, broccoli, radishes, green onions—in which Mexican growers and packers have been able to undercut U.S. costs. But even here, the seasonal nature of production means that Mexican products may compete with those from some parts of the United States, while complementing production elsewhere. For instance, Florida cucumber shipments reach their highest levels during November-December and April-May, while California ships at relatively constant levels from May through November. Imports of cucumbers from Mexico reach their peak during the December-March gap.

OTA's analysis of U.S.-Mexico trade and competition in agriculture leads to the following conclusions:

- Despite lower labor costs for most agricultural products, Mexico could not expect to achieve across-the-board advantages in agriculture even if all trade restrictions were removed. The United States would retain large advantages rooted in agricultural research (including biotechnology). These advantages include superior plant and livestock varieties and cultivation practices creating yield and productivity margins sufficient to offset Mexico's low labor costs. Indeed, costs increased more rapidly in Mexico than in the United States during the 1980s, in part because Mexico's government has been reducing subsidies (e.g., for fertilizers, fuel, and electricity).
- Mexico's primary agricultural exports—fresh winter fruits and vegetables-compete most directly with production in Florida, which has a similar growing season. Florida is as far or farther from many major U.S. markets (e.g., the West Coast) as the regions in Mexico with which it competes; as Mexico's transportation system improves, the advantages Florida has historically gained from rapid, reliable, low-cost shipping will diminish. Florida farmers would probably experience a greater share of adjustment costs following a North American Free Trade Agreement (NAFTA) than farmers in other States.
- Growing seasons in California less frequently overlap those in Mexico. While substantial production and processing capacity-notably for broccoli—has moved to Mexico, California growers have had little trouble in switching to other crops. Generally speaking, farmers in States other than Florida and California are less likely to face direct competition with Mexico.
- U.S. farmers produce grains at much lower cost than Mexican farmers, much of it for animal feed. Transportation costs for feedgrains would probably preclude the widespread relocation of cattle feeding to Mexico, even if Mexico could achieve comparable efficiencies. Because it is more costly to ship cattle than feed, beef

packing will remain concentrated in the U.S. grainbelt. While some meatpacking jobs may be lost to Mexico, U.S. packers have been aggressive in driving down domestic wages and working conditions, reducing the attractions of Mexican labor. Because transportation is less of a barrier for poultry than for beef, Mexico's low labor costs could attract production and processing of chicken and turkey.

- Cow-calf imports from Mexico to supply U.S. feedlots would probably grow following a NAFTA, at the expense of competing operations in Texas and other border States. But limits on Mexican range land, water, and feed, along with transportation costs, would probably limit the market share of imported feeder calves to about 5 percent (compared to past shares in the range of 3 percent).
- Mexico itself faces fundamental limits on production of food, for domestic consumption as well as for export, beginning with limited amounts of arable land and water for irrigation. Competition for water is increasing as the economy industrializes and urbanizes. These factors limit Mexico's ability to expand production for export, reducing the potential threat posed to U.S. agriculture as a whole. Because the population is rising rapidly, and because of U.S. advantages in grain production, Mexico will continue buying wheat, corn, and feedgrains from the United States. Mexico also has the potential to become an important market for grain-based products such as beef as income levels rise.
- A NAFTA would probably increase the rate at which *ejido* farmers are displaced, exerting additional downward pressure on wages for unskilled workers in both Mexico and the United States.

Although the two agricultural sectors have been integrating, the pace has been slow. Three factors account for this: Mexican Government policies; U.S. policies, especially trade restrictions; and the technological advantages of the United States, which for products such as Florida tomatoes have enabled farmers in potentially vulnerable regions to maintain or even increase cost- and quality-based advantages.

For 75 years, Mexico's government has supported small-scale, traditional agriculture through distribution of *ejido* lands and a wide variety of subsidies. The results included farms and food processing plants below minimum efficient size, discouragement of a modem agricultural sector, and rising imports of food. These policies began to change during the 1980s, with restrictions on land ownership lifted in January 1992. While some *ejidos will be* consolidated, much of the land is too poor to produce at competitive cost levels regardless of money spent on improvements.

Where Mexico has achieved competitive costs, it has been in cases where low wages offset low efficiency. Despite high labor costs compared to Mexico, U.S. growers benefit from a broad range of government policies. Some enjoy low cost water for irrigation. Tariffs have helped preserve market share and profits, as have better distribution, superior quality, and longer in-store shelf lives for perishable commodities. Moreover, many U.S. growers faced with low-cost imports in their traditional products have successfully switched to crops more suited to the changing competitive environment.

In the United States, both the private and public sectors are eager to develop and introduce new agricultural and food processing technologies. Government has helped diffuse best practices through the agricultural extension program. In contrast, Mexico has neither the seed companies and agrochemical firms to develop and supply new products, nor the agricultural research organizations to support the underlying technology base. Mexican farmers must usually be content with seed and fertilizers developed for U.S. conditions.

MEXICAN AGRICULTURE: TRADE AND STRUCTURE[1]

Only Japan and the former Soviet Union buy more U.S. agricultural products than Mexico. And only

[1] This discussion is based in part on "Agricultural Issues in U.S.-Mexico Economic Integration," report prepared for OTA under contract No. 13-0310 by B. Kris Schulthies and Gary W. Williams, April 1992. Information otherwise uncited comes from this report, which relies heavily on Mexican Government statistics.

For summary information on Mexican agriculture, see *Foreign Agriculture 1990-91* (Washington DC: U.S. Department of Agriculture, Foreign Agricultural Service, August 1991), pp. 82-83. Also "U.S., Mexico Seek Economic Boost from Free-Trade Pact," *Farmline*, February 1991, pp. 2-6; and *The Likely Impact on the United States of a Free Trade Agreement with Mexico*, USITC Publication 2353 (Washington, DC: U.S. International Trade Commission February 1991), pp. 4-3 to 4-17.

Table 10-1-U.S.-Mexico Agricultural Trade, 1991

	U.S. exports to Mexico	U.S. imports from Mexico	Balance[a]
	(millions of dollars)		
Total	$2,998	$2,527	$471
Livestock and livestock products (all)	1,128	392	736
Fats and of fals	207	1	206
Hides and skins	137	4	133
Dairy products	121	3	118
Beef	185	—	185
Cattle	133	361	(228)
Poultry	131	0	131
Pork	68	0	68
Other	146	24	122
Grains and feeds (all)	739	64	675
Wheat and wheat flour	48	—	48
Corn	148	—	148
Sorghum	372	—	372
Other	171	64	107
Fruits and vegetables (all)[b]	183	1,233	(1,050)
Tomatoes			
Fresh	4	250	(246)
Processed	—	18	(18)
Broccoli and cauliflower, fresh and frozen[c]	—	102	(102)
Peppers	—	111	(111)
Onions	5	90	(85)
Cucumbers	—	73	(73)
Squash	—	50	(50)
Strawberries	—	37	(37)
Grapes	—	54	(54)
Mangoes	—	54	(54)
Melons	—	98	(98)
Citrus, fresh and processed	—	78	(78)
Other	174	320	(146)
Coffee	2	333	(331)
Seeds	87	6	
Sugar and related products	114	33	81
Oilseeds and related products	524	43	481

[a]Parentheses denote negative balance (U.S. imports from Mexico greater than U.S. exports to Mexico).
[b]Total includes fresh and processed fruits and vegetables; subheadings refer to fresh produce unless otherwise noted.
[c]The U.S. Department of Agriculture provides only the combined total for importsof fresh and frozen broccoli and cauliflower.

SOURCES: *Foreign Agricultural Trade of the United States: January/February 1992* (Washington, DC: Department of Agriculture, Economic Research Service, 1992), table B-3, pp. B4-B42; *Foreign Agricultural Trade of the United States, Calendar Year 7997 Supplement* (Washington, DC: Department of Agriculture, Commodity Economics Division, Economic Research Service, July 1992), table 23, p. 399.

Canada ships more agricultural goods to the United States. But the relationship between the United States and Mexico is hardly symmetrical (table 10-1): Mexico needs inexpensive U.S. grain and milk products far more than the United States needs Mexican feeder cattle or tomatoes. Mexico sends more than three-quarters of its agricultural exports to the United States, but the United States buys only about 12 percent of its agricultural imports from Mexico,

Crop production accounts for 58 percent of the value of Mexico's agricultural output, livestock for 33 percent, and forestry, fishing, and hunting for the remaining 9 percent. As noted in chapter 3, agriculture accounts for about 9 percent of Mexico's gross domestic product (GDP). The majority of the country's 4 1/2 million farms are small and inefficient. Many still use traditional practices, producing corn and beans for subsistence and local consumption. Corn grows on about a third of Mexico's arable land (figure 10-1). Over half of the agricultural labor

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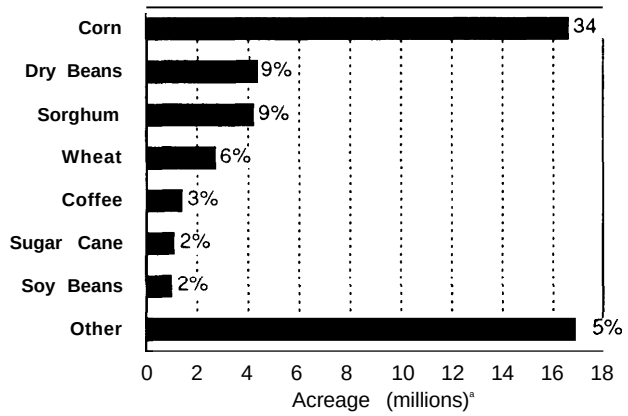
Figure 10-1-Cultivated Acreage by Crop in Mexico



a A_{verage}, 1985-19~.

SOURCE: "Agricultural issues in U. S.-Mexico Economic Integration," report prepared for OTA under contract No. I3-O31O by B. Kris Schulthies and Gary W. Williams, April 1992, table 4, p. A3.

force works in the traditional sector, many on a casual or seasonal basis; the modem sector, which accounts for only a small minority of farms, produces perhaps three-quarters of total output.[2]

Land and water set fundamental limits for Mexican agriculture. Only 12 percent of the country's land is arable-some 57 million acres-compared with 464 million arable acres in the United States (a little over 20 percent of all U.S. land). Although the United States has eight times more arable land, it has only half as many farms. About half of the arable land in Mexico could be irrigated, but 60 percent of this land remains rainfed.[3] Mexican agriculture suffers from salinity in much of its limited supply of water and from widespread erosion. Irrigated as well as raided lands in Mexico are subject to the vagaries of weather, since most irrigation water comes from reservoirs rather than underground aquifers (many of which are being rapidly depleted in any case).

After Mexico's revolution, foreigners were barred from owning land. Thus, foreign direct investment (FDI) in agriculture has been very low, with officially recognized investment totaling only a cumulative $30 million in 1990 compared with $18 billion for industry. Food processing plants operated by a dozen or so U.S.-based multinational corporations (MNCs) account for about half a billion dollars of Mexico's FDI ($470 million in 1989, included in the industry total), and a substantial share (perhaps one-third) of Mexico's total food processing capacity.[4]

Subsistence Farming: The Traditional Sector

In January 1992, the Salinas government's land reform program went into effect.[5] The intent is to modernize traditional farming, beginning with changes in laws governing land ownership and use that date to 1917. The *ejido* system was intended to reduce the power of prorevolutionary landowning families by redistributing their huge holdings to the peasantry, while ensuring that peasants retained their land. The state held title to *ejido* plots—in principle 10 hectares (about 25 acres), but in practice averaging less than half that-and granted peasants usage rights. *Ejidos* could not be legally sold, rented, or used as collateral. Over the years, slightly over half of those eligible received land.[6] The Mexican Government also maintained highly restrictive ownership policies on land outside the *ejido* sector. For example, individuals cannot own more than 100

2 Alejandro Portes and Lauren Bent@ "Industrial Development and Labor Absorption: A Reinterpretation" ***The informal Economy: Studies in Advanced and Less Developed Countries***, Alejandro Portes, Manuel Castells, and Lauren A. Benton, eds. (Baltimore: Johns Hopkins University Press, 1989), pp. 589-611. Many *ejidatarios* must seek employment on larger, more prosperous farms in the modem sector to supplement their income. Martine Vanackere, "Conditions of Agricultural Day-Labourers in Mexico," ***International Labour Review,*** vol. 127, 1988, pp. 91-110.

3 Lloyd E. Slater, ''Food: U.S. Perspective,' ***U.S.-Mexican Industrial Integration: The Road to Free Trade, Sidney*** Weintraub, Luis Rubio F., and Alan D. Jones, eds. (Boulder, CO: Westview, 1991), p. 276.

4 Libby established a food processing facility, currently owned and operated by Heinz, in 1929. Other examples of U.S. MNCs with *professing* facilities in Mexico include: Green Giant, KeUogg, Gerber, Del Monte, and Ralston Purina. Slater, ''Food: U.S. Perspective," ibid., pp. 280-281, and industry interviews. In addition, a number of U.S.-owned *agro-maquilas, like their* counterparts in manufacturing, import everything from tractors to com to cardboard packaging, perform labor-intensive processing (e.g., of tortilla chips) in Mexico, then send the finished products back to the United States, But these operations are not very representative. While the *agro-maquila* sector has been expanding rapidly, in 1990 there were fewer than 50 such fins, producing goods valued at around $100 million. Joel Millman, '' 'There's Your Solution',' ***Forbes,*** Jan. 7, 1991, pp. 72,76.

5 This discussion is based on an interview with Guillermo Ramos, Agricultural Counselor, Embassy of Mexico, Washington, DC, July 14, 1992.

6 Some 2 1/2 million Mexicans still have outstanding claims, while 3 million have received land. "The Legal Proposal for Mexico's Agricultural Reform: Background Information," Embassy of Mexico, Washington, DC, November 1991, p. 5.

hectares of irrigated farmland.[7] Corporations could not own land at all.

Today, modem agriculture is concentrated on irrigated land in northwestern Mexico, with the bulk of the *ejidos in the* central part of the country. Crops are raised on a little over 20 percent of *ejido* acreage; the rest is wooded or used for grazing. *Ejidatarios* had little incentive to leave their land, which they could not sell, nor to invest in improvements; only 17 percent of *ejido* croplands are irrigated.

The burden of these policies finally proved unsustainable. As noted in chapter 3, Mexico was left with a great many people in agriculture in proportion to output, while the government continued pumping money into price supports and subsidies for fertilizer, water, electricity, and diesel fuel.[8] Both price supports and subsidies have been heading downward since the middle 1980s, a consequence of crisis and *apertura*.

The 1992 reforms substantially changed the rules for land ownership and use. *Ejidatarios will* get title to their lands. While individuals are still limited to 100 hectares, foreigners can purchase land on much the same basis as Mexican citizens. Corporations, domestic and foreign, may *own* up to 2,500 hectares (about 6,200 acres).

Steady reduction in subsidies, coupled with the changes to the *ejido* system, promises to displace many small farmers from marginal land, which will no longer be worth cultivating. Meanwhile, the modem sector will expand as more prosperous farmers assemble larger plots and purchase higher quality *ejido* acreage. More *ejidatarios will* be able to join the modem sector; others will be displaced and seek work in market-oriented agriculture or move to cities. Management of this transition by Mexico will have consequences for the United States, most likely in higher levels of immigration, as well as for the future of the Mexican economy.

Industrialized Agriculture and Food Processing: The Modern Sector

While the traditional sector came close to collapse, the modem sector increased in scale and scope, becoming substantially integrated into the North American regional market. The modem sector has drawn to considerable extent on U.S. know-how, buys U.S. farm machinery, and relies to some extent on U.S. capital. Even so, it remains on average significantly less advanced than commercial farming as practiced in the United States. The development of large commercial farming and food processing operations in Mexico has been driven, not only by exporting, but by the need to feed a rapidly growing urban population.

Mexican farmers devote only 2 to 4 percent of their land to fruits and vegetables, but horticultural products account for 9 percent of total output value and for more than half of Mexico's total agricultural exports.[9] Mexico supplies more than 80 percent of all fresh vegetables imported by the United States-not surprising given that fresh vegetables do not travel well.[10] Tomatoes account for nearly half of

[7] Limits vary by use: up to 400 hectares (967 acres) of grazing land and 200 hectares of nonirrigated farming land, but for certain crops (e.g., cotton, coffee, bananas, fruit trees), 150 hectares of irrigated land or 300 hectares of nonirrigated land. These restrictions, like those on *ejido* holdings, have been circumvented in various ways. For example, a large farm might be put together with title to the land distributed among family members. Many *ejido* lands are leased and many are part of Mexico's modem farming sector.

[8] The agricultural labor force continued to rise at leastthrough the 1980 census, growing from an estimated 4.8 million in 1950 to 5.6 million in 1980, despite the industrialization and urbanization taking place over this period. Francisco Alba, "Migrant Labor Supply and Demand in Mexico and the United States: A Global Perspective," *U.S.-Mexico Relations: Labor Market Interdependence,* Jorge A. Bustamante, Clark W. Reynolds, and Raúl A. Hinojosa Ojeda, eds. (Stanford, CA: Stanford University Press, 1992), pp. 243-256.

With CONASUPO (*Companía Nacional de Subsistencias Populares*, the government's agricultural distribution and marketing organization) purchasing com and many other farm products at guaranteed prices, subsidy and support levels in some years exceeded 60 percent of the value of agricultural output. "Mexico After the Oil Boom: Refashioning a Development Strategy," World Bank Report No. 6659-ME, Washington, DC, June 23, 1987, p. 38; Myles J. Mielke, "Government Intervention in the Mexican Crop Sector, " Staff Report No. AGES89-40, U.S. Department of Agriculture, Economic Research Service, Washington, DC, September 1989. As recently as the mid-1980s, the government subsidized purchases of diesel fuel by 30 percent and fertilizer by about 60 percent. *NAFTA: Effects On Agriculture; vol. IV, Fruit and Vegetable Issues* (Park Ridge, IL: American Farm Bureau Research Foundation, 1991), p. 104. The government also used negative subsidies to discourage some types of production.

[9] *NAFTA: Effects on Agriculture; vol. IV, Fruit and Vegetable Issues,* ibid., pp. 4, 6.

Reportedly, 2 percent of Mexican agribusinesses account for three-quarters of value-added. Steven E. Sanderson, *The Transformation of Mexican Agriculture: International Structure and the Politics of Rural Change* (Princeton, NJ: Princeton University Press, 1986), p. 100.

[10] Of Mexico's total shipments of vegetables to the United States, 85 percent is shipped fresh, 10 percent frozen, and 5 percent canned. *NAFTA: Effects on Agriculture: vol. IV, Fruit and Vegetable Issues,* op. cit., footnote *8*, pp. 19, 20. The percentages quoted here and below fluctuate depending on price levels, which in turn reflect output as influenced by the vagaries of the weather in the growing regions of both countries.

Mexico's flesh vegetable shipments to the United States, although Mexico also exports cucumbers (taking about **40 percent** of the U.S. market), peppers, broccoli, **strawberries,** melons, and much else besides.

Some of the products of the export-oriented modem sector compete directly with those from growers in California, Florida, Texas, and other warm-weather States. Others complement U.S. production, supplying U.S. supermarkets during winter months. Many of the imports are controlled by a few large distributors, typically located in Arizona, who have longstanding ties with Mexican growers and U.S. buyers.

Legal restrictions on land ownership hindered but did not foreclose commercial agriculture. Contract growing evolved to meet the needs of U.S. distributors and processors, who agree to purchase the farmer's output at a stipulated price (which may depend on the market price at the time of sale), and frequently provide seeds and technical advice as well. Contract production reduces risks for both parties; it also transfers know-how from the United States to Mexico.[11] Agribusiness operations benefited from many of the same subsidies as small farmers, especially cheap water from government irrigation projects and subsidized electricity. With the elimination of these subsidies, their costs have risen substantially.

U.S.-based processors and distributors have moved into Mexico for three major reasons:

1. low costs;
2. rising U.S. demand for fresh fruits and vegetables in season and out; and
3. Mexico's expanding domestic market for processed food, and for off-season fresh produce that can be supplied from the United States.

Investments will continue, but—given that, for instance, a canning plant for tomato products costs $35 million to $40 million---only where significant, long-term cost advantages seem assured. At present, Mexico has considerable excess capacity for processing frozen vegetables. This promises to discourage additional investment for export until the market expands, unless new plants can achieve absolute cost advantages against competitors pricing at variable cost.

As U.S.-based companies began to penetrate Mexico's processed food sector, the government put in place policies to support and protect domestic fins, several of which were able to develop nationwide distribution and widely recognized brand names like Bimbo Bread.[12] These large firms use much the same processing and packaging technologies as their U.S.-based counterparts. But the policies of Mexico's government also ensured the survival of **a** large number of smaller firms with a local or regional focus **that** operate plants resembling those found in the United States before World War II. A NAFTA would expand the market opportunities for larger Mexico-based as well as U.S.-based food processors as the two industries integrate on a regional basis. It would also accelerate the consolidation and rationalization of the Mexican food processing industry, with new competition leading to the exit or merger of smaller firms without a defendable market niche or other source of advantage.

COMPETITION AND COMPLEMENTARITY: VEGETABLES AND BEEF

Farmers in northwest Mexico, particularly in the state of Sina.lea, have marketed winter vegetables in the United States for years. During the "tomato wars' ' of the 1960s and 1970s, Florida growers sought protection under U.S. trade law from Mexican producers and U.S. distributors, accusing them of dumping and other "unfair" practices. In fact, with their warm winter weather, farmers in northwest Mexico can often produce tomatoes and **other fruits** and vegetables more cheaply than U.S. growers. Because of variations in soil and climate, yields (output per acre per year) vary greatly from place to place and year **to year in** both countries, but in most cases are higher in the United States. While Mexican

[11] One u.s. processor interviewed by OTA reported a contract price for jalapeno peppers from Mexico of about 35 cents per pound (including duty), compared with spot prices that fluctuated wildly above and below this figure (peaking above 60 cents per pound). Production costs are about the same in the Mexico and the United States, at 15 to 18 cents per pound, with transportation costs, in refrigerated trucks from Mexico to Texas, adding about 4 cents. This processor contracted for peppers in Mexico to ensure supplies during times of the year when U.S. peppers might not be available at an acceptable price.

[12] Slater, "Food: U.S. Perspectives," op. cit., footnote 3, pp. 281ff.

farmers have lower per-acre production costs, lower yields coupled with transportation, marketing, and other distribution expenses can offset this, depending on the product and its final destination (and on U.S. tariff levels) .13 Hence, landed unit **costs at the** U.S. border are frequently similar to U.S. costs.

Mexico sends not only tomatoes and other horticultural products northwards, but coffee and cattle as well. At the same time, with population growth outstripping the country's ability to feed its population, Mexico purchases corn, soybeans, and, in recent years particularly, milk products and wheat from the United States. Indeed, Mexico imports more dairy products than any other country in the world—nearly all in the form of surplus dried milk from the U.S. Commodity Credit Corp. Government agencies purchase about 40 percent of Mexico's imports of agricultural products.

Mexican farmers ship fresh fruits and vegetables to the United States primarily in the winter months (box 1O-A). This puts them in direct competition with Florida, but Mexican crops come in before those in California.[14] Given normal weather, Winter fruits and vegetables from Mexico supply west coast U.S. markets, those from Florida the east coast. In the center of the country, produce from Mexico and Florida competes on the basis of delivered costs. With this primary exception, then, Mexican agriculture complements more than it competes with U.S. agriculture. In most years, depending on tomato prices, coffee is Mexico's biggest agricultural export to the United States, which grows coffee only in Hawaii.

Where the two countries compete, both governments have called on a broad range of direct and indirect policies-including tariffs, import licenses (Mexico), and agricultural marketing orders (the United States)---to manage trade and protect domestic farmers. Many U.S. tariffs on fresh fruits and vegetables are seasonal; that is, they apply or increase during domestic harvesting periods.[15] Although Mexico has reduced many of its trade barriers since joining the General Agreement on Tariffs and Trade (GATT) in 1986, import licenses were still required for corn, wheat, and **a** number of other commodities as the NAFTA negotiations concluded. Typically, the government would not issue licenses until the domestic crop had been bought Up.[16] In some cases, Mexico's government has raised tariffs after removing licensing requirements.

On the U.S. side, the Agricultural Marketing Agreement Act of 1937 permits fruit and vegetable growers to enforce standards for grade, size and other characteristics through marketing orders that apply to imports as well **as** domestic produce. Foreign growers often claim that marketing orders have been artificially manipulated to keep out their products (e.g., by imposing minimum size require-

13 Stephen Fuller and Charles Hall, ''The U.S.-Mexico Free Trade Agreement: Issues and Implications for the U.S. and Texas Fresh Vegetable/Melon Industry, ' TAMRC International Market Research Report No, IM-2-91, Texas A&M University, College Station, TX, April 1991. Production costs in Sinaloa (which currently accounts for 40 percent of Mexico's horticultural exports to the United States) are significantly lower (40 to 80 percent) than in Texas, but are often similar to those in California and Florida. Transportation (usually by truck because of perishability) arrd marketing costs can exceed production costs; delivered costs of Mexican vegetables in the United States breakdown approximately as follows: production and handling, 50 percent; transportation and marketing within Mexico, plus border crossing costs, 30 percent; and, transportation and handling within the United States, 20 percent.

14 Because northern Mexico is on the same latitude as Florida, growing seasons are similar. Florida farmers compete With Mexico primarily in tomatoes, cucumbers, peppers, and squash. *NAFTA: Effects On Agriculture; vol. IV, Fruit and Vegetable Issues,* op. cit., footnote 8; Nicholas G. Kalaitzandonakes, and Timothy Taylor, ''Competitive Pressure and Productivity Growth: The Case of the Florida Vegetable Industry' *Southern Journal of Agricultural Economics,* December 1990, pp. 13-21.

15 *U.S.-Mexico Trade: Trends and Impediments in Agricultural Trade,* GAO/NSIAD-90-85BR (Washington, DC: U.S. General Accounting of ffice, January 1990). The United States tends to use tariffs to restrict imports of products for which Mexico has a delivered cost advantage. Also see *[J. S.-Mexico Trade: Extent to Which Mexican Horticultural Exports Complement U.S. Production, GAO/NSIAD-91-94BR* (Washington, DC: U.S. General Accounting Office, March 1991); and *U.S. Mexico Trade: Impact of Liberalization in the Agricultural Sector,* GAO/NSIAD-91-155 (Washington, DC: U.S. General Accounting Office, March 1991),

16 For corn, the quotas imposed through licensing have had the effect, on an annual average basis, of a tariff of about 55 percent. Sherman Robinson, ''Agricultural Policies and Migration in a U.S ,-Mexico Free Trade Area: A Computable General Equilibrium Analysis, ' presentation at the Symposium on Economy-Wide Modeling of the Economic Implications of a FTA with Mexico and a NAFTA with Canada and Mexico, U.S. International Trade Commission, Washington, DC, Feb. 24-25, 1992.

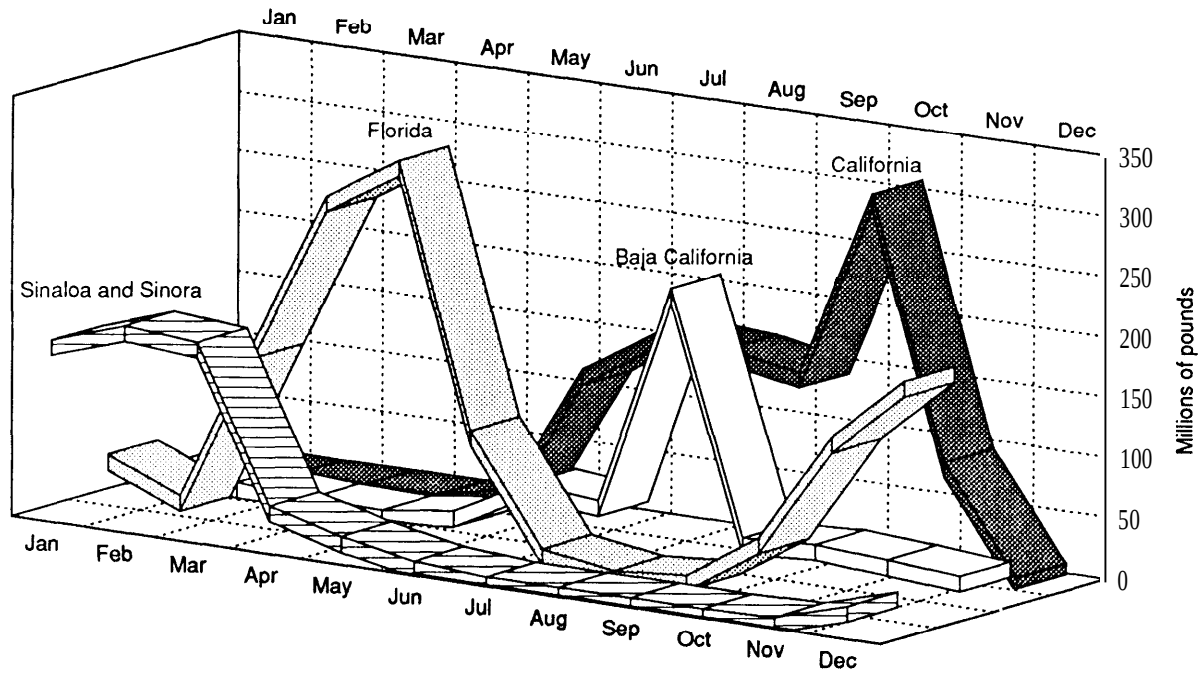
Mexico also imposes export tariffs, charging, until early 1990, $60 per head for feeder cattle shipped to the United States. This tax has since been reduced in stages to $5 per head, and is scheduled to be eliminated completely. *NAFTA: Effects on Agriculture; vol. 11, Livestock and Dairy Issues* (Park Ridge, IL: American Farm Bureau Research Foundation, 1991), p. 58.

Box 10-A--Seasonality in Fruit and Vegetable Production

Growers in Florida and Mexico ship fresh tomatoes from November through May, with California, and to a lesser extent the Baja area of Mexico, the primary suppliers during the summer (figure 10-2). It is only from January through March, when Florida weather is somewhat colder (and more variable) than that in Sinaloa, that Mexican production has been fully competitive. Only in Dade Country, the southernmost growing region in Florida, does production peak during these months. Over the last 10 years, Florida's share of the U.S. winter tomato market has ranged from 56 to 68 percent. Prices fluctuate wildly when weather disrupts production in either Florida or Mexico.

Fresh strawberry imports exhibit a similar seasonal pattern, with shipments from Mexico rising from November through March, before ending in April. The California harvest peaks in May and declines steadily until December, when it begins to rise again. Florida's growing season, in contrast, is limited to the period November-April, with peak harvests when California production is relatively low. Mexico's Bajío region (not far from the Federal District) has a growing season similar to Florida's, but obsolete technology and inferior product quality have led to a steady decline in share of the U.S. strawberry market.

Figure 10-2-Monthly Fresh Tomato Production by Growing Region, 1990



SOURCE: *NAFTA: Effects on Agriculture; Vol. IV, Fruit and Vegetable* Issues (Park Ridge, IL: American Farm Bureau Research Foundation, 1991), table X-3, p. 287.

ments that imported fruits and vegetables do not meet) .17 Claims are also heard that sanitary and phytosanitary regulations serve as nontariff barriers, while concerns have been raised that a NAFTA would increase imports of food products from Mexico with excessively high levels of pesticide residues.[18] As explained in box 1O-B, there is little evidence suggesting that pesticide residues on fresh produce imported from Mexico constitute a significant danger to consumer health.

17 U.S. marketing orders covered 14 percent by value of agricultural imports from Mexico in 1989. *U.S. -Mexico Trade: Extent to Which Mexican Horticultural Exports Complement U.S. Production,* op. cit., footnote 15.

18 In OTA interviews, for example, Florida growers have questioned the adequacy and timeliness of monitoring at the border and whether current procedures are capable of detecting deliberate violations.

Box 10-B—Pesticides In Food: Cause For Concern?[1]

Do pesticide residues in foods imported from Mexico, particularly fresh fruits and vegetables, exceed U.S. standards (e.g., because of excessive or inappropriate application) and therefore constitute a potential hazard to consumers? In theory, produce with residual levels of pesticides exceeding U.S. tolerances, or for which no tolerances exist (because the pesticide is not registered for use in the United States), will be detected and stopped at the border. In practice, excessive levels might not be detected.

Both exporters and the Mexican Government take steps to ensure that fresh Mexican produce will not be barred from the United States because of pesticide violations. Mexican pesticide regulations increasingly resemble those here. As in the United States, pesticides must be registered before they can be sold or used. The number of pesticides registered in Mexico that have no U.S. tolerances has been reduced from 35 in 1988 to 19 in 1991. If they intend to ship to the United States, Mexican growers must register with export associations that provide information on the types of pesticides permitted and appropriate application practices. U.S. and international agencies provide information, training, and technical assistance on pesticide use to Mexican growers, and multinationals assist their contract growers.

The U.S. Environmental Protection Agency sets standards for pesticide residues, with the Food and Drug Administration (FDA) responsible for sampling shipments at border crossings. Although less than 10 percent of all U.S. food imports enter from Mexico, and less than one-quarter of horticultural imports, one-third of all samples analyzed by the FDA originate in Mexico. Intensive sampling dates to 1979, when the U.S. Government undertook to improve Mexican compliance with U.S. regulations.

In recent years, violation rates have been relatively low. In 1991,3.8 percent of food shipments from Mexico failed to meet the standards. About three-fourths of these were "no-tolerance violations' most were cases in which the pesticide had not been approved for that product, although the levels detected were below those allowed for that pesticide on other foods.[2]

1 This box draws on: *NAFTA: Effects* *n *Agriculture; vol. I,* Genera/Issues (Park Ridge, IL: American Farm Bureau Research Foundation, 1991); Teofilo Ozuna and Ramon Guajardo-Quiroja, "The U.S.-Mexico Free Trade Agreement: Natural Resource and Environmental Issues," TAMRC International Market Research Report No.IM-8-91, Texas A&M University, College State, TX, April 1991;*Food Safety and Quality: Neurotoxicity: Identifying and Controlling Poisons of the Nervous System* (Washington, DC: Office of Technology Assessment April 1990); *Five Countries' Efforts to Meet U.S. Requirements on Imported Produce,* GAO/RCED-90-55 *(Washington DC:* U.S. General Accounting Office, March 1990); *Pesticide Residues in Food: Technologies for Detection* (Washington, *DC:* Office of Technology Assessment, October *1988);* and *Pesticides: Comparison of U.S. and Mexican Pesticide Standards and Enforcements,* GAO/RCED-92-140 (Washington, *DC:* U.S. General Accounting Office, June 1992).

2 *No* tolerance violations *do not* necessarily mean that the pesticide in question constitutes a health hazard, but that the level above which it can be a hazard has not been established for a particular food, perhaps because the manufacturer chose not to incur the costs of registration for the crop in question.

According to the American Farm Bureau Research Foundation the "results of surveillance indicate that the levels and types of pesticide residues on current imports of agricultural products from Mexico are similar to residues on domestic products and imports from other countries .... These findings do not indicate the use of banned pesticides that give Mexican producers a competitive advantage at the expense of the health of the U.S. consumer." *NAFTA: Effects on Agriculture; Vol. I, General Issues,* ibid., p. 48. The U.S. Department of Agriculture concurs that produce exported to the United States from Mexico is generally free of dangerous pesticide residues. See *U.S.-Mexico Trade: Trends and Impediments in Agricultural Trade, GAO/NSIAD-90-85BR* (Washington DC: General Accounting Office, January 1990), p. 17.

Frozen Broccoli and Strawberries: Cheap Labor Is Not Enough[19]

Broccoli, along with cauliflower, is perhaps the most labor intensive of all vegetables to freeze, and was the first for which processing moved to Mexico. Indeed, almost all of Mexico's frozen vegetable exports consist of these two products, and almost all of these exports go to the United States. California grows most of the U.S. broccoli and as Mexico's production and exports expanded, California farmers switched from frozen broccoli to fresh, or planted their fields with more profitable crops. Thus, output is down, and there is excess processing capacity in

19 This section draws upon *NAFTA: Effects On Agriculture; vol. IV, Fruit and Vegetable Issues,* op. cit., footnote 8, pp. *97-138,* 171-204; David Runsten and Sandra O. Archibald, "Technology and Labor-Intensive Agriculture: Competition Between Mexico and the United States," *U. S.-Mexico Relations: Labor Market Interdependence,* Jorge A. Bustamente, Clark W. Reynolds, and Raúl A. Hinojosa Ojeda (Stanford, CA: Stanford University Press, 1992), pp. 449-476; and industry interviews.

both countries. Shipping costs are significant, and California processors increasingly supply frozen broccoli to West Coast markets only. (There is little demand for frozen food in Mexico currently, in part because many households do not have freezers.)

Processing, not cultivation, gives Mexico its advantages in broccoli (table 10-2). Growing broccoli is not particularly labor intensive compared to other horticultural products: cultivating strawberries takes 25 to 30 times as much labor as broccoli, which in turn requires 25 to 30 times as much labor as wheat.[20] Removing the current tariffs of 17.5 percent on frozen broccoli and 25 percent on fresh would permit Mexican farmers to undercut prices for California production by even larger margins.

A very different picture emerges for frozen strawberries. Packers in Mexico have been sending strawberries north since about 1950, but California farmers have maintained huge yield margins. They can produce an average of 23 to 24 tons per acre, compared with about 8 tons per acre in Mexico, and have better quality.[21] These advantages have been more than enough to counter Mexico's lower costs for labor and other inputs, even for this very labor intensive crop. (Tariffs on frozen strawberries are too small to have much effect.)

The most important reason that Mexico has been cost-competitive in broccoli but not strawberries appears to be that U.S. agribusiness firms invested not only money but know-how in Mexican broccoli production. By contrast, U.S. investors financed strawberry cultivation in Mexico, but left production to local growers. Technologically based productivity increases were rapid in California, while Mexico fell behind in strawberry yields and quality. U.S. success came with painstakingly developed high-yield plants having a longer growing season, thus permitting more crops per year. Mexico uses the same plant varieties, but they are not designed for Mexican growing conditions. California farmers also rely on such practices as fumigation, which, at costs of $1,000 per acre, far exceed the budgets of Mexican farmers.

Table 10-2-Cost Comparison for Frozen Broccoli, 1990

	Mexico	California
	(cents per pound)	
Harvested product	12.0¢	18.5¢'
Freezing and packaging	23.0	39.0
Transportation to border	2.5	NA
Customs fees and border crossing costs	1.0	NA
U.S. import duty (17.5 percent)	4.6	NA
Total,	43.1 ¢	57.5¢*

NA = Not applicable.

SOURCE: *NAFTA: Effects on Agriculture; vol. IV, Fruit and Vegetable Issues* (Park Ridge, IL: American Farm Bureau Research Foundation, 1991), pp. 123, 126.

Tomatoes[22]

About three-quarters of Mexico's tomatoes are sold fresh, many of them in the United States. The rest are processed as tomato paste, ketchup, salsa, and the like. Tomatoes grow in many parts of the country, with the fresh export industry concentrated in Sinaloa, Sonora, and Baja California, and the processing tomato industry in Sinaloa and Sonora. Farms in Baja--many of them under U.S. ownership-match or nearly match southern California yields for fresh tomatoes, but yields of processing tomatoes are nearly twice as high in California.

Sinaloa is Mexico's tomato processing center, producing about 85 percent of its tomato paste. Lower yields, together with shipping costs and a tariff of 13.6 percent, have prevented Mexican farmers from achieving a sustainable cost advantage. But if the tariff goes to zero under a NAFTA, the price of tomato paste from Mexico would probably fall below prices for imports from Europe

20 In U.S. agriculture, labor, *on average, accounts* for about 15 percent of direct production costs, but about 50 percent for vegetables and fruits. H.L. Goodwin, Jr. "The U.S.-Mexico Free Trade Agreement: Agricultural Labor Issues," TAMRC International Market Research Report No. IM-11-91, Texas A&M University, College Station, TX, April 1991.

21 Both California and Florida growers have maintained a significant advantage in quality over their Competitors in Mexico. Differences in quality are particularly important for fresh strawberries. It is not uncommon for fresh strawberries grown in these two States to command prices that areas much as a third higher than those from Mexico.

22 This section draws *on NAFTA: Effects on Agriculture; vol. IV, Fruit and Vegetable Issues,* op. cit. footnote, 8, pp. 1-23 and pp. *234-237; Barney* H. MacClure, "Growing Importance for Mexican Imports," *Supermarket Business,* March 1991, pp. 23ff; and presentations at the Conference on the Impact of the Free Trade Agreement with Mexico on the California Fruit and Vegetable Industry, Santa Clara University, Nov. 4, 1991.

Table 10-3-Costs for Fresh Tomatoes, 1990-91

	Sinaloa	Florida
	(Dollars per box)[a]	
Preharvest cost (including seed, chemicals, land, labor, machinery).	$2.75	$3.41
Harvest cost, including transport to packing point.	.36	.84
Grading and packing.	.28	1.77
Boxes.	.88	.67
Marketing and miscellaneous. . . .	.91	.15
Transport to border.	.67	NA
Customs fees and border crossing costs.	.30	NA
U.S. import duty, ...	.38	NA
Total.	$6.53	$6.84

aA box of tomatoes holds 25 pounds.

NA = Not applicable.

SOURCE: *NAFTA: Effects on Agriculture; vol. IV, Fruit and Vegetable Issues* (Park Ridge, IL: American Farm Bureau Research Foundation, 1991), p. 281, table X-1.

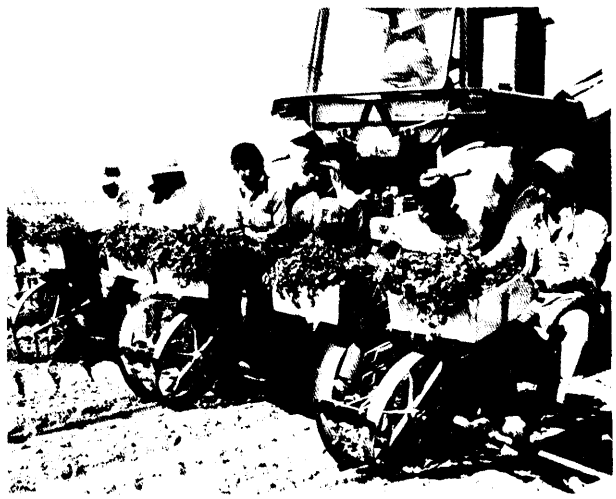


Photo credit: John Colwell, Grant Heilman Photography

Transplanting tomatoes.

(which are heavily subsidized) and Chile, the apparent low-cost producer.[23]

For fresh tomatoes--a much more important crop for both U.S. and Mexican farmers-the situation is very different. California and Florida produce three-quarters of U.S. tomatoes, but west coast winters are too cold for tomatoes. Only Florida can compete with Mexico from December until May or June, although freezes in some years harm the Florida crop, driving up prices (as in the winter of 1989-90). Growing, harvesting, and packing costs are all substantially lower in Sinaloa than in Florida, Even so, Florida growers have managed to compete successfully because of higher yields. Tomato plants suited to staked cultivation, plastic mulch, and mechanized harvesting have offset higher labor costs. Nonetheless, costs in Sinaloa and Florida have tended to converge, with U.S. import duties—38 cents to 52 cents per box (25 pounds), depending on time of year-keeping delivered costs similar (table 10-3). There is little question that with comparable technologies, and even comparable wages, farmers in Sinaloa-with their superior climate---could produce tomatoes considerably more cheaply than Florida growers.

Beef

Mexican ranchers buy semen and breeding stock from the United States to support both beef and dairy herds. While selling almost all their beef and dairy products domestically, Mexico does ship feeder cattle to U.S. producers for fattening and slaughter, more than a million of them in 1990, about one-third of all cattle fed in the Texas panhandle.[24]

Mexico cannot grow enough grain to feed many more cattle. Transportation costs for imported grain approximately offset Mexico's labor cost advantages for feeding and slaughtering cattle. The cost estimates in Box 10-C indicate that, even after improvements in Mexico's transportation system, costs in the northern part of the country would drop only slightly below those in the United States. Because there is substantial U.S. overcapacity, and per capita beef consumption is decreasing, neither feeders nor packers have much reason to contemplate investments in Mexico.

Trade data also indicate that Mexico does not have significant cost advantages in the production, slaughter, and packing of beef. Mexico is currently the third largest export market for U.S. red meats, taking $472 million, or 11 percent of exports, and

23 At present, Mexico supplies about 17 percent of U.S. imports of tomato paste. A Uruguay Round GATT agreement that drastically reduced subsidies and duties on tomato paste would enable both Chile and Mexico to displace higher-cost U.S. producers and most imports from Europe. Everything else the same, Mexico would appear to be able to gain a cost advantage of 3 to 5 cents per pound in the U.S. market.

24 Mexico's imports of bull semen in 1990 were valued at $3.4 million, imports of dairy cattle at $36 million (for 30,000 be@, and imports of beef cattle at $18 million (for about 35,000 head). *NAFTA: Effects on Agriculture; vol. II, Livestock and Dairy Issues,* op. cit., footnote 16, pp. 80, 85, 117, 146. In recent years, the total number of beef and dairy cattle in U.S. herds has averaged a bit under 100 million.

Box 10-C—Boxing Beef: Will It Go To Mexico?[1]

Years ago, beef was a growth industry in the United States. Cattle were fattened on the range, then shipped by rail to Chicago and other Midwestern cities for slaughter by unionized workers in packing plants designed around gravity-driven disassembly lines. Boxed beef made these plants obsolete by simultaneously reducing labor, inventory, transportation, and feeding costs, while improving quality.[2] Meat packers built new plants in low-wage regions closer to feedlots. To minimize transportation costs of grain and cattle, most production takes place in such States as Texas, Kansas, and Nebraska, where feed is abundant. After butchering, boxed beef is shipped to the customer, reducing costs for supermarkets which could avoid many of the meat cutting operations once performed in the store by butchers.

Meat **products cannot enter the United States unless they originate in packing plants approved by the U.S. Department of Agriculture (USDA). Mexican packers lost their approvals in 1984, after USDA found that the inspection procedures in use in Mexican** plants could not detect chemical residues at the required levels. Only in 1989 were five Mexican packing plants again approval, all in the border region.[3] But given that wages are so much lower in Mexico, isn't it possible that meat packing will migrate there? The answer to this question turns on transportation costs for cattle and feed and the ability of Mexico to increase the size of its herd.

The Mexican cattle herd averages about 20 million. Each year, Mexico exports about 1.2 million feeder cattle to the United States for finishing-essentially all the steers that meet U.S. quality and type specifications. Mexico does not have enough rangeland, water, or croplands suitable for feedgrains to increase cattle production. As table 10-4 shows, even with improvements in the country's transportation system that reduced shipping costs to U.S. levels, costs for importing feed and shipping beef back to the United States would add more than $30 per animal for feedlots in northern Mexico, and about $60 for feedlots near Mexico City. Labor costs per animal (including benefits) in the United States, for both feeding and packing, are in the neighborhood of $40 to $50.

Actual costs in Mexico would in most cases be higher than shown in table 104[4] These estimates assume that cattle are held in feedlots in both countries for 180 days, which is at least 30 days longer than currently required by the most efficient U.S. feeding operations. Today, even the best Mexican feedlots and packing plants are relatively small and inefficient, using practices characteristic of the 1960s in the United States (in part, because the low cost of labor has discouraged mechanization).

Both feedlots and packing plants exhibit large economies of scale in purchasing, production, sales, and distribution, which reduces the vulnerability of large, efficient U.S. plants to competition from Mexico.[5] At present, the United States has considerable excess capacity in both sectors, much of it below efficient size and thus likely to be closed at some point in the future. In 1990, for example, 205 U.S. feedlots with capacities of 16,000 head or more accounted for more than half of production (52 percent); 44,000 smaller feedlots supplied the remainder. Ninety-one plants accounted for more than 90 percent of all U.S. beef packing (again in 1990) in an industry with more than 1,000 packing plants. One of the largest packers, IBP, has recently been operating at around 75 percent of capacity.

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1 This box is based on industry interviews; annual reports and 1O-K filings; *NAFTA: Effects on Agriculture; vol. II, Livestock and Dairy Issues* (Park Ridge, IL: American Farm Bureau Research Foundation 1991); *1991 Meat Facts* (Washington, *DC:* American Meat Institute, August 1991); *Livestock & Poultry: Situation and Outlook Report* (Washington DC: Department of Agriculture, Economic Research Service, January 1992); and U.S. *Industrial Outlook* '92 (Washington, DC, Department of Commerce, January 1992), pp. 32-3 to 32-7 and 011.

2 Kathleen Stanley, "The Role of Immigrant and Refugee Labor in the Restructuring of the Midwestern Meatpacking Industry," contract report prepared for the U.S. Department of Labor, October 1988, pp. 10-18,

3 *U.S.-Mexico Trade: Trends and Impediments in Agricultural Trade,* GAO/NSIAD-90-85BR (Washington, DC: U.S. General Accounting Office, January 1990), p. 16. Six more *maquila* packing plants had been certified by early 1992, although not all were producing beef for export to the United States. Mexico sends some exports to Japan from these plants,

4 Today, shipping costs for grain evidently render feedlots in northern Mexico unprofitable, on average. Some have gone out of business. *NAFTA: Effects On Agriculture; vol. II, Livestock and Dairy Issues, op.* cit., footnote 1, p. *28.*

5 Clement E. Ward, *Meatpacking Competition and Pricing* (Blacksburg, VA: The Research Institute On Livestock Pricing, July 1988), pp. 21-33.

Unless U.S. red meat consumption rises more rapidly than expected-unlikely given consumer trends-there will be little incentive to move production operations to Mexico. Depressed wages in the U.S. industry also reduce the attractiveness of relocation, as does competition for water with other industrial and agricultural sectors in northern Mexico.

Table 10-4-Estimated Costs of Cattle Feeding and Meat Packing[a]

	Cost (dollars per steer)		
	Texas	Northern Mexico	Mexico City
Feedlot costs			
Feeder steer Purchase[b]	$552.48	$550.50	$550.50
Purchase price of feed	250.79	250.79	250.79
Additional transportation costs for feed		22.32	41.16
Management fee and labor[e]	21::	12.00	12.00
Veterinary medicine	3.00	3.00	3.00
Interest[f]	35.44	37.72	36.21
Attrition	8.18	8.18	8.18
Packing costs			
Wages, salaries, and benefits[g]	33.93	11.31	11.31
Supplies	13.41	13.41	13.41
Overhead	22.66	22.66	22.66
Additional transportation costs to U.S. market	NA	8.93	17.85
Total	$940.89	$940.82	$967.07

[a]Assumes a NAFTA is in place and that Mexico's transportation system has improved so that rail costs are the same in both countries. Based on industry interviews, along with Livestock & *Poultry: Situation and Outlook Report* (Washington, DO: Department of Agriculture, Economic Research Service, January 1992), table 36, p. 26; and *1991 Meat Facts* (Washington, DC: American Meat Institute, August 1991), p. 33.

[b]Assumes feeder cattle purchase price and commission the same in Mexican and the United States, with transport to U.S. feedlots at $3.96 per steer, and half as much for transport to Mexican feedlots. Each steer is assumed to yield 714 pounds of beef.

[c]Assumes 4,200 pounds of feed per animal, over 180 days (to achieve a weight gain of 500 pounds). OTA'S estimates assume the same feed mix and purchase price for both countries. Mexico prohibits the use of corn as a feedgrain, although it can be imported as part of prepared cattle feed; sorghum is the primary feedgrain in Mexico. Alfalfa is seldom fed to cattle in Mexico, but it is assumed that substitutes cost the same. The assumed feed mix: 1,500 pounds of corn (U.S. cost of $104.50 per ton); 1,500 pounds of grain sorghum ($84.46 per ton); 800 pounds of alfalfa ($134.75 per ton): and 400 pounds of cottonseed meal ($240,00 per ton).

[d]Assumes 3,400 pounds of feed must be imported into Mexico, with the other 600 pounds purchased locally. The northern Mexico estimate assumes grain is shipped by rail from Kansas to the border region ($1 3.13 per ton, including elevator costs), then trucked to the feedlot. The Mexico City case assumes shipping by rail to New Orleans ($10.57 perton), by sea to Mexican ports ($8.18 per ton, including unloading, fumigation, and customs clearance at $4.54 per ton), then by rail to the feedlot ($5.45 per ton).

[e]Assumes $10.50 management fee in both countries, including overhead. U.S. labor, $1 0.50; Mexican labor, $1.50.

[f]Based on an annual interest rate of 10.54 percent on the purchase price of the steer, minus commission and transportation to the feedlot, for 180 days, plus half the cost of feedgrain and feedgrain transportation charges. (In fact, interest rates are significantly higher in Mexico.)

[g]At 1.5 percent of the purchase price of the steer.

[h]Mexican plants are assumed to have less automation, hence require more labor.

[i]Based on 1,000 miles of incremental transportation from Mexico City, 500 miles from northern Mexioo. Transportation by truck, 44,000 pound capacity, at $1.10 per mile.

NA = Not applicable.

SOURCE: Office of Technology Assessment, 1992.

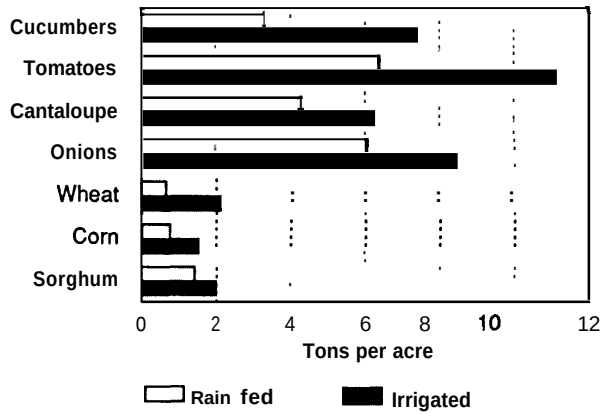
also imports beef from South America and Australia, (It is also **a net** importer of chicken and pork, both of which require significantly less feed to produce a pound of meat.) Most of the U.S. beef goes to supply the tourist trade and wealthy consumers who can afford it, although Mexico also buys some cheap cuts and products that have little appeal here. Thus, the pattern by which Mexico sends feeder cattle to the United States and imports beef in return seems unlikely to change.

Mexican cow-calf operators can compete successfully with their U.S. counterparts because both labor

Box 10-D-Increasing Irrigated Fruit and Vegetable Acreage[1]

Figure 10-3 shows that irrigated land produces higher yields per acre. Of Mexico's 12.1 million acres of irrigated land, about 2.5 million acres, or 20 percent, is planted in horticultural products. Corn grows on 19 percent of the remaining irrigated land. Past subsidies for irrigation water led to inefficient use, while subsidies for corn encouraged planting on irrigated land.

Figure 10-3-Productivity of Irrigated and Rainfed Farming in Mexico, 1985



SOURCE: "Agricultural issues In U.S.-Mexico Economic Integration," report prepared for OTA under contract No. I34I31O by B. Kris Schulthies and Gary W. Williams, April 1992, table 9, p. AS.

[1] The discussion of irrigation in this box is based on interviews, plus Santiago Levy and Sweder van Wijnbergen, "Transition Problems in Economic Reform: Agriculture in the Mexico-US Free Trade Agreement," *Economy-Wide Modeling of the Economic Implications of a FTA with* Mexico *and a NAFTA with Canada and Mexico*, Addendum to the Report on Investigation No. 332-317 Under Section 332 of the Tariff Act of 1930, USITC Publication 2S08 (Washington, DC: U.S. International Trade Commission, May 1992), pp. 299-357; *NAFTA: Effects On Agriculture; vol. IV, Fruit and Vegetable Issues* (Park Ridge, IL: American Farm Bureau Research Foundation, 1991); and "Agricultural Issues in U. S.-Mexico Economic Integration," report prepsred for OTA under contract No. 13-0310 by B. Kris Schulthies and Gary W. Williams, April 1992.

and land costs are important in breeding and raising calves for sale to feedlots. But Mexico's cattle raising capacity is fundamentally limited .25 Feedgrain production in Mexico will likewise continue to be severely restricted by shortages of water and suitable land; in the end, Mexico needs to grow food for feeding people, not animals.

Currently, no more than half of Mexico's population can afford beef, even at CONASUPO's subsidized prices. Rather than investing in *maquila-like* operations in Mexico, U.S. feedlot operators and packers--facing a saturated market in the United States—will probably seek to expand into Mexico through acquisitions, joint ventures, and wholly-owned subsidiaries with the aim of serving the Mexican market as it expands. The terms of a NAFTA, and government policies within Mexico, will shape these strategies and their outcomes.

THE FUTURE

Output Growth in Mexico

Mexican farmers can compete effectively in some crops already, notably hits and vegetables grown on irrigated land. If Mexico could increase its production of these crops, it might pose more serious threats to U.S. growers. Mexico could increase production by bringing more land under irrigation, shifting irrigated land now planted in other crops to horticultural products, or by increasing yields from existing acreage. For reasons explored below, increased yields through better technology offers the best prospects for Mexican farmers to increase their output.

Irrigated Horticultural Production

If Mexico irrigated all its suitable land, and shifted all irrigated land now planted in corn to export-oriented horticultural crops, farmers might be able to devote another 2 million acres to horticultural production (box 10-D). This would be a large increase for Mexico, but not so impressive relative to the 9 million acres currently under irrigation in California. Still, Mexico might in principle be able to increase its production for export by a factor of about 4. In fact, such an outcome is unlikely for reasons discussed in the box. Moreover, growing Mexican demand would absorb much of any in-

~ Grazing lands are relatively poor in quality, and already stretched to capacity; Mexico's cattle herd has declined substantially over the last 4 years because of drought. Examination of these limits leads to estimates that Mexico could not send more than 2 or 2 1/2 million feeder cattle per year northwards—roughly 10 percent of the number of cattle on feed at any one time in the United States. Most of the impacts of these shipments will continue to be felt in Texas. Ibid., pp. 27, 70-72.

In principle, land now planted in corn could be switched to horticultural products, while more land could be irrigated for growing fruits and vegetables. Horticultural exports have come from the 12 Mexican states listed in table 10-5.[2] A total of 1.2 million acres in these states is currently irrigated but planted in corn. An estimated 0.77 million acres not now under irrigation has potential for irrigation. Mexico might thus be able to add as much as 2 million acres of horticultural production, an increase of 78 percent, by switching from com and irrigating land that is now rainfed. This suggests that Mexico might in theory be able to increase its production of fruits and vegetables for export by up to four times, assuming that all the new horticultural acreage produces for export. But such an outcome is unlikely. With rapid economic development in northern Mexico, the prime growing region for fruits and vegetables, demand for water for industrial uses and growing cities has cut into the water available for irrigation. Even today, most irrigation projects provide only enough water for one crop per year. The Mexican Government's high priority for industrialization suggests that investments in new, large-scale irrigation projects will proceed at modest rates. And to the extent that agriculture might prove unable to compete for water with industrial and urban consumption, horticultural acreage could even decline.

Table 10-5-Potential for increased Horticultural Production in Mexico's Primary Exporting Regions

	Land under irrigation	Irrigated corn	Potential new irrigated land	Possible increase
	(thousands of acres)			
Sinaloa	2,280	245	455	670
Tamaulipas	968	310	32	342
Michoacán	677	169	101	270
Sonora	1,655	166	7	173
Jalisco	388	78	32	110
Guanajuato	981	97	7	104
Guerrero	106	54	47	101
Nayarit	232	15	54	69
Colima	104	20	27	47
Morelos	96	30	12	42
Baja California	541	12	—	12
Total	8,028	1,196	774	1,970

SOURCE: Santiago Levy and Sweder van Wijnbergen, "Transition Problems in Economic Reform: Agriculture in the Mexico-US Free Trade Agreement," *Economy-Wide Modeling of the Economic Implications of a FTA with Mexico and a NAFTA with Canada and Mexico,* Addendum to the Report on Investigation No. 332-317 Under Section 332 of the Tariff Act of 1930, USITC Publication 2508 (Washington, DC: U.S. International Trade Commission, May 1992), pp. 299-357.

2 Sinoloa (47 percent of exports in 1989-90), Sonora (14 percent), and Bajac~ornia(11 percent) account for the bulk of exports. For 1989-90 production in the other exporting regions, see *NAFTA: Effects On Agriculture; Fruits And Vegetable Issues, vol. IV*, ibid., table IV-1, p. 49; and Levy and van Wijnbergen, *Mexican Agriculture in The Free Trade Agreement,* ibid., p. 48.

crease. Currently, Mexico exports no more than 18 percent of its horticultural production.[26]

Technological Improvements

Increasing yields on existing horticultural acreage to levels comparable to those achieved in the United States has greater potential for increasing horticulture output at reasonable cost than bringing more land into production. Here the hurdles begin with lack of the agricultural research necessary for developing technologies optimized for local conditions, including the varied microclimates in this arid and mountainous country.[27] Mexican farmers growing winter vegetables for export buy almost all their

26 Roberta Cook, "Mexican Free Trade Agreement: Who Will Be The Winners And Losers?" *American Vegetable Grower,* February 1992, p. 30.

27 Runsten and Archibald, "reelmoIogy and Labor-Intensive Agriculture," op. Cit., footnote 19.

seed from the United States because Mexican-produced seed is inferior.[28] But most of this seed is adapted for U.S. growing conditions, not those in Mexico. Viruses plague farmers particularly in the central and southern part of the country; Mexico lacks resistant varieties or other means of control. Without investments in research, in diffusion of best practices, and in training of agricultural research workers, farmers, and agribusiness managers, Mexico will remain dependent on seeds and agrochemicals developed for conditions in the United States and elsewhere, on farming practices improved through slow-paced trial-and-error, and on animals bred for conditions in other countries.[29]

Plainly, there is a great deal of room for improvement. Yet in many respects, the country's agricultural sector declined during the 1980s—a consequence of withdrawals of government support, as well as the troubled economy. Seed production fell, along with fertilizer consumption and Mexico's stock of tractors and other farm machinery (prices for imported equipment increased rapidly with peso devaluation during the 1980s).[30] With government investments low, multinationals have been the major channel for inflows of agricultural know-how. Their interests focus on the fertile northwest, where the modem sector and FDI have concentrated, providing little or no help in meeting the needs of small farmers in other parts of the country.

Applications of biotechnology will diffuse relatively slowly into the agricultural sectors of both Mexico and the United States. Because most potential applications involve manipulations of multiple genes, research is difficult and expensive. Mexico's expenditures on both traditional agricultural research and on biotechnology are tiny fractions of those in the United States, ensuring that Mexico will be a follower rather than a leader.

Because there are few apparent limits to improvements in agricultural productivity through technology in the United States, growers who have been able to maintain advantages in delivered costs through yield and productivity improvements in the past have good prospects for continuing to do so in the future. Mexico will have to achieve substantial increases in productivity to maintain its competitive position over time, and may be hard pressed to do so.

NAFTA Impacts

Agriculture is heavily regulated and subsidized around the world, primarily for domestic political reasons. The United States and Mexico are no exceptions. Government policies affect prices and output levels, and hence trade patterns. The current Uruguay Round of GATT negotiations seeks to moderate subsidies in agriculture. If it succeeds, trade between the United States and Mexico would be affected. Regardless of the outcome of the GATT negotiations, a NAFTA would contain provisions affecting trade and therefore employment in the agricultural sectors of both countries, no doubt including transition periods and ''snapback' provisions (triggering increases in tariffs if imports rise beyond specified levels) to protect vulnerable sectors. The U.S.-Canada Free Trade Agreement, for instance, provides for staged tariff reductions over a 20-year period for some agricultural products.

California produces more fruits and vegetables than any other State. Despite their apparent vulnerability to competition from Mexico, California growers expect a NAFTA to have only limited adverse consequences. The common view: impacts would limited, and felt over relatively long time periods.[31] There will be some losers, but winners will predominate, These views reflect confidence in California's advantages, which are both broad and deep. Those advantages include, for example, the workforce skills needed to keep expensive farm machinery operating continuously during critical planting and harvesting periods. They also include the capabilities of research organizations, universities, and the

28 David R. Mares, *penetrating the International Market: Theoretical Considerations and a Mexican Case Study* (New York, NY: Columbia University Press, 1987), p. 32.

Although two-thirds of *ejido* farms make use of fertilizers and/or herbicides, only about 40 percent grow crops from improved seed varieties. *NAFTA: Effects on Agriculture; vol. IV, Fruit and Vegetable Issues,* **op. cit., footnote 8, p. 8.**

29 The process of developing hybrid seeds in Mexico, particularly by agencies of the government, has been criticized for paying insufficient attention to local conditions. John Heath, "An Overview of the Mexican Agricultural Crisis, " *The Mexican Economy, George* Philip, ed. (London and New York: Routledge, 1988), pp. 129-163.

30 *NAFTA: Effects on Agriculture;* vol. *IV, Fruit and Vegetable Issues,* op. cit., footnote 8, pp. 23,24.

31 Industry interviews; and Conference on the Impact of the Free Trade Agreement with Mexico on the California Fruit and Vegetable Industry, Santa Clara University, Nov. 4, 1991.

agricultural extension system. The views of California growers also reflect three other factors:

1. The complementary nature of production in California and Mexico.
2. Superior management skills, marketing, and distribution.
3. Confidence that vulnerable sectors will get protection, or at least transition periods long enough for growers to shift to other crops.

Florida competes more directly with Mexico. Many growers are worried that transition periods will be too short and that they will have trouble identifying new crops and mastering new techniques. Overall, Florida's agribusiness industry exhibits little of the dynamism, innovation, and confidence evident in California. Even so, growers in the various parts of Florida can be expected to specialize on the basis of comparative production, transportation, and marketing costs, and to succeed in carving out new markets.

Impacts of a NAFTA on U.S. jobs in agriculture would be localized, with farm workers in Florida most likely to be displaced. Mexico's advantages in growing and freezing broccoli also threaten jobs in California. By and large, these are not good jobs, although for those who hold them now, a bad job may be better than no job.

Hired (nonfamily) agricultural workers are paid less than workers in any other U.S. industry .32 In 1990, seasonal agricultural workers earned median hourly wages of $4.85. Fewer than half are covered by unemployment insurance; fewer than a fourth have health insurance. Seventy percent of seasonal agricultural workers are Hispanic, 62 percent are foreign born, and perhaps 20 percent are undocumented. Because demand for hired farm workers has been declining in the United States (from about 4.7 million at the end of the 1950s to a little over 2 million currently), those displaced—most of whom are poorly educated and few of whom have other skills-will experience substantial difficulty in finding new jobs.

The 600,000 or so jobs in food processing pay better than farm work. The range in 1991: from an average of $7.07 per hour for poultry workers (about one-third of all food processing workers) to $9.39 per hour in fruit and vegetable processing (two-fifths of food processing workers). Wages for meatpacking workers, the other major group of food processing workers (about one quarter of the total), have been under great pressure during the last 15 years as the industry restructured (see box 10-C, earlier in the chapter), In 1978, meatpacking workers earned 80 percent more than poultry workers; in 1991, they averaged $8.91 per hour, only 26 percent more than poultry workers. This relative decline is the result of radically lower union coverage and the breakdown of pattern bargaining as packers decentralized and built new plants in rural areas near feedlots. Many of these plants depend heavily on immigrant workers. Injury rates increased as wages fell; the combination of machine pacing and a vulnerable, sometimes illegal immigrant workforce brought work conditions not seen in decades in this industry. But because fresh rather than processed food accounts for most U.S. agricultural imports from Mexico, and because there seems little likelihood of meat packing moving to Mexico, a NAFTA itself would probably make little difference for most U.S. food processing workers, with the possible exception of those in the poultry sector.

In the longer term, new entrants in Central and South America may pose greater threats to U.S. production of both fresh and frozen horticultural products than exports from Mexico. Countries including Chile, Peru, and Guatemala have been expanding production for export in regions with extended growing seasons. Their agribusiness sectors promise continuing competition for both Mexican and U.S. farmers .33 On balance, U.S. producers of grain and beef should benefit from increased exports to Mexico, although some small feedlots and packing plants near the border could close.

Mexican agriculture faces a more troubled future than U.S. agriculture, particularly in the traditional sector. Rapid population growth, urbanization, and rising per capita income suggest that demand for

32 *Findings From the National Agricultural Workers Survey (NASW) 1990*, Office of Program Economics Research Report No. 1 (Washington, DC: Department of Labor, July 1991). Also see Victor J. Oliveira, *Trends in the Hired Farm Work Force, 1945-87*, Agriculture Information Bulletin 561 (Washington, DC: Department of Agriculture, Economic Research Service, April 1989); and Runsten and Archibald. "Technology and Labor-Intensive Agriculture, " op. cit., footnote 19, pp. 449-486.

33 Taiwan and china, as well as Chile and Peru, for example, send canned asparagus to the United States, while Canada, Chile, and Peru ship frozen asparagus. *NAFTA Effects On Agriculture: vol. IV, Fruit and Vegetable Issues*, op. cit., footnote 8, pp. 78-79.

food could increase at 5 to 6 percent per year, with Mexico likely to become more dependent on imported food. The agricultural sector must overcome a decade of declining investment, adjust to lower government supports and subsidies, and contain rapidly rising costs per unit of output-all the while depending on outsiders for technology.

CONCLUDING REMARKS

A NAFTA would accelerate the integration of North American agribusiness. Mexico must buy food abroad, and the United States will be the preferred source for many products. In return, Mexico will send larger quantities of fruits and vegetables northwards. These shipments will not overwhelm U.S. farmers, who have amply demonstrated their flexibility and resilience in the face of manmade as well as natural obstacles. Still, gains and losses from a NAFTA will be concentrated geographically and by product, and for growers who have trouble switching to new crops there will be little solace in a NAFTA that benefits U.S. agriculture as a whole.

The seasonal nature of fruit and vegetable production means that Florida competes most directly with Mexico. But restricted supplies of land and water will limit Mexico's capacity to expand production, and, together with rising domestic demand, limit the volume of fresh fruits and vegetables shipped to the United States. OTA's analysis, finally, suggests that Mexico poses little threat in cattle feeding and meat packing. Limited grazing lands and rising beef consumption will preclude a dramatic increase in exports of feeder cattle. Transportation costs for grain counterbalance Mexico's low labor costs in feeding and packing. Indeed, Mexico will probably import greater quantities of U.S. beef in the years ahead.

Movement of people, rather than movement of goods, may have the greatest implications for the United States. Mexico's agricultural reforms will drive large numbers of people off the land. Many of these people will move to urban areas where they will put downward pressure on wages for low-skilled jobs, with spillover effects here. Some will emigrate to the United States.