Integration and Interdependence in the U.S. and Canadian Live Cattle and Beef Sectors

Linda M. Young, Agricultural Policy Coordinator
Montana State University–Bozeman
and
John M. Marsh, Professor
Montana State University–Bozeman

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About the Authors

Linda M. Young is the Agricultural Policy Coordinator, Trade Research Center, Montana State University–Bozeman.

Dr. Young obtained her Ph.D. from the University of California–Davis. Her research interests include agricultural policy and trade, emphasizing the grain and livestock markets.

John M. Marsh is a Professor of Economics in the Department of Agricultural Economics and Economics, Montana State University–Bozeman.

Dr. Marsh has published in the areas of livestock and meat demand and supply and marketing issues. He also researched in livestock and meat trade issues

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This paper was originally delivered at the meetings of the Association for Canadian Studies in the United States in a session on "Prairie Agriculture: Sectoral Issues" in November 1997.

The live cattle and beef markets of Canada and the United States are well integrated and highly interdependent, but in an unequal fashion. This paper assesses the role of trade agreements and domestic policies in increasing market integration and analyses the impact of remaining barriers to integration. In this paper, we use integration in the context of forming or blending markets into a whole.

When the Canada–United States Free Trade Agreement (CFTA) was implemented in 1989, tariffs on both live cattle and beef were reduced and within a few years many were eliminated. In 1996, the United States imported 1.5 million head of slaughter and feeder cattle from Canada, nearly a sixfold increase in the number of cattle imported prior to CFTA, which numbered 262,091 in 1987. However, live cattle imports are still extremely small compared to the U.S. market, with imports of live cattle in 1996 (carcass weight equivalent) constituting around 4 percent of U.S. beef consumption. The United States is a much more important market for Canada than vice versa, with 60 percent of Canada's beef exports destined to the United States in 1996, but only 16 percent of U.S. beef exports destined to Canada.

As impediments to trade between Canada and the United States were removed, north-south trade increased. As the feedlot and packing industries in Alberta expand, it is anticipated that fewer Canadian slaughter cattle will be exported to the United States. In fact, U.S. feeder cattle may be exported to Alberta.

Subsidies for beef producers in Canada have been significantly higher than for the United States, at times twice as high, although the level of support for beef and veal is lower than that for other commodities. Both the United States and Canada protect their domestic industries through tariffs, although this protection will decline moderately with the implementation of the 1994 Uruguay Round Agreement. Both countries subsidize their industries through provision of inspection services, research and advisory programs, and marketing and promotion programs; however, the importance of these government policies varies between countries.

Canada has eliminated a number of programs previously used to assist the beef industry, including an insurance program, the National Tripartite Stabilization Program. The United States does not have a regular program of income

support for stockgrowers. The United States does have several programs that promote beef exports. To the extent that export promotion programs result in higher U.S. market prices, they may also increase U.S. imports of live cattle and beef from Canada.

Due to the large size of the United States market relative to Canada, it is commonly argued that cattle and beef prices are determined in the U.S. market, with Canadian prices reflecting differences in exchange rates and transportation costs. U.S. slaughter prices were found to be an extremely important determinant of Canadian slaughter prices. A weaker relationship was found between U.S. and Canadian barley prices.

Mutual recognition of the equivalency of U.S. and Canadian meat grading systems has not occurred and this has ramifications for U.S.-Canadian trade in beef. Canadian packers are forced to sell beef at greatly reduced prices in the United States, resulting in lower boxed beef exports to the United States and higher exports of carcasses than would occur with grade equivalency. The same is true for U.S. packers. Because U.S. beef cannot be sold into the eastern Canadian market without a large reduction in price, the U.S. beef industry is deprived of a lucrative outlet for the lean beef that is preferred in eastern Canada.

The increasing level of integration in Canadian and U.S. cattle and beef markets has been accompanied by a corresponding increase in their interdependence. Policymakers in both countries must recognize that domestic and export policies need to account for open borders between the two countries, limiting the choice of policies available to achieve a particular goal.

Transportation costs will always limit the choice of packers that producers can sell to. However, within these bounds, a single market means that there are more choices for producers.

The beef industries in both the United States and Canada are increasingly dependent on export markets, particularly the Pacific Rim. Both countries have a mutual interest in increasing access to third country markets.

Integration of U.S. and Canadian live cattle and beef markets is well advanced, and it is perhaps the most integrated market of the major agricultural commodities. Supply management of the Canadian dairy, egg, and poultry industries and the implementation of high tariffs after the removal of quotas have prevented integration in those markets. For grains, marketing institutions and systems in Canada prevent complete market integration. For cattle and beef, the lack of trade barriers and relative unimportance of government intervention in the sector have facilitated movement toward a single market.

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Introduction

The live cattle and beef markets of Canada and the United States are well integrated and highly interdependent, but in an unequal fashion. This paper assesses the role of trade agreements and domestic policies in increasing market integration and analyses the impact of remaining barriers to integration. This integration is necessarily accompanied by interdependence between the U.S. and Canadian livestock sectors and has associated costs and benefits.

The live cattle and beef markets of Canada and the U.S. are well integrated.

In this paper, we use integration in the context of forming or blending markets into a whole. This implies a certain degree of harmony. Criteria used to assess the degree of integration between the live cattle and beef markets of Canada and the United States include the following:

- Prices in the two countries move together so that a shock in one output market is transmitted to the other output market via supply and demand adjustments, and prices differ between points by transportation costs;
- Trade occurs between the two countries;
- Similarities exist in important markets for inputs—in this case, feed.

For market integration to occur, the commodity in question must be relatively homogeneous, or without large differences in quality characteristics between the two countries. Integration of two countries' markets for a particular commodity, in this case, live cattle and beef, is prevented by the existence of trade barriers, including tariffs, quotas, and border regulations. Creation of an integrated market for live cattle and beef is also influenced by factors affecting supply and demand in each country. These factors include health and safety regulations, macroeconomic policies, and domestic agricultural and trade policies that affect commodity production and marketing and the cost of inputs such as feed grain.

This paper begins with a discussion of trade agreements between the United States and Canada, the current level of integration of the U.S. and Canadian live cattle and beef markets, and resulting trade in live cattle and beef. In this paper, beef refers to both carcasses and table cuts. It then assesses remaining barriers to market integration.

Provisions of the Canada–United States Free Trade Agreement

When the Canada–United States Free Trade Agreement (CFTA) was implemented in 1989, tariffs on both live cattle and beef were reduced and within a few years many were eliminated. Since tariff reductions were already in place, the implementation of the North American Free Trade Agreement (NAFTA) in 1993 had little impact on trade between Canada and the United States, as the provisions from CFTA were largely incorporated into NAFTA.

Trade in Live Cattle and Beef between Canada and the United States

Although U.S. imports of live cattle from Canada have increased sixfold, imports remain small compared to the size of the U.S. market.

Live Cattle. In 1996, the United States imported 1.5 million head of slaughter and feeder cattle from Canada, nearly a sixfold increase in the number of cattle imported prior to CFTA, which numbered 262,091 in 1987 (see Figure 1). However, live cattle imports are still extremely small compared to the U.S. market, with imports of live cattle in 1996 (carcass weight equivalent) constituting around 4 percent of U.S. beef consumption. Figures 2 and 3 show production, consumption, and trade of live cattle for the United States and Canada. The United States exported 40,722 head of live cattle to Canada in 1996, which is less than 1 percent of 1996 Canadian beef cow inventories. Figure 1 illustrates trade in live cattle between the two countries and changes in tariff regimes. It is likely that changes in the tariffs were not extremely important in determining trade levels, as tariffs were already quite small at the beginning of the CFTA. In 1988, the U.S. tariff on live cattle imports from Canada was 2.2 U.S. cents/kilogram, just 1.4 percent of the import value. The elimination of quotas may have been more important than reductions in tariffs in increasing trade between the United States and Canada. Before the CFTA, each country restricted imports under their domestic meat import laws. With the CFTA, these quotas were eliminated for trade between the United States and Canada.

Figure 1. U.S. and Canadian Trade in Live Cattle

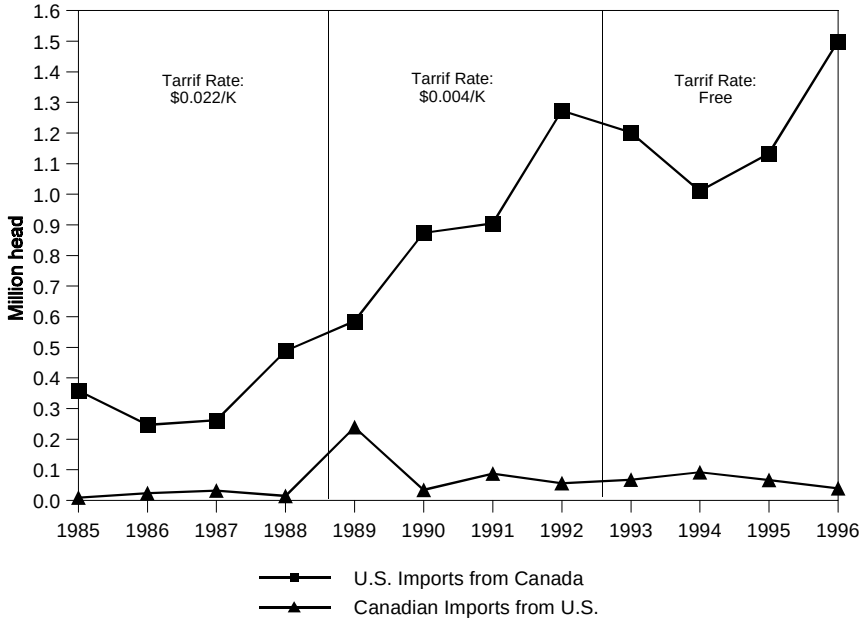


Figure 2. U.S. Production, Consumption, and Trade of Cattle, 1992–1996

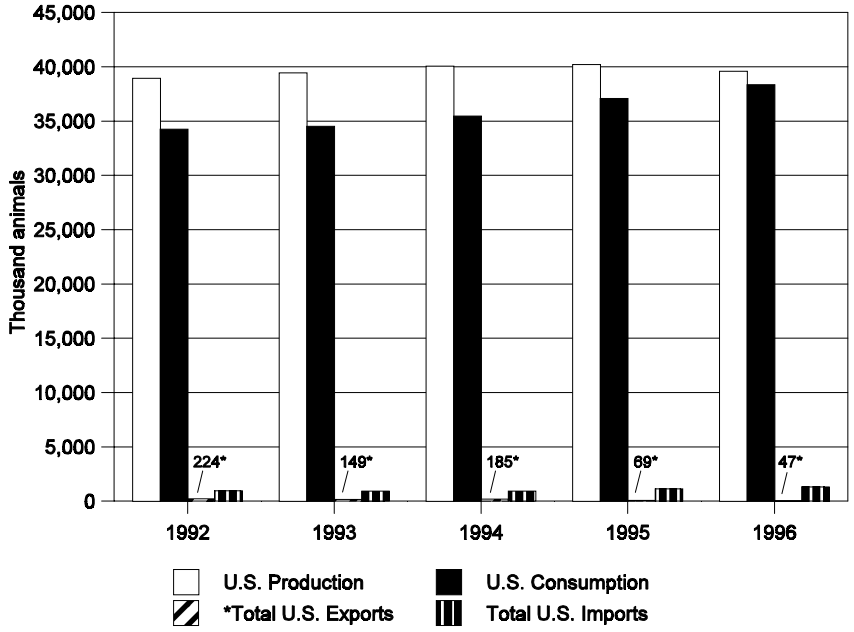
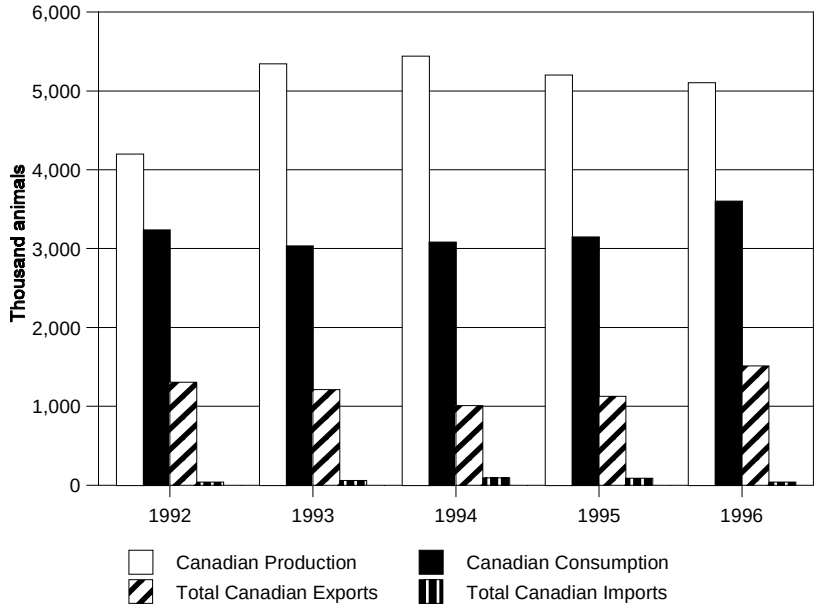


Figure 3. Canadian Production, Consumption, and Trade of Cattle, 1992–1996



Beef. U.S. and Canadian trade in beef is illustrated in Figure 4. U.S. imports of beef from Canada increased from 241 million pounds in 1985 to 586 million pounds in 1996. Even with this increase, imports of beef from Canada equaled just 2.3 percent of 1996 U.S. production. The United States is a much more important market for Canada than vice versa, with 60 percent of Canada's beef exports destined to the United States in 1996,

but only 16 percent of U.S. beef exports destined to Canada. In 1996, 25 percent of Canada's beef production was exported, and imports equaled 23 percent of production. Figures 5 and 6 show production, consumption, and trade of beef for the United States and Canada. Measured in terms of beef production, the U.S. industry is ten times larger than Canada's and is less dependent on trade. In 1996, only 7 percent of U.S. production was exported, while beef imports represented 8 percent of U.S. production.

The United States is a much more important market for Canadian beef than vice versa.

Figure 4. U.S. Boxed Beef Imports from and Exports to Canada, 1985–1996

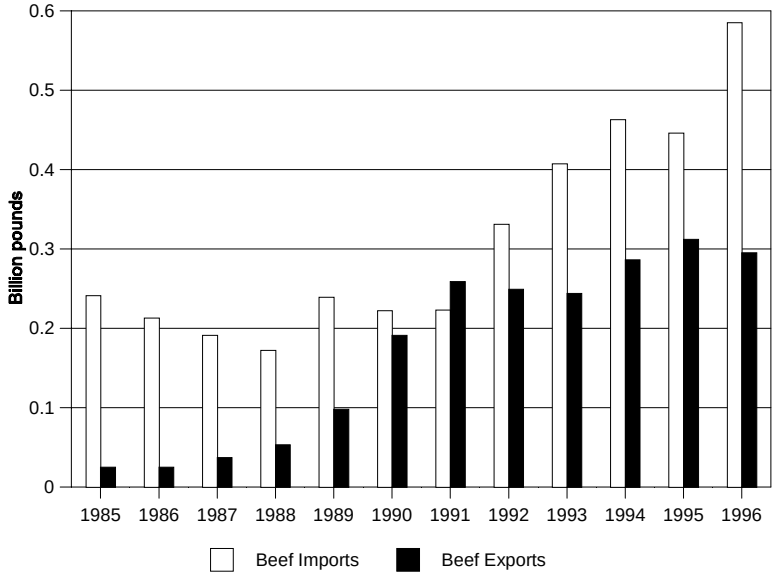


Figure 5. U.S. Production, Consumption, and Trade of Beef, 1992–1996

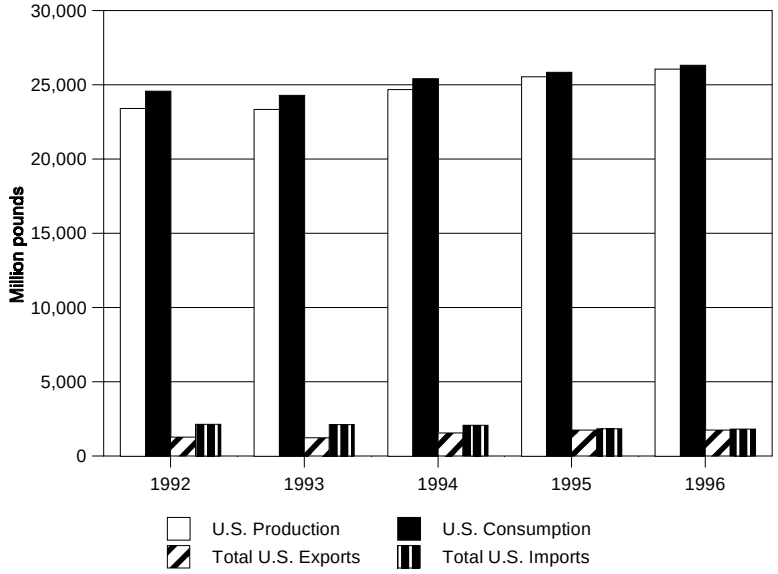
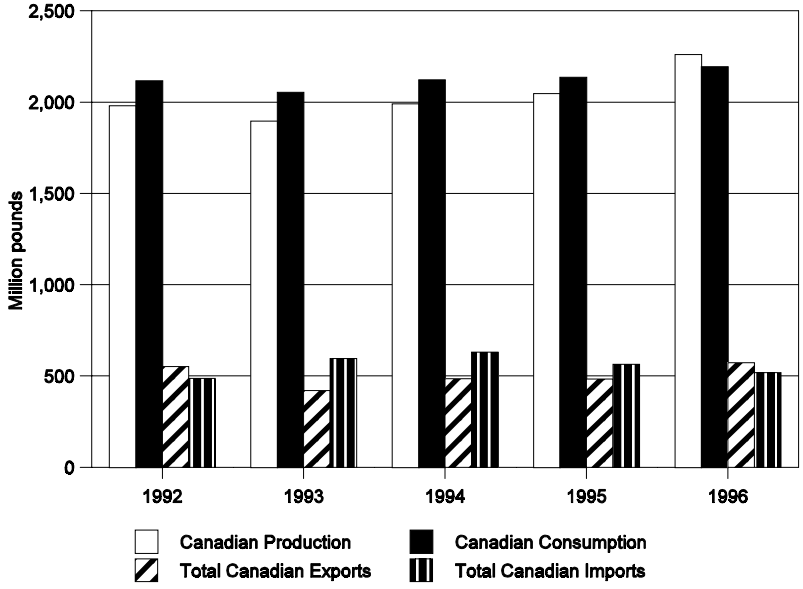


Figure 6. Canadian Production, Consumption, and Trade of Beef, 1992–1996



Trade Patterns. As impediments to trade between Canada and the United States were removed, north-south trade increased. Live cattle have been exported from the western provinces of Canada, particularly Alberta, to otherwise underutilized feedlots and packing plants in the western United States. Leading destinations include the states of Washington, Colorado, and Utah (U.S. International Trade Commission 1997). As the feedlot and packing industries in Alberta expand, it is anticipated that fewer Canadian slaughter cattle will be exported to the United States. In fact, U.S. feeder cattle may be exported to Alberta. More Canadian beef is likely to be exported to the United States and to the Pacific Rim, also a major export market for the United States. Beef is exported from the Midwestern United States into the eastern population centers in Canada. One reason for this long-established trade pattern is the long distance from Alberta to eastern Canada, between forty and fifty hours by road, whereas the Midwestern United States is closer (Hayes, Hayenga, and Melton 1996).

Live cattle have been exported from the western provinces of Canada, particularly Alberta, to otherwise underutilized feedlots and packing plants in the western United States. Beef is exported from the Midwestern United States into the eastern population centers in Canada.

Cattle and Beef Production in the United States and Canada

United States. Cattle are raised throughout the United States; however, cattle operations are concentrated in the western rangelands, the Corn Belt, and the southeastern states where forage is abundant (U.S. International Trade Commission 1997). Between 1992 and 1996, the number of operators (defined as farms having one or more head) declined by 3 percent to 1.2 million. Many of these are family-owned and are part of diversified farming operations. The larger feedlots are concentrated on the West Coast, in the Southwest, and the Southern Plains and account for 83 percent of fed cattle marketings. The slaughter industry is the most highly concentrated, with 812 federally inspected plants in 1996. Four firms accounted for 81 percent of steer and heifer slaughter in 1994.

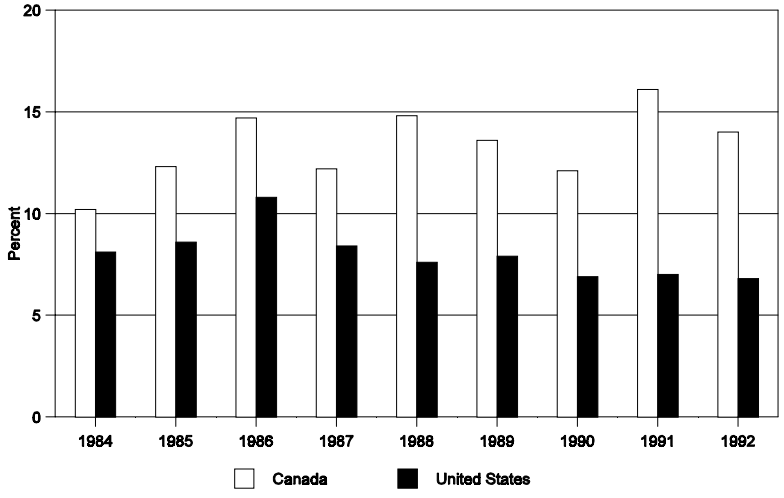
Canada. The western Canadian provinces of Alberta, Manitoba, Saskatchewan, and British Columbia accounted for two-thirds of the Canadian cattle inventory in 1997, with Alberta alone accounting for 38 percent. In 1996, more than one-half of the 276,548 census farms in Canada raised cattle, producing cash receipts of $4.5 billion for cattle and calves (Ducksworth 1997). Expansion of two major cattle slaughtering facilities in Alberta (the Lakeside facility owned by Iowa Beef Processors and the High River facility owned by Cargill) will increase Alberta's slaughter capacity by one-third. The level of concentration of the slaughter industry in Canada is similar to that in the U.S. industry. In 1996, four packing plants (three located in Alberta) accounted for 80 percent of Canadian cattle slaughter (Jewison 1997).

Agricultural Policies Affecting Cattle and Beef Production

Producer subsidy equivalents for Canada are significantly higher than for the United States, at times twice as high, although the level of support for beef and veal is lower than that for other commodities.

This section describes the agricultural policies that have affected beef and veal production in the United States and Canada and discusses trends in government subsidization of the industry. Figure 7 shows producer subsidy equivalents for Canada and the United States for beef and veal for the years 1984 to 1992 (Economic Research Service 1994). Producer subsidy equivalents are the sum of specified government subsidies to the sector as a percentage of commodity receipts. Producer subsidy equivalents for Canada are significantly higher than for the United States, at times twice as high, although the level of support for beef and veal is lower than that for other commodities. Although producer subsidy equivalents are a useful summary measure for comparing the degree of intervention over time, they are acknowledged to be an imperfect measure of subsidization. It is useful to keep in mind that the degree of government intervention, as measured by producer subsidy equivalents, does not address the degree of distortion that these policies cause in production and consumption decisions.

Figure 7. U.S. and Canadian Producer Subsidy Equivalents for Beef and Veal, 1984–1992



Beef and Veal Production. Many U.S. and Canadian policies affecting beef and veal production are similar, and subsidies measured in the producer subsidy equivalents are shown in Table 1. Both the United States and

Canada protect their domestic industries through tariffs, although this protection will decline moderately with the implementation of the 1994 Uruguay Round Agreement (World Trade Organization 1995). Both countries subsidize their industries through provision of inspection services, research and advisory programs, and marketing and promotion programs, although the importance of these government policies varies between countries. In Canada, meat grading was privatized in 1996. The Canada Beef Grading Agency performs this function and is a nonprofit corporation that operates on a cost recovery basis. In addition, both countries have allowed their cattle industries to use federal lands for grazing at prices that are less than market value.

Both countries subsidize their industries through provision of inspection services, research and advisory programs, and marketing and promotion programs, although the importance of these government policies varies between countries.

Table 1. Composition of U.S. and Canadian Producer Subsidies, 1984–1992

Canada		United States	
---------- Average Percentage Shares[1] ----------			
Feed Freight Asst. Program	1	Advisory	3
Marketing and Promotion	6	Pest and Disease Control	3
Development	9	Grazing Feed	3
ASA/Tripartite Payments	9	Beef Purchases	3
WGTA Offset Programs	10	Taxation	7
Tariffs	10	Research	8
Research, Advisory	12	Inspection	10
Inspection Services	17	Farm Credit	18
Provincial Programs	28	State Programs	19
		Tariffs	23

Source: Economic Research Service.

[1]Totals may not add to 100% due to rounding.

Canada has eliminated a number of programs previously used to assist the beef industry. The National Tripartite Stabilization Program, an insurance program funded by the Canadian federal and provincial governments and producers, was eliminated in 1995 (Huff 1997). This program included two agreements for cattle: the cow-calf agreement and the slaughter cattle agreement. The major objective was to stabilize the receipts of participating beef producers by providing payments when the national average market price for beef fell below a calculated support price (U.S. International Trade Commission 1993).

In August 1995, the Canadian federal government eliminated transportation subsidies for Canadian grain bound for export. This grain freight subsidy is not included in Table 1, which details subsidies for cattle and beef. However, programs used to offset distortions caused by grain transportation subsidies, including the Western Grain Transportation Authority Offset Program, the Feed Freight Assistance Program, and the Alberta Crow

Benefit Offset Program were eliminated either prior to or concurrent with the grain transportation subsidies.

Currently, the Net Income Stabilization Account is the only program providing whole farm net income stabilization, which affects both grain and cattle producers. However, the province of Alberta, which accounts for 60 percent of beef cattle production, has opted out of this program. It uses a separate program to stabilize farm incomes, the Farm Income Disaster Program (Govindasamy 1997).

The United States does not have a regular program of income support for stockgrowers. The United States does have several programs that promote beef exports. The U.S. Meat Export Federation is funded by industry and federal funds and promotes all U.S. meat exports. U.S. federal programs guarantee credit to importers, and market development programs provide a small level of assistance to U.S. meat exports (Ackerman, Smith, and Suarez 1995). To the extent that export promotion programs result in higher U.S. market prices, they may also increase U.S. imports of live cattle and beef from Canada.

Government intervention in the beef sector has been reduced over the last ten years, particularly in Canada which had much larger support programs. The programs remaining in Canada and in the United States have many similarities and are not likely to distort markets to a significant degree.

In conclusion, government intervention in the beef sector has been reduced over the last ten years, particularly in Canada which had much larger support programs. The programs remaining in Canada and in the United States have many similarities and are not likely to distort markets to a significant degree.

Feed Grain Policies and Marketing. The United States and Canada have each had numerous and quite different policies affecting the production of feed grains. In the United States, implementation of the 1996 Federal Agricultural Improvement Act (FAIR ACT) largely eliminates the linkage between planting decisions for grains and government payments to producers. This should increase the responsiveness of U.S. feed grain supply to price signals (Smith and Glauber 1997). The United States has not used export subsidies for grains since July 1995. Although export subsidies for wheat were more prevalent than those for barley, both resulted in an increase in the U.S. price of feed grains (Gray, Becker, and Schmitz 1995).

The Canadian government has delivered farm income support for grain producers through several programs and has made three ad hoc payments to grain producers. Currently, the only direct income support program is the Net Income Stabilization Account (NISA). Due both to the nature of NISA and its small size, it probably has a very small impact on grain production (Gray and Smith 1997). More pertinent for the livestock industry is the removal of transportation subsidies for grains, which is expected to decrease the price of feed grains in the prairie provinces and has been one factor behind the recent expansion in the feedlot and packing industries in Alberta. In a broad assessment of policies affecting grains, including income support, price policies, land retirement, and crop insurance, Gray and Smith note that the "pattern of reduced intervention in both countries has led to considerable economic convergence in grains and oilseeds programs implemented in the two countries."

However, an important and contentious difference continues to exist in grain marketing. In Canada, the Canadian Wheat Board (CWB) has the sole authority to export wheat and barley. Thus, wheat and barley sales to the United States are determined by the CWB. The CWB also controls the sale of wheat and barley for human consumption in the Canadian domestic market. The single-desk seller status of the CWB is a controversial issue within Canada and has been the subject of producer referendums, recent court cases, and an investigation by a federally appointed commission.

Removal of the single-desk seller status of the CWB could influence feed grain prices both in Canada and in the United States. In the United States the price impact would be extremely small, due to the size of the feed grain market.

Removal of the single-desk seller status of the CWB could influence feed grain prices both in Canada and in the United States and the quantity of feed grains exported from Canada to the United States. Empirical economic analyses of this question have reached different conclusions.

The question addressed by the following studies concerns the impact of the removal of the single-desk seller status of the CWB. Although the consequences are much broader, only the price impacts on feed grains and Canadian export volumes to the United States are considered here. Schmitz et al. (1997) find that the price of feed barley would decline in the prairies provinces on average by CA$3.52/mt, a decline of about 2 percent (based on the Winnipeg 1995–1996 average price for western feed barley of CA$168). Schmitz et al. estimate that export sales of feed barley by Canada would *decrease* by an average of 500,000 tons and that Canadian feed barley consumption would, on average, slightly increase.

Both Carter (1993) and Johnson and Wilson (1995) conclude that exports of feed barley from Canada to the United States would *increase* if the authority of the CWB to control exports was removed. This would decrease U.S. feed prices, but the decrease would be extremely small. Carter finds that the price of feed barley would decrease in Canada as well, with the likely implication that more would be consumed by the Canadian livestock industry.

The U.S. livestock industry has expressed concern over the single-desk seller status of the Canadian Wheat Board (National Cattlemen and Beef Association 1997). The U.S. National Cattlemen and Beef Association asked the Canadian Cattlemen's Association to help alleviate barriers prohibiting U.S. producers from directly purchasing barley from Canadian barley growers. They believe that Canadian barley is cheaper because of the single-desk seller status of the CWB, which provides Canadian cattle feeders with a $60 per head advantage on finishing costs. If this estimate is accurate, it would translate into a production cost advantage of $5.00/hundredweight for a 1,200 pound slaughter steer.

Although empirical findings are dissimilar, the impact of a change in the level of imports of feed wheat and barley is likely to be extremely small, due to the size of the feed grain market in the United Sates. For Canada, if barley prices declined as estimated in Schmitz et al., Canadian livestock production is estimated to increase by 2.4–4 percent if offsetting factors do not occur.

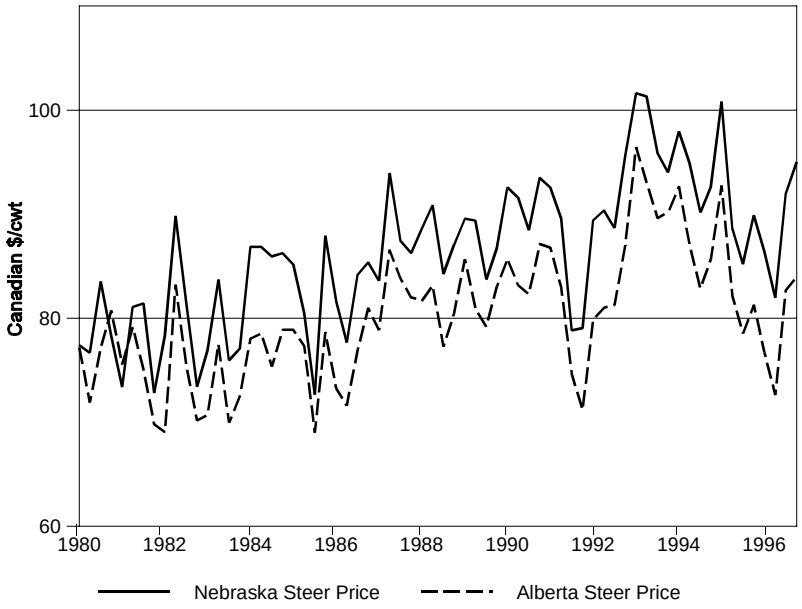
Degree of Market Integration

Prices for slaughter cattle in the United States and Canada are illustrated in Figure 8. The data show that they move together and have the same turning

points. Due to the large size of the United States market relative to Canada, it is commonly argued that cattle and beef prices are determined in the U.S. market, with Canadian prices reflecting differences in exchange rates and transportation costs.

Due to the large size of the United States market relative to Canada, it is commonly argued that cattle and beef prices are determined in the U.S. market, with Canadian prices reflecting differences in exchange rates and transportation costs.

Figure 8. U.S. and Canadian Slaughter Prices, 1980–1996



A statistical analysis of U.S. and Canadian slaughter prices was performed to further investigate this price relationship. U.S. slaughter prices were found to be an extremely important determinant of Canadian slaughter prices. This analysis could not be performed on beef prices due to lack of Canadian data (Dunford 1997).

The previous discussion of feed grain policies in the United States and Canada indicate that institutional barriers exist between these markets. The same empirical analysis was performed on Canadian feed barley prices and U.S. feed barley prices (converted into Canadian dollars). A weaker relationship was found between U.S. and Canadian barley prices. The statistical analysis indicates that other variables are needed to explain the price of barley in Canada, probably due to institutions that have prevented market integration.

Regulatory Policies Affecting Market Integration

This section discusses regulations, including border, food safety, and meat grading regulations that are important to the sector.

Changes in Border Regulations. Integration of the Canadian and U.S. live cattle markets could be facilitated by a pilot project started in October 1997 to reduce sanitary regulations at the border. Sanitary requirements are of greater relative importance since the decline of other barriers to trade. Industry leaders from the province of Alberta and the states of Montana and Washington have promoted this change to make it less costly to move

cattle across the border in either direction. Due to the expansion in the feedlot and packing industry in Alberta, it is anticipated that Alberta may import feeder cattle from northern tier states in the United States.

The pilot project eliminates testing for anaplasmosis, brucellosis, and tuberculosis for feeder cattle from Montana and Washington imported into Canada for the period October 1 through March 31 (Young and Marsh 1997). There are strict identification requirements for feeder cattle imported under the pilot program, and these cattle cannot commingle with the Canadian herd. The United States eliminated federal test requirements for brucellosis and tuberculosis for Canadian cattle as part of the Animal Health and Plant Inspection Services (APHIS) regionalization initiative. Montana and Washington states also eliminated their brucellosis vaccination requirements for imported animals. Exports of cattle from Montana to Canada under the Pilot Project have been extremely small to date. Negotiations are underway to change Canadian feedlot protocols on cattle imported under the project.

This pilot project is indicative of the kinds of changes that are likely to occur due to the Sanitary and Phytosanitary Agreements of both the Uruguay Round Agreement (URA) and NAFTA. These agreements are roughly similar. One new concept is that sanitary restrictions should be based on regions, not countries, when a disease is limited to, and can be confined within, a region. This regionalization concept, which is being advanced by APHIS, applies to brucellosis, the incidence of which differs by state in the United States. For example, Montana has a very low incidence of brucellosis, and its proximity to Canada makes it appropriate for implementation of the pilot project.

Stricter scientific criteria for sanitary regulations were implemented in recent trade agreements.

The implementation of the pilot project may have a small but positive impact on the beef industry. If it achieves a significant reduction in the costs of sending animals across the border, it will facilitate packer procurement of animals within a least-cost distance of their plants without reference to national borders. A reduction in net U.S. imports of live cattle from Canada due to Canadian feedlot and packing expansion would also mitigate the demands for protection in the United States.

The Sanitary and Phytosanitary Agreements of NAFTA and the URA also mandate that a country's regulations must be based on science and can be challenged if the regulations do not meet international standards. The implementation of these rules will have both costs and benefits for the industry. However, both Canada and the United States increasingly depend on export markets. A recovery in consumer confidence in livestock products may be facilitated by stricter implementation of sanitary rules based on scientific criteria rather than politics. Increased demand for livestock products in countries such as Japan and Korea would have a positive impact on prices in Canada and the United States.

Meat Grading Regulations. Mutual recognition of the equivalency of U.S. and Canadian meat grading systems has not occurred. Although the systems are similar, some differences do exist. For example, the marbling

standards for USDA Choice and Select are identical to those used in the Canadian AAA and AA grades respectively. However, differences exist between U.S. and Canadian grade standards in terms of maturity, meat color, muscling, and fat (Canadian Beef Grading Agency 1997).

Lack of grading system equivalency has ramifications for U.S.-Canadian trade in beef, and the impacts were described and estimated by Hayes et al. in their 1996 study. Canadian packers are forced to sell beef at greatly reduced prices in the United States, commonly called "no-roll prices," due to the lack of a USDA stamp. However, Canadian carcasses can be imported into the United States, fabricated, and receive USDA grades. This has resulted in lower boxed beef exports to the United States and higher exports of carcasses than would occur with grade equivalency.

If grading barriers were removed, western Canada would export approximately 27,000 additional tons of beef to the United States, primarily boxed middle cuts of select and choice beef. Canadian packers sell more beef than they would otherwise to eastern Canada because of the large discount on sales to the United States.

Mutual recognition of the equivalency of the U.S. and Canadian meat grading systems has not occurred.

The same is true for U.S. packers. Because U.S. beef cannot be sold into the eastern Canadian market without a large reduction in price, the U.S. beef industry is deprived of a lucrative outlet for the lean beef that is preferred in eastern Canada. Hayes et al. estimate this cost to be equivalent to a 5 percent tax on U.S. beef that is exported to Canada.

Food Safety Regulations. The U.S. Department of Agriculture recently implemented new regulations, the Hazard Analysis Critical Control Points (HACCP), for meat and poultry processing and slaughter plants. HACCP is a system that identifies specific hazards that adversely affect the safety of food and identifies preventative measures for hazard control. All state and federally inspected meat and poultry slaughter and processing plants must have such a plan. Testing for salmonella on raw meat and poultry products and for generic *E. coli* on carcasses will be used to monitor effectiveness of the HACCP plan (Antle 1995; Crutchfield et al. 1997).

Implementation dates for HACCP are based on plant size. Large plants, defined as those with 500 or more employees, are now required to test for *E. coli.* Other aspects of HACCP will be phased in; plants with 11–499 employees will be required to begin in January 1999, and plants with fewer employees will begin in the year 2000.

Research is currently being conducted on the impact of these food safety regulations on the cost structure of the U.S. industry (Antle 1997). Imposition of HACCP regulations is likely to increase the costs of the U.S. industry. If an equivalent set of regulations is not imposed on the Canadian industry, the U.S. industry may suffer a competitive cost disadvantage, with a resulting change in trade patterns. However, if U.S. meat industry gains a reputation as producing a safer product, this competitive disadvantage could be mitigated.

Industry Marketing Initiatives

The Canadian Cattlemen's Association is developing a national cattle identification system (Grogan 1997). The purpose of the system is to track the original source of an animal over its lifetime. Although the technology is still being developed, it may take the form of a small computer chip placed in the animal. Concerns over food safety, particularly those expressed by customers in Asian markets, have prompted this initiative to identify and correct the sources of disease.

The Canadian industry has also implemented a system to increase the accuracy of payments for quality characteristics of beef, a system called value-based marketing. For example, Western Feedlot in High River, Alberta, has a program with Cargill in which producers receive an initial payment based on 95 percent of the current calf market. After slaughter and grading, producers are paid premiums based on carcass quality. This system is new, and variations are being tried throughout Canada and the United States. Actions by the industry are indicative of the high degree of integration that exists in the live cattle market. Efforts have been made to launch a producer-owned beef processing and marketing cooperative named Northern Plains Premium Beef (Tjaden 1997). Although this cooperative is based in North Dakota, it has members from Canadian provinces.

The Canadian industry is developing a national identification system for cattle.

Conclusions: Interdependence and Integration

Evidence indicates that the live cattle and beef industries of the United States and Canada are well integrated. Quotas and tariffs no longer restrict trade, and border sanitary restrictions are being reduced. Trade in both directions has increased since the implementation of the Canada-U.S. Free Trade Agreement. U.S. and Canadian slaughter cattle prices are closely related. Distortions caused by domestic policies affecting the beef sector still exist but have been significantly reduced over the past ten years, particularly in Canada.

The grain marketing system in Canada prevents free movement of feed wheat and barley across the border. However, the impact of this institutional barrier on the livestock industry is likely to be small.

Although trade barriers have decreased in importance, differences in domestic regulations exist. Lack of equivalency in meat grading between the United States and Canada distorts trade flows between these countries and increases the quantity of Canadian exports of carcasses relative to beef. The implementation of new safety regulations in the United States, namely HACCP, may also affect trade by increasing costs in the U.S. industry.

The increasing level of integration in Canadian and U.S. cattle and beef markets has been accompanied by a corresponding increase in their interdependence. This interdependence has a number of ramifications. Policymakers in both countries must recognize that domestic and export policies need to account for open borders between the two countries. This severely limits the choice of policies available to achieve a particular

policy goal. In addition, the government must continually defend the integrity of free trade agreements from domestic interests who argue for protection. In the United States, there have been two recent investigations by the U.S. International Trade Commission on the impact of trade agreements on the level of imports, and thus on domestic prices.

There are positive aspects to interdependence as well. With open borders, industries on each side must be aware of innovations in marketing, including value-based marketing, identity preservation, and methods to add value to products. Transportation costs will always limit the choice of packers that producers can sell to. However, within these bounds, a single market increases options for producers.

The beef industries in both the United States and Canada are increasingly dependent on export markets, particularly the Pacific Rim. Income growth and dietary changes toward more animal-source proteins will increase this dependence. Since the late 1980s, the United States has exported increasing amounts of choice and prime grade beef, particularly to Japan. However, Canada desires to seize opportunities here, perhaps more in terms of lean beef, as Asian consumers have increased their demand for lean beef. Thus, both countries have a mutual interest in increasing access to third country markets. This is partially motivated by declining per capita consumption of beef in U.S. and Canadian domestic markets.

For cattle and beef, the lack of trade barriers and relative unimportance of government intervention in the sector have facilitated the creation of a single market.

Due to the relative size of the U.S. and Canadian markets, the interdependence between them is not equal. The Canadian industry has a higher degree of dependence on the U.S. market for its exports than vice versa and is vulnerable because the U.S. market is the major force in price determination.

Integration of U.S. and Canadian live cattle and beef markets is well advanced, and it is perhaps the most integrated market of the major agricultural commodities. Supply management of the Canadian dairy, egg, and poultry industries and the implementation of high tariffs after the removal of quotas have prevented integration in those markets. For grains, marketing institutions and systems in Canada prevent complete market integration. For cattle and beef, the lack of trade barriers and relative unimportance of government intervention in the sector have facilitated movement toward a single market.

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