
STRUCTURE OF FARMING UNDER FREER TRADE AMONG NAFTA COUNTRIES

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INTRODUCTION

Liberalization of markets under the North American Free Trade Agreement (NAFTA) has progressed unevenly. Major opportunities remain to open trade in agricultural products among member countries of NAFTA. Progress in negotiations depends on political as well as other factors, including how freer trade would affect farm structure in Canada, Mexico, and the United States. The objectives of this paper are to analyze:

- economic forces causing changes in agriculture in NAFTA countries;
- the structure, composition, and location of farming with freer trade among NAFTA countries;
- trade dispute tensions caused by freer trade and attending changes in the structure of agriculture; and
- actions governments and the private sector would take to cushion adjustments and ease the transition to freer trade.

ECONOMIC FORCES CAUSING STRUCTURAL CHANGE

Principal forces causing structural change include:

- knowledge creation and technology;

Agriculture is now a post-industrial economy in its dependence on knowledge, information technology, and service industries. Successful farm operators increasingly spend more time in the office at the computer and spend less time in the field, barn, and shop (Tweeten and Zulauf, 1998). Labor-saving technology is freeing labor from producing food to producing goods and services more favored by consumers as their income expands.

- economic growth;

Economic growth is a product of knowledge apparent in human, material, and technological capital growth. Such growth increases the price of labor relative to capital, causing farm operations to displace labor with larger and more efficient machines of all types. Economic growth also causes consumers to want and afford a wider variety of foods. The impact is to foster more trade as a means to acquire food, and innovative forms of vertical coordination to facilitate information flows up and down the food chain.

Farms are growing fewer and larger mainly because farm operators are seeking economies of size to reduce production and marketing costs. Economies of size are mainly a function of technology and information systems. New institutions such as production contracts reduce transaction costs and more closely coordinate farm input supply and precision food production and processing to meet the “designer” food needs of ever more affluent consumers.

An assessment of how farm structure would develop in a free trade environment requires recognition that under any trade regime farm products are not homogeneous, that agribusiness and farm sectors are not perfectly competitive, and product does not flow from a single location or to a single location in North America. This means that distinct regional markets will continue to exist even in a freer agriculture trade environment. This is evident in other sectors; for example, economists have found “home consumption bias” or “border effects” to be very large in virtually all sectors of the economy despite close to free trade conditions (Nitsch, 2000; Helliwell, 1996). For agricultural inputs and outputs, Furtan and van Melle (2000) show that the Canada-U.S. border is still very apparent despite the absence of tariffs and quotas for many commodities. Understanding the form of these departures from the single market is essential to

understanding the existing farm structure as well as the potential farm structure within a free trade environment.

Farm structure, or the organization of production units, is heavily influenced by the size of the farm firm minimum cost unit, which can differ considerably by sector. Where this minimum cost per unit of output is reached at a size with less than two employees, an owner operator "family farm" structure will prevail. Where the minimum cost is at a size that involves many employees, the farm structure could include external corporate ownership. Both of these farm structures will be generally competitive unless at minimum cost a farm can supply most or all of the market. In this case, a few farms will exist within the sector and each farm will possess some market power, allowing it to price above marginal cost. In cases where transaction (coordination) costs are large, a simple assessment of the cost of production may be misleading in determining the competitiveness of a region. The transactions cost literature suggests that the economic linkages between farmers and processors, or between farm input suppliers and farmers, will be influenced by the structure of the upstream and downstream industries, and, importantly, the institutions that exist within a region to govern these relationships. The literature also suggests that those regions having institutions with the lowest transaction costs will produce the product and perhaps dominate other regions with higher transaction costs.

The various combinations of processor/farmer production technologies, and transport costs of raw and processed products versus production economies of scale will result in an array of different industry structures and trade patterns. When the transportation costs are high relative to the economies of size downstream, the processors will locate close to the source of raw product. This will result in processors locating throughout the region of production. Here trade will tend to be in processed product, rather than in raw agricultural product. Livestock processing is an example of this type of structure. When the cost of transporting the final product is high relative to transporting the raw product, then processing will tend to locate close to the final market. Here the processors will tend to locate near metropolitan areas with little trade in processed product between these areas. Bakeries and to some extent flour milling are examples of this type of cost structure. Finally, some raw and processed products will be expensive to transport relative to the economies of size in

processing. This used to be the case in fresh milk where production and processing tended to take place near large urban areas.

In regional pockets of production and processing where there is potential market power, arrangements other than spot markets for agricultural products may emerge. In this situation, the regions able to create institutional arrangements to overcome the resulting problems will tend to produce and process the product. For example, producers able to organize a cooperative to process sugar beets may have an advantage over other potentially lower cost producers who do not have this organizational ability. Similarly, a willingness of North Carolina's farmers to accept hog production contracts may have allowed that region to grow at the expense of other, potentially lower-cost, regions.

Technology, economies of size, and environmental regulations will interact under freer trade to favor livestock and poultry feeding in regions characterized by low labor costs and low rainfall. Such areas include the plains, mountain, and desert areas of Canada, Mexico, and the United States. Relatively few but very large cattle feeding and meat processing "hubs" will be tied by "spokes" of transportation and communication to sometimes distant farm grain and soybean producing areas and urban food consumption areas. Western Mexico will be one such hub, importing feed by unit train from cash-grain farming regions and exporting case-ready meat to urban centers not only in Mexico but also in the United States, and perhaps in Canada.

STRUCTURE, COMPOSITION, AND LOCATION OF PRIMARY AGRICULTURAL PRODUCTION IN NAFTA COUNTRIES WITH FREER TRADE

This analysis of the impact of freer trade among NAFTA countries presumes that: (1) freer trade will especially affect farm structure through commodity prices and receipts, and (2) domestic commodity programs as well as trade will be liberalized. Thus the impact on farming structure (size, number, type, and organization of farms and agribusinesses) will depend, among other things, on the degree to which local agriculture will be protected from global and regional markets and on the importance of agricultural trade in each country of NAFTA. According

to estimates of the Organization for Economic Cooperation and Development (OECD), a major shift occurred in support of agricultural producer receipts among NAFTA countries between 1982-92 and 1999. While Mexico's producer subsidy equivalent (PSE, or proportion of farm receipts from the public sector) remained at approximately one-fifth, Canada's PSE fell from 35 percent in 1982-92 to 20 percent in 1999. While Canada's PSE was being cut, the U.S. PSE rose slightly, going from 23 percent to 24 percent in the same period.

The form of programs contributing to the PSE has a major impact on domestic resources and trade as apparent for the United States in Table 1. Massive direct payments increased U.S. farm output only 0.15 to 0.25 percent in the 1998-2000 period. Far more modest-size marketing loan deficiency payments coupled to production raised U.S. farm output by 0.68 to 1.38 percent. Crop and revenue insurance subsidies accounting for one-half of the approximately \$3 billion in annual crop insurance outlays in recent years encouraged production of higher-yield, higher-risk crops, and retention of marginal cropland that would have gone to grass and trees in the absence of subsidies. The result was to add as many as 25 million acres to crop production and to add 0.28 to 4.10 percent to U.S. farm output (Table 1).

Results in Table 1 suggest important implications for farm structure under a liberalized NAFTA:

- output-increasing tendencies of farm commodity programs not only distort trade, they also offset some and perhaps most of the intended economic benefits to farmers;

According to Table 1, coupled public programs increased output, depressed U.S. farm prices, and possibly reduced receipts by \$18 to \$25 billion, enough to offset benefits of direct payments to U.S. farmers in recent years. Thus an end to decoupled programs under free trade might have only modest impact on farm economic welfare and farm structure.

- direct payments (production flexibility contract, AMTA, or transition payments) only modestly affect output.

Hence "decoupled" payments might be used to cushion farm income and structured adjustments in the transition to freer trade. Member countries of NAFTA

Table 1: Production of farm output above competitive market levels induced by the 1996 farm bill, U.S., 1998-2000.

Program feature	Contribution to farm output	
	Low	High
	<i>(Percent of farm output)</i>	
Direct payments	0.15	0.25
Marketing loans and deficiency payments	0.68	1.38
Insurance subsidies	0.28	4.10
Total, all sources	1.11	5.73
Loss in farm receipts (\$ billion)		
Short run (E=-0.3)	4.93	25.46
Intermediate run (E=-0.6)	1.42	18.45
Long run	0.00	0.00

Source: Estimates from Westcott and Young (2000), Burfisher et al.(1998), and Skees (2000) as reported in Tweeten (2001).

differ greatly in ability to finance payments, however. Despite measures to cushion adjustments, lower farm prices and incomes attending free trade and less generous commodity programs will bring structural changes to farming. In general, lower prices and interregional competition create pressure for farm consolidation to achieve size economies, and for organizational changes such as contract production and leasing to shift risk and to serve capital and management needs of a competitive agriculture.

Impacts on farm commodity and resource structure of more open trade depends on the level and mix of affected trade. NAFTA was formed partly because Canada, Mexico, and the United States are in close proximity, and close neighbors trade heavily with one another, *ceteris paribus*. Thus the three NAFTA partners trade especially with each other. Also, a small economy tends to trade relatively more with other economies, *ceteris paribus*. Of agricultural trade in 1995, 27 percent of U.S. trade, 74 percent of Canadian trade, and 79 percent of Mexican trade was with NAFTA partners (Gehlhar, 1998, p.36). Hence the United States is expected to be influenced relatively less by removing trade barriers than are its partners in NAFTA¹. Table 2 shows levels of U.S.

¹ The impact of more open trade in NAFTA depends partly on current trade balances and barriers. Although the United States is a major exporter to the world as a whole, the United States exported only 84 percent as much as it imported of food and agricultural items from NAFTA partners in 1995 (Gehlhar, 1998,p.3).

Table 2: NAFTA Partners' Level and Share of United States' Farm Exports.

Destination Country	FY 1994		FY 2000	
	Value (\$Bil.)	Share (%)	Value (\$Bil.)	Share (%)
Canada	5.3	12.1	7.5	14.8
Mexico	4.1	9.5	6.3	12.4
U.S. subtotal	9.4	21.6	13.8	27.2
U.S. total	43.5	100.0	50.9	100.0

Source: U.S. Department of Agriculture, November 1996, p. 48 and December 2000, p. 49.

Table 3: Changes in Farm Exports, Imports, Output, and Welfare Due to NAFTA.

Country	Exports (Percent change from base)	Imports	Output	Welfare (\$ million)
Canada	1.5	0.1	-0.4	500
Mexico	23.7	10.4	-1.8	299
United States	1.3	4.7	0.1	464

Source: Burfisher, et al. (1998, pp. 72, 73)

farm exports to NAFTA partners for 1994 (when NAFTA was formed, although it was preceded by the CUSTA in 1989), and for year 2000. The value (and share) of U.S. farm exports going to NAFTA partners rose from \$9.4 billion (21.6 percent) in FY 1994 to \$13.8 Billion (27.2 percent) in FY 2000. The rising U.S. export share to NAFTA has come especially at the expense of Europe and Asia.

The rise in U.S. farm export share to NAFTA is somewhat misleading as an indicator of revenue or job creation, however. The reason is that the United States and Canada are in approximate agricultural trade balance depending partly on whose trade data are used (Tweeten et al., March 1997). An equal increase in farm exports and imports is likely to create better jobs and add to real national income, but it probably creates few net new jobs. Thus one "cost" of more open trade is job shifts, which for disadvantaged workers can be traumatic although overall job quality and remuneration rises on average. The following pages explore what sectors and resources in agriculture are favored and disfavored by freer trade.

Limitations to expanding U.S. trade with NAFTA partners are apparent. With nearly equal farm trade to and from Canada, Canada is consuming nearly 10 times as much U.S. farm product per capita as U.S. consumers are of Canadian farm products. Furthermore, because the United States and Canada are affluent and mature economies, food demand and hence food trade will typically expand slowly, other things equal. In contrast, Mexico has more potential to expand food consumption as income and population expand. Mexico's consumers will shift toward higher-value products such as meat requiring considerably more resources to produce than do current consumption items. With Mexico's limited supply of quality land and water, the country will import more food and feed paid for by manufactured exports as economic growth progresses.

Freer trade will speed that process as evident from the impact of NAFTA to date. Tweeten et al. (March, 1997) estimated that CUSTA/NAFTA added \$1.4 billion to U.S. agricultural exports to Canada and \$1.9 billion to Canadian agricultural exports to the United States by year 1995 over 1989 exports. Burfisher, Robinson, and Thierfelder (November 1997, p.11), using a computable general equilibrium (CGE) model, estimated that the NAFTA agreements added \$258 million of the \$582 million additional agricultural exports to NAFTA partners. The Tweeten et al. and Burfisher et al. estimates are not strictly comparable because of different methodology, commodity coverage, and time period, but both estimates indicated that NAFTA created trade, and that trade creation benefits probably exceeded trade diversion losses.

Past trade trends are prologue to trends under future NAFTA liberalization. That freer trade under NAFTA will be felt most by NAFTA countries relatively most dependent on trade with its NAFTA neighbors is apparent from numbers in Table 3. The NAFTA has most heavily influenced Mexico whose exports were expanded 33.7 percent while imports expanded 10.4 percent (Table 3). Because water availability limits Mexico's ability to compete in corn, oilseeds, and selected other crop and livestock production, overall agricultural output was estimated to decline 1.8 percent. Despite this (modest) decline, welfare (national income or deadweight gain) was calculated to increase \$299 million by Burfisher et al. (p. 72).

Table 4: Changes in Factor Employment Due to NAFTA.

Country	Resource			International agriculture <i>terms of trade</i>
	Land	Labor	Capital	
	<i>(Percent change)</i>			
Canada	0.6	0.9	1.4	0.9
Mexico	5.1	4.6	3.2	-0.9
United States	0.2	0.2	0.1	2.1

Source: Burfisher, et al. (1998, pp. 70, 72; assumes new farm programs)

Agricultural resource use changes from NAFTA as shown in Table 4 were greatest in Canada and Mexico because they depend more heavily than does the United States on trade. By ending trade distortions such as import duties in its farm and food economy, Mexico was able to increase land, labor, and capital use by 3.2 to 5.1 percent and realize an increase in real national income despite a slight drop in prices for what they sold relative to what they bought in international markets (Table 4). Canada's resources expanded less than Mexico's but more than the United States' (Table 4). Because it began with relatively low trade barriers when NAFTA began in 1994, the United States was able to improve its terms of trade with liberalization but its land, labor, and capital resources expanded less than did those of its two NAFTA partners (Table 4).

REMOVING REMAINING TRADE BARRIERS

Neither NAFTA, nor CUSTA preceding it, is a genuine free trade agreement. Each allows for continued government interventions in some farm markets, notably for dairy and poultry (including eggs) in Canada and sugar, peanuts, and tobacco in the United States. Because NAFTA partners compete little in peanuts and tobacco, the concerns especially are with dairy, poultry and eggs in Canada, and sugar in the United States. Other trade irritants have been troublesome from time to time.

An example is wheat export subsidies. The U.S. Export Enhancement Program (EEP) raised U.S. wheat prices relative to world wheat prices. With Canada receiving world wheat prices, the result was higher-U.S.-relative-to-Canadian wheat prices and a surge in Canadian exports to the United States in 1993-94. Such exports undermined the EEP and resulted in a Canadian-U.S.

Joint Commission on grains to coordinate cross-border trade, domestic programs, and export programs of the two countries. (Burfisher et al., November 1997, p. 74). Tensions continued, and in 1998 the two countries established a pilot program monitored by the Canadian Grain Commission to help U.S. wheat enter Canada. Frictions between Canada and the United States over wheat markets will remain for several reasons. One is that free trade in commodities in which free trade partners are competitive tends to render supports coupled to production and prices unworkable because imports undermine such coupled programs. Second, forces such as exchange rate and weather risks originating outside of farm commodity markets heavily influence farm markets, causing cross-border frictions². The frictions from the above factors are intensified because wheat in Canada and the United States has the backing of powerful political forces. Hence even minor trade problems can turn into institutional confrontations.

Another unresolved issue is sugar trade especially between Mexico and the United States. Although the United States has retained controls over sugar imports from Canada and Mexico, NAFTA controls over Mexico sugar exports will be phased out after year 2008 (Burfisher et al., November 1997, p. 74). The NAFTA agreement prevents Mexico from substituting high fructose corn syrup (HFCS) sweeteners for sugar in its domestic market, but Mexico has found that provision difficult to enforce. The United States fears that Mexico will import HFCS while exporting its domestic sugar production to the United States where such imports undermine the U.S. sugar price support program. In turn, Mexico fears that it will not be allowed to export domestic sugar production to the United States although sugar is one of the farm crop products (along with fruits and vegetables) it can export at a profit to the United States. How this issue will finally be resolved remains unclear.

Some progress has been made on resolving a few thorny issues. Many divergent farm product standards and regulations have been harmonized. Resolution of sanitary and phytosanitary disputes in citrus has helped to open fresh

² Perhaps it is time to seriously consider an institutional reform, creating a NAFTA dollar to remove exchange rate risk that causes unpredictable shifts in comparative advantage across NAFTA borders.

Table 5: Government Payments as a Proportion of Net Farm Income and Total Personal Income by Region, U.S., 1995-98.

Region	Net Farm Income	Personal Income, All Persons
	<i>(Percent)</i>	
Northeast	6.34	0.008
Lake States	34.03	0.167
Corn Belt	27.62	0.231
Northern Plains	33.98	1.375
Appalachia	5.46	0.049
Southeast	4.78	0.037
Delta	23.24	0.394
Southern Plains	27.01	0.187
Mountain	22.29	0.191
Pacific	7.02	0.046
United States	18.29	0.125

Source: Moss (2001). Includes AMTA, loan deficiency, and disaster payments.

markets in Mexico to U.S. citrus, and opened some U.S. markets to live hog and avocado exports from Mexico. Because of favorable labor costs and environmental laws, Mexico could be in a position to feed U.S. produced coarse grains and soybean meal to poultry, hogs, and beef cattle, which in turn could be processed locally into case-ready products for export to the U.S.

INDIVIDUAL COUNTRY ADJUSTMENTS

We now turn from this overview to adjustment impacts of freer trade under NAFTA for member countries.

United States

Direct payments have been the principal income support for U.S. agriculture in recent years and their phase out would be sorely felt by grain and cotton producers. Government payments have been a sizable portion of farm income in the Lake States, Corn Belt, Northern Plains, Delta, Southern Plains, and Mountain regions (Table 5). The impact of loss of transfers that could attend freer trade is less onerous when direct payments are expressed as a proportion of personal income of all people in each region. Greatest losses would

Table 6: Estimated Annual Welfare Impacts of Freer Trade Under NAFTA for Canada and the United States, 1997.

Commodity:	Country	
	Canada	United States
	(\$ million)	
Dairy		
Annual benefits to:		
Consumers	720	-437
Producers	-636	442
Nation	84	5
Eggs		
Annual benefits to:		
Consumers	174	-52
Producers	-141	53
Nation	19 ^a	1
Sugar		
Annual benefits to:		
Consumers	-77	1,450
Producers	10	-1,200
Nation	-67	250
Total (above only)		
Annual benefits to:		
Consumers	817	961
Producers	-767	-705
Nation	36 ^a	256

Source: Tweeten, Sharples, and Evers-Smith, pp. 7-10.

^aSubtracts production quotas rent value

be in the Northern Plains and Delta regions where payments were 1.4 percent and 0.4 percent respectively of personal income in 1995-98 (Table 5).

The Southeast would be a greater loser from commodity program and trade liberalization than indicated by Table 5. The focus on payments (expanded massively under the 1996 farm bill and subsequent "emergency" legislation) masks the importance of sugar, peanut, and tobacco programs, which were not reformed and do not rely on payments. A relatively few U.S. farmers produce cane sugar, and each would face major adjustments with termination of the sugar program (see Table 6).

U.S. producers would be losers (\$1.2 billion annually) from termination of the U.S. sugar program. The seemingly incongruent conclusion that Canada would lose from termination of the U.S. sugar program is explained by the fact that world prices (paid by Canadians) for sugar would rise. Because Canada is a major net importer of sugar, losses to Canadian consumers from higher world sugar prices more than offset gains to the few Canadian producers. Hence, deadweight losses accrue to Canada from sugar market liberalization in the United States.

Numbers in Table 6 hide the trend to more equal prices for dairy and poultry products in the United States and Canada since 1997. In part, that movement is the product of a declining Canadian dollar relative to the U.S. dollar. Competitiveness is influenced by production costs as well, and data in Table 7 indicate an advantage for U.S. dairy producers. Costs per liter of milk in the West are lower in California than in Alberta, and in the East are lower in New York than in Quebec.

Canadian producers would lose and U.S. producers would gain from termination of the Canadian dairy quota system. Overall, consumers gain more than producers lose in Canada and the United States from liberalization of dairy, egg, and sugar markets. Less rent seeking (lobbying, etc.) and administrative costs with liberalization could raise the national gains from liberalization well above the totals shown in Table 6.

Mexico's National Agricultural Insurance System paid up to 30 percent of insurance premiums for its farmers but Canadian Prairie provinces and the central government paid nearly 70 percent of crop premiums and the U.S. government paid up to 60 percent of crop insurance cost for its producers in year 2000 (Knutson et al., 2001). An end to resource and trade distorting crop insurance subsidies would especially target the U.S. Southeast and Plains states (Table 8). Costs average nearly double premiums for crop insurance from 1981 to 1999. Loss ratios were especially high in Arkansas, Texas, and Georgia, and these and other Southeast states would especially feel the consequences of ending subsidies.

Table 7: Cost of Milk Production.

State or province	(C\$/liter)
West	
Alberta	0.37
British Columbia	0.48
Washington	0.35
California	0.29
East	
Quebec	0.42
Ontario	0.45
New York	0.37
Minnesota	0.32

Source: Jeffrey (1992)

Table 8: Ratio of crop insurance indemnities to premiums, 1981-1989.

State	(Loss ratio)
Arkansas	2.97
Texas	2.72
Georgia	2.68
N. Carolina	2.40
N. Dakota	2.16
Florida	2.12
United States	1.88

Source: Makki (2000)

The paper by Zahniser et al. (February 2001) presented at this workshop provides data helping to identify farms most likely to be disadvantaged by less commodity program and trade interventions. U.S. farms with sales of less than \$100,000 receive most of their income from off-farm sources. These small farms, which account for most U.S. farms, are helped little by farm programs. Most such farms would hardly miss commodity programs.

Farms with annual sales of over \$250,000 are highly efficient, have incomes and wealth in multiples of those of non-farmers, and receive most of their income from crop and livestock receipts rather than from government. Land prices would fall with termination of programs, threatening the solvency of some highly leveraged farmers in this class. Larger farms accounting for two-thirds of farm output can afford risk management strategies for survival,

and would fare well on average without programs after coping with a difficult period of adjustment to lower land prices.

In 1998, 4 percent of all farms were judged to be financially vulnerable with negative cash flow from farming and debt-asset ratios exceeding 40 percent. Many of these 80,000 farms would fail without commodity programs, but most are likely to retire, expand size, or obtain more off-farm employment to survive with or without taxpayer support. Financial vulnerability after accounting for off-farm income is especially high among mid-size farms with annual crop and livestock sales of \$100,000 - \$250,000, the farming-dependent 171,469 farms accounting for 8.3 percent of farms and 17.1 percent of farm sales in 1998. They depend heavily on government programs (71 percent received payments versus 36 percent of all farmers in 1998), are too large to earn much off-farm income, and too small on average to be efficient producers. These vulnerable farms could be helped at relatively low cost to taxpayers through targeted credit, direct payment, and adjustment assistance programs.

Canada

The impacts of freer trade on farm structure in most sectors in Canada would be very similar to those in the United States. As in the United States, Canadian farm families on average receive the majority of their income from off-farm sources. While larger farms still receive the majority of income from farming, that share is falling over time. Canada has large numbers of small farms, but their share of farm output will continue to fall in part because their propensity to invest is only 2 percent out of long-term assets (sales \$10,000-\$24,999) compared to 7 percent out of long-term assets on large farms with sales of over \$500,000 (Canadian dollars, Statistics Canada, Farm Financial Survey 1998). The low rate of investment on small farms suggests that these farms will continue to be small and have no real prospect for generating significant farm family income in the future.

Agricultural support in Canada has a significant provincial government component. As such, the level of support varies across Canada. In general, the safety net programs in Quebec and Ontario provide greater support for their grains, oilseeds, and red meat sectors than do those in Western Canada. Second, the level and form of support varies considerably across commodities. In

Canada, the red meat sector (beef and hogs) has operated with little support for the past 15 years (except in Quebec). The grains and oilseed sector on the prairies has experienced a significant reduction in subsidies. In 1986, the PSE peaked at over 60 percent for wheat³. Prairie grain farmers now receive minimal support in the form of crop insurance, the NISA (Net Income Stabilization Act) program allowing farmers to set aside 2 percent of gross sales matched by government contributions and interest subsidies in favorable economic times for use in later unfavorable times, and AIDA (Agricultural Income Disaster Assistance Program⁴). Current programs have provided a wheat producer subsidy equivalent (PSE) of 10-12 percent in the past few years.

The poultry and dairy sectors operate supply management schemes. Farmers of a commercial size are required to have a quota to produce poultry, eggs, and milk. Beyond a minimal level of imports, the domestic industry is protected from foreign competition with prohibitively high import tariffs. For these sectors, there is currently little difference between Canadian and U.S. prices and at times the U.S. prices have exceeded Canadian prices. Given that the U.S. price is the reference price for poultry, this implies the Canadian sector is relatively competitive with the U.S. industry. In dairy, however, the U.S. industry is also protected, suggesting that prices in both countries could fall considerably in a free trade scenario extending beyond the three countries in NAFTA. Based on landed product prices from New Zealand, the PSE in this sector is close to 50 percent. The horticultural sectors in the United States and Canada operate with very modest support, but with some eligibility in Canada for NISA and crop insurance.

Overall, governments have vastly reduced economic support for the agricultural sector in Canada. The transition to free trade in most cases will be an acceleration of trends currently apparent in each sector within agriculture. If the United States removed all support for grains and oilseed producers, producers of these commodities in Canada would be slightly better off than they are now. In Western Canada these better conditions would slow the current trend

³ Surpluses accumulated in several insurance funds in Canada, hence the effective government subsidy was below 60 percent.

⁴ AIDA was extended for three years and converted to the Canadian Farm Income Program (CFIP) in 2000.

toward diversification in crops, and the shift to livestock production. Hard spring wheat production would continue to be an important crop in the drier regions. The elimination of the Canadian Wheat Board, combined with the deregulation of grain transportation, would result in a greater although sporadic flow of wheat into the United States domestic market. Given the historic pattern of grain disputes, Canadian shipments of grain during low price periods would still cause trade friction. The prospect of antidumping suits based on cost of production would likely continue to be a threat to obstruct trade within the existing trade agreements. The only way to eliminate this threat would be to eliminate this protectionist provision within trade agreements.

The hog industry in Western Canada would continue to expand under freer trade. The hog industry, particularly in Western Canada, has operated with very little support for a number of years. The reduction in grain transportation subsidies in 1996 resulted in significant growth in hog feeding. The pork-processing sector in Western Canada has also recently expanded and is now owned by the same multinational corporations that operate in the United States. The net result has been a decrease in hog exports from Canada with some hogs produced in North Dakota now being processed in Manitoba. A free trade scenario would see continued growth in this sector in Western Canada. The trade in live hogs will be governed by the processing capacity relative to the growth in hog production. The safety net program for hog production in Quebec has allowed many smaller farmers to remain in production. In a free trade environment, many of these producers would exit the industry. Given that environmental regulations will make building permits difficult to secure for larger operations, hog production could decline somewhat in Quebec.

Some transition of Canadian grain farms into beef will create more mixed grain/beef operations in the next decade. If the elimination of the farm payments in the United States resulted in growth in the U.S. beef herd and somewhat higher grain prices, then lower calf prices and slower growth in cow-calf production could prevail in Western Canada. In Eastern Canada the effect on the cow-calf sector is very unclear because much depends on the dairy sector. If there were significant reduction in the large dairy sector, pasture and forage production could shift to beef production. Cattle feeding in Western Canada has expanded significantly in the past decade. Feedlots cur-

rently operate very much in a free trade environment. Both the feeding sector and the processing sector likely will continue to expand as the cowherd grows. The expansion of the Canadian industry will almost certainly continue to be a trade irritant for the U.S. beef industry. With freer trade, real or alleged dumping below the cost of production would be a credible threat for trade action.

The poultry and egg price difference between Canada and the United States is now very modest and, at times, reverses. Despite nearly price parity, Canadian quota values remain large. Thus, although the Canadian industry would not undergo a major price change in a free trade environment, the industry would undergo a major restructuring at the farm level, the processing level, and at the regional level. Quotas have tended to keep enterprise size somewhat uniform among farms. In the absence of supply management, new producers would tend to construct and operate with much larger units. There would be little incentive to consolidate smaller units; rather these units would continue to operate until they are fully depreciated. The current poultry and egg supply management system is governed by provincial agencies and is close to self-sufficiency in each province in Canada. In the absence of supply management, new regional and international markets would develop. If this industry follows the hog industry, this expansion would likely occur in Manitoba or Saskatchewan. The implication for trade is very unclear in this industry. Much depends on how regional markets develop.

Anticipating implications of free trade for the Canadian dairy sector is the most interesting and challenging. Although it has similarities to the supply managed poultry sector, dairy differs in several important respects. First of all, with international free trade the industry would have to compete with much lower priced New Zealand exports. Second, dairy production relies on forage acres as a production base, and must have sufficient acres to spread manure. Third, the U.S. industry would undergo a major structural change at the same time. Finally, the substantial transport costs, particularly for fluid milk, suggest the development of smaller regional milk sheds. Much lower prices would induce larger production units, displacing mid-size dairy farms. At some scale the production units would be beyond a traditional family farm and may be corporately financed and operated. As in the United States, large dairies producing for cured milk products are likely to locate in less populated areas near

Table 9: Main Agricultural Products (annual value of production, 1997-99).

	Million U.S.\$	Percent		Million U.S.\$	Percent
Cattle	3,407	13.2	Peppers	708	2.7
Poultry	3,313	12.9	Sorghum	683	2.7
Corn	2,914	11.3	Alfalfa	602	2.3
Milk	2,648	10.3	Potatoes	456	1.8
Hogs	1,571	6.1	Avocados	456	1.8
Sugarcane	1,169	4.5	Wheat	414	1.6
Tomatoes	905	3.5	Mangos	299	1.2
Grass	785	3.0	Bananas	290	1.1
Coffee	770	3.0	Oranges	248	1.0
Dry beans	698	2.7	Onions	236	0.9
			Subtotal	22,572	87.7
			Total	25,747	100.0

Source: Secretaria de Agricultura.

low-cost forage and concentrate supplies, while dairies for fluid milk use are likely to locate in the East nearer population centers. An alternative scenario is for the sector to operate much as it does today, producers working with existing processors maintain something like the status quo, with lower rents for producers. Trade in dairy products would increase.

Mexico

Grains and oilseeds, with 14.6 million hectares, account for 71 percent of arable land. Of this, oilseeds only represent 2 percent. The surface area devoted to these crops has remained fairly constant over the past 20 years. Land planted with forage, fruits, and vegetables, on the other hand, has increased considerably over the same period of time; however, their share of total agricultural cropland is still small (2 percent for vegetables and 4 percent for fruits). Mexican agriculture had annual sales averaging U.S. \$25.7 billion in 1997-99. Cattle, poultry, corn, and milk account for almost half the total value of production. The 20 products shown in Table 9 account for 87.7 percent of the value of Mexican agriculture.

The composition of Mexican agriculture is not likely to show dramatic changes in the next 20 years. Conventional wisdom holds that Mexico's agricultural potential lies with expanding production of fruits and vegetables, and

that an important production shift is expected from grains to fruits and vegetables with freer trade. This trend has not been observed in the past and is not likely to take place in the future. With a mere 6 percent of total arable land devoted to the production of fruits and vegetables, Mexico already amply supplies its domestic market and exports significant quantities to the U.S. market. A doubling in fruit and vegetable production would quite likely severely depress prices because the demand for these products in both the domestic and foreign markets seems to be well met with current supply sources. The United States already imposes very low import tariffs on Mexican fruits and vegetables; thus, substantially higher exports due to trade liberalization are not expected. Furthermore, agronomic, water, and weather conditions represent a constraint for switching grain land to fruit and vegetable production (14.6 million hectares, 71 percent of arable land, currently engaged in grain production could hardly be employed for other purposes). Finally, the impact on the Mexican and U.S. vegetable markets of increased investment in U.S. greenhouses for vegetable production is yet to be determined. In any event, it represents an important risk for Mexican vegetable exports to the United States.

With freer trade, grain production likely will maintain current or even slightly higher levels. It is often argued that Mexico lacks comparative advantage in the production of grains. However, grains are produced under a wide range of production systems, locations, and agronomic and weather conditions; thus, it is inappropriate to generalize the concept of comparative advantage when referring to Mexican grain production. In fact, some competitiveness studies of Mexican agriculture using the Policy Analysis Matrix methodology indicate comparative advantage for grain production in several Mexican regions (Salcedo, 1989 and 1993; Colegio de Posgraduados, 1992).

Over the past ten years, important technological innovations have been adopted in grain production in Mexico. For instance, in the La Barca region in the state of Jalisco, farmers have been able to attain corn yields as high as 15 tons/ha under rainfed conditions. In the state of Sinaloa, high yielding seeds, precision seeders, and low or no-tillage practices have increased farmers' competitiveness. New technologies in grain production also will continue to be adopted in other regions of Mexico. However, 46 percent of all corn farms still produce for self-consumption. On those farms, decisions are not sensitive to

price incentives. Such farms will maintain current levels of corn production despite changing economic incentives under free trade. Mexican corn production is primarily white varieties, which are preferred by consumers due to their taste and consistency in tortilla making. Corn imports, on the other hand, are yellow varieties having poor qualities for tortilla making. As income increases, consumers will be willing to pay a premium for white corn, thereby fostering domestic production.

Mexican grain processors, like processors elsewhere, are establishing closer relationships with farmers to guarantee a certain domestic supply of a specific quality of grain. Processors have provided farmers with new technologies, credit, and a fixed price for their crops. These initiatives have had mixed results, and they are likely to be fine-tuned for success in the future.

Perhaps the most conclusive evidence for expecting Mexico to produce current or slightly higher levels of grains in the next 10-20 years is that, over the past five years, under highly adverse conditions (an overvalued peso, high interest rates, near record low international prices, quite low import tariffs including a zero import duty in the case of sorghum, high input costs especially for diesel and agrochemicals, and record low domestic subsidies) grain production has actually increased over levels of the 1980s and early 1990s. Grain production in the future, however, will probably take place in a different farm structure, as explained below.

With respect to future livestock production, it is worth noting that trade policy in the past decade has varied from highly protectionist (poultry) to free trade (cattle and beef). Thus, in the case of cattle and hogs, perhaps current or slightly higher levels of production are likely to be observed in the future. Some of the broiler, hog, and cattle production will be offered for export especially to the United States under freer trade. A huge potential has not yet been exploited for cattle and milk production in the Mexican tropics. If investors were to take advantage of this potential, cattle and milk production could show even more impressive growth. In the case of poultry, a sector that has been highly protected from imports, over the past 20-30 years commercial companies have vertically integrated and have consolidated. Poultry has actually been the fastest growing subsector in agriculture (over 7 percent growth per year in the past

15 years). The current firm consolidation trend will facilitate continued growth in the future. In summary, the present composition of agricultural production and land use in Mexico is not likely to change in the next 10-20 years with freer trade.

Mexico has over twice as many farms as the United States, but differing definitions of farms precludes precise comparisons across countries. The 1990 Agricultural Census of Mexico reported 3.8 million crop farms, 1.3 million cattle ranches, 1.3 million hog farms, and 2.3 million poultry production units. Minifundia (small farms) are prevalent in Mexican agriculture; the average farm size is only 8.1 hectares. Sixty percent of all farms possess 5.1 percent of arable land, and their average size is only 0.7 hectares. The average size of farm is only 18.5 head for cattle farms, and 6.4 head for hog farms.

To interpret these numbers, it is important to note that the 1990 Agricultural Census classified as farms even those rural households with only a couple of backyard cows or hogs. Census data in Mexico are not reliable because respondents under-report farm size. Even though the 1992 Agrarian Law maintained earlier farm size ceilings, farmers have found ways to operate larger sized farms, either by renting additional land or by making several relatives or friends the legal owners of the farms. The size of some grain farms in the North and Northwest is several hundred hectares, and some farms are as large as 5,000 hectares.

It is interesting to see that, unlike the observed trend towards fewer farms in the United States, census data in Mexico reported an increase of 763,099 farms from 1980 to 1990. Although there are no official data with respect to what has happened over the last decade to the number of farms and farm size, direct observation, field studies, and interviews with representatives of several farmers organizations support the hypothesis that farm numbers have decreased and farm size has increased.

In the BajNosp region (the main pork production area), farmers estimate that the number of hog farms has declined 70 percent over the past 20 years. Some ejidos in Northern Mexico (Chihuahua, Tamaulipas) that used to produce cotton, sorghum, and corn are now renting up to 90 percent of their

agricultural land (compared to 10 percent 20 years ago). Also, some ejidatarios from Northern and Central Mexico have permanently abandoned their land and have migrated either to urban areas or to the United States.

Number of farms has also declined in the poultry and dairy sectors (since the 1970s), and in the cattle sector (especially during the 1980s, when import tariffs for meat were eliminated). The financial stress brought about by the 1995 peso crisis in the Mexican economy, coupled with agricultural policy reform initiated since the late 1980s, which rapidly opened the agricultural sector to foreign competition and drastically reduced subsidies, forced many farmers out of business.

In the next 10-20 years, the trend towards fewer and larger farms observed in the 1990s will continue in the livestock and grain sectors. These trends will be speeded by freer trade. Given current low government subsidies, achieving economies of scale becomes crucial for Mexican farmers to compete with grain imports. Larger farms will have access to credit necessary to introduce technological innovations for becoming more competitive. Commercial banks are not interested in lending to small farmers, since banks are just overcoming the huge problem of past-due portfolio they faced over the last five years. Also, banks face high administration costs in agricultural lending, and they regard farming as a highly risky business, especially due to the uncertainty of domestic agricultural policies. Even the government agricultural bank (Banrural) has reduced its credit programs and faces a large past-due portfolio. Still, as mentioned earlier, many small farms whose production is for self-consumption will quite likely remain "in business." For many middle-sized farms, future financial viability is at high risk. Some of these farms, with proper non-distorting policies, could remain operating in the next 10-20 years. These policies mainly include technology transfer, access to credit for production and land buying, development of farmers organizations, providing market information, and investing in production and marketing infrastructure. Other middle-sized farms, however, because of agronomic and weather restraints and lack of economies of scale, will be forced out of the market.

A final fact that points towards fewer and larger farms in the future is the current age of most farmers, which probably ranges between 50 and 60

years. In the next 20 years these people will stop farming, and their sons and daughters are not likely to take up farming. Farmers' offsprings lack a farming culture: they have gone to school in urban areas, have pursued non-agricultural careers, and are not interested in becoming farmers. An additional factor reducing the number of farms in the hog sector is the possible implementation of strict sanitary regulations in those states where foot and mouth disease is still present. The enforcement of strict regulations would probably force a large number of rural households to do without their backyard animals.

Weather, agronomic conditions, and water availability, rather than trade liberalization, will be the main factors that will determine the location of production in the next 20 years. Irrigation has played a major role in Mexican agriculture over the past five decades, and it will be even more important in the future as Mexico faces increased water shortages and water contamination. Mexico ranks 6th in the world by largest number of irrigated hectares (around 6 million hectares or 20 percent of arable land). Most of the irrigation infrastructure was developed in the Northwest during the 1950s and 1960s. Some 60 percent of agricultural land in the Northwest is irrigated, compared to 9 percent in Central and Southern Mexico. Specialists expect that, in 2025, 30 percent of today's irrigated land in Mexico will face water problems, which would indicate a possible reduction in agricultural production in the Northwest and to a lesser extent in the BajNosp region. These regions also face salinization problems, which already affect around 300,000 hectares. Increased salinization will impede agricultural production on some farms.

It is worth noting, however, that current irrigation systems are quite inefficient, and 50 percent of the water is actually wasted. Thus, irrigation efficiency could be greatly improved, and salinization could be overcome through parcel drainage, but this calls for substantial investment which neither the government nor farmers may be able or willing to make. In the case of vegetables, however, the increasing trend toward the use of greenhouses reduces the importance of natural conditions in determining the location of production.

Factors such as cheaper labor costs could become more important. de Janvry (1996, p. 2) contends that dislocations of labor from NAFTA between the United States and Mexico were less than anticipated in part because Mexico

had substantially reduced trade barriers when it joined the General Agreement on Tariffs and Trade (GATT) in 1986 and reduced its import duties unilaterally to 10 percent from the prior 25 percent average. Although experts had predicted massive depopulation of ejidos as Mexican corn prices dropped and imports from the United States displaced domestic production, de Janvry (p. 5) contended displacement was modest. A reason is that relatively few people from the ejido depended on corn sales for their livelihood. In the longer run with more open trade, job creation in manufacturing and other industries is likely to more than offset employment loss in ejidos caused by NAFTA. Thus more open trade generating off-farm jobs could reduce migration of workers from Mexico to the United States.

TRADE DISPUTE TENSIONS

Trade disputes arising from a change in the structure of agriculture per se are likely to be rare. Countries will, however, continue to respond to real and perceived unfair trade practices. Governments will often champion the protectionist measures proposed by politically powerful groups that, under freer trade, will see their incomes decline. Trade conflicts in a free trade environment are likely to be especially frequent over anti-dumping cases brought when commodity prices are low. As long as access to antidumping (AD) and countervailing duty (CVD) trade action exists within trade agreements, then a free trade environment cannot exist.

NAFTA offers what de Janvry (1996, p. 7) refers to as “equitable and expeditious” dispute settlement. Numerous, even bewildering, trade dispute settlement procedures are available. Each country has its own AD and CVD laws. National AD duties may be imposed if imports are being sold below “fair value” and causing or threatening to cause material injury to a domestic industry (USDA, August 1999, p. 21). CVD duties may be imposed on imported goods to offset subsidies provided to producers or exporters and causing material injury to a domestic industry. Lack of uniform rules among countries and arbitrary judgments of terms such as “fair value,” “subsidies,” “cost of production,” and “injury” cause frictions. Most NAFTA trade disputes have been settled at early stages by negotiations among affected parties. Institutional capacity of the three NAFTA countries has been strengthened for intergovernment nego-

tiations, interindustry negotiations, and technical assistance. The U.S.-Mexico agreement on tomatoes, for example, a response to U.S. AD action, was ultimately settled through an intergovernment agreement between Mexico and the United States to set temporary minimum prices on Mexican tomatoes exported to U.S. markets. More open trade under NAFTA undoubtedly will create new frictions and hence new challenges for dispute settlement procedures. A potentially divisive issue is sanitary and phytosanitary (SPS) standards. Some progress has been made through the NAFTA Committee on Sanitary and Phytosanitary (SPS) measures (USDA, August 1999, p.23).

Cattle and hog trade between Canada and the United States is relatively free, and two-way trade between the two countries in poultry and poultry products has increased markedly. But SPS (Newcastle disease) concerns sharply curtailed Mexican exports of poultry to the United States. Following negotiations, arrangements have been made to produce and export to the United States poultry and poultry products and swine from selected regions in Mexico.

Concerns regarding growth hormones, antibiotics, genetically modified foods, diseases, organic foods, and synthetic chemicals could intensify with greater trade among NAFTA countries. Canadian dairy and poultry and eggs producers and American sugar producers are likely to use means available to slow or even stop trade. In this effort, they will receive support from numerous non-governmental, environmental, labor, and social organizations (NGOs) as evident in protests against the World Bank, International Monetary Fund, and the World Trade Organization at Seattle in late 1999 and Prague in year 2000. Thus adequacy of rules and dispute settlement procedures are of worldwide importance and are not restricted to NAFTA.

GOVERNMENT AND PRIVATE SECTOR ACTIONS TO REDUCE TRADE TENSIONS AND THEIR CONSEQUENCES, AND TO EASE TRANSITION TO FREER TRADE

Probably the most important issue to reduce trade disputes and to ease the transition toward complete trade liberalization is putting into place similar non-trade-distorting agricultural policy instruments in the three countries. However, disparate priorities and political concerns, the absence of reliable indica-

tors for Mexican agriculture, and budgetary constraints may impede efforts to establish a truly common North American agricultural policy. Nonetheless, even if viewed as a long-term goal, each government can begin to adopt policies that move toward such a commitment.

Governments can do much to reduce trade tensions. Decoupled direct payments can help producers adjust to more open markets. Such payments can facilitate transition from protected to open markets while having only a very small impact on output and trade (Westcott and Young, 2000). Governments can play a role in reducing the social cost of the transition toward freer trade. The United States at times has been too quick to apply CVD and antidumping measures. The situation is different for Mexico, where the government needs to develop its ability to appraise and respond to unfair trading practices. However, there will be less reason to protect against dumping in Mexico if the United States reduces loan price supports and crop insurance subsidies that cause overproduction and prices in world trade below that of a competitive market. And all countries need to forego export subsidies, such as the U.S. EEP, if trade frictions are to be reduced among NAFTA partners as well as other countries. Consumers and taxpayers as well as producers could be considered in anti-dumping and countervailing duty cases. Similarly, consumer as well as producer interests could be represented on trade grievance and mediation panels. Procedures for calculating what is “dumping” need to be clarified.

Another problem in Mexico is that regional agricultural markets are not well developed. Several inefficiencies still exist (inadequate storage and transportation infrastructure, monopolistic power, lack of information, excess influence of middlemen, ineffective price transmission, etc.). Also in Mexico, macroeconomic stability (bringing inflation and interest rates in line with those prevailing in the United States and Canada), and a competitive exchange rate are essential in easing the transition toward freer trade.

More science and education is needed to address SPS issues not only in NAFTA but in other countries as well. Restrictions on trade for SPS reasons can often be traced to unwarranted fears of consumers “educated” by special interest groups to protect domestic producers. A public educated regarding SPS from a strong base of sound science coupled with regulatory procedures to

identify real threats to food safety can improve public trust and chances for making competent regulatory decisions.

Even with the above measures, some farmers will be forced out of agriculture under freer trade. Because time is required for the non-farm economy to absorb released labor, a transition program, including basic education, job training, and investment in rural development projects, can ease adjustments. In the United States, the Transitional Adjustment Assistance (TAA) program established in 1993 could be expanded (USDA, August 1999, p. 39). The TAA program provides job training, career counseling, and financial allowances to workers whose employment is diminished as a result of trade with Canada and Mexico. TAA has been of little help to farm workers, however. Of 1,794 certifications of groups of workers eligible for benefits to 1998, only 19 or 1 percent were in agriculture (USDA, August 1999, p. 39).

CONCLUSIONS

Freer trade under NAFTA could speed structural adjustments already underway. Farm types and areas most affected in the United States give insight into farms likely to be affected in other countries in the absence of adjustment assistance from the public sector:

- sugar, tobacco, and peanut farms;

These farms have been especially favored by safety net programs.

- Southeast and Plains states farmer;

Farmers in these states have especially benefited from price support and federal cost-sharing of crop revenue insurance programs. From 1981 to 1999, the ratio of losses (indemnity payments) to premiums paid by producers averaged 2.0 for the several states in the Southeast and Great Plains. Loss ratios have averaged over 2.0 for cotton, tobacco, peanuts, sorghum, and wheat and are much lower for corn and soybeans. Up to an estimated 25 million acres currently in crops would be grass, trees, or other non-crop uses without safety net payouts. Many of those acres are in the Southeast and Plains states. Agribusinesses also would experience a decline in economic activity in the Southeast and Plains states.

- mid-sized farms with sales of \$100,000 to \$250,000;

These farms would be especially hard-hit because many are too large to allow much off-farm work for the operator and spouse, but too small to achieve economies of size essential to compete with other farms. The 171,469 farms in that sales class classifying themselves as farmers in 1998 averaged only \$10,149 of household income from crops and livestock. Without the \$11,314 of government payments, they would be financially stressed indeed despite averaging a very substantial \$669,458 of net worth. Some of that net worth in real estate would be lost as noted below.

- landowners.

Farmland prices would fall in the absence of a farm safety net. Landowners would lose but new entrants to farming would face lower entrance barriers and mortgage payments.

- livestock and poultry feeders;

Favorable commodity support loan rates and crop insurance assistance from government induced production of crops that in turn lowered crop prices and hence feed costs to feeders. Net economic benefits would accrue from an end to market and trade distortions. Thus net gainers could in principle compensate losers with decoupled payments and adjustment assistance so that everyone would be better off. The challenge is to provide equitable and efficient programs to provide such compensation.

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