Role and Impact of Renewed Canada-US Trade in Dairy Heifers and Dairy Breeding Stock

Al Mussell and Graeme Hedley

GEORGE MORRIS CENTRE

Don Ault and David Bullock

informa economics
an AGRA informa company

February, 2006

EXECUTIVE SUMMARY

The purpose of this study was to determine economic effects of Canada-US trade in dairy cattle, and to provide an assessment of the impact of the border reopening to dairy cattle trade. To meet this purpose, the following was undertaken. First, the markets in dairy heifers and breeding stock in the two countries were profiled to establish the relative magnitudes of dairy cattle markets in the two countries and the trends that existed prior to and since the Canadian case of BSE. Secondly, consultations were conducted with US and Canadian industry participants to understand how the market conditions have changed since the border closure, and what the anticipated effects would be of the border reopening. Finally, a statistical analysis of the market dynamics of dairy replacement heifer pricing in the US are assessed by collecting and empirically analyzing data on the factors that influence US dairy heifer prices.

The following findings were evident from the analysis:

- Prior to the border closure in May, 2003 the Canadian inventory of dairy heifers was steady at around 500,000 head. Since the border closure, inventories have increased to around 525,000 head.
- Data on cull rates in eastern Canada suggest that the maximum proportion of the heifer inventory that would be available for export is around 20%. In other words, not accounting for dairy expansions or cow mortalities, 80% of the Canadian heifer inventory is needed for replacements in Canada.
- Because the dairy market in Canada is supply managed, the Canadian dairy cow herd is stable to slightly decreasing. This makes the inventory of dairy heifers stable at around 500,000 head.
- Dairy heifers are held by dairy farmers, specialized heifer raisers, and mixed dairy/beef enterprises. The specialized dairy heifer raising business is unique to Ontario and Quebec. The bulk of heifers exported, particularly the commercial breeding cattle, come via dairy heifer raisers. Data from Ontario and Quebec suggest that heifer raisers held relatively fewer heifers after the May, 2003 case of BSE, and relatively more heifers were held by dairy farmers and dairy/beef enterprises. The number of farms in the heifer raising business has declined.
- The US dairy heifer inventory has been steady in recent years in the range of 4 million head. At its height in 2002, US imports of Canadian dairy heifers numbered 65,000 head, or about 1.6% of US dairy heifer inventory.
- According to US dairy producers and cattle dealers, most value the quality and relative sturdiness of Canadian cattle. However, past purchases of Canadian cattle by the US have been dependent on the demand/shortage of dairy heifers in the US, the price of Canadian dairy heifers, and the Canada-US currency exchange rate.
- Most US producers and dealers believe that the border closure to trade in dairy breeding animals is inappropriate and should removed. A minority of producers supported the border measure, and connected the border closure with increased milk prices.

- The former dairy cattle exporters in Canada largely validated the market factors identified by US producers and dealers in influencing purchases of Canadian cattle. Most said that Canadian cattle were perceived by US customers to be of premium quality, but that heifer pricing and (especially) the exchange rate were critical factors driving sales to American customers in the past.
- Former Canadian exporters also agreed with American producers and dealers that if the border opened immediately to trade, time would be required before meaningful trade resumed. In particular, former Canadian exporters indicated that the capacity to custom raise, transport, and inspect dairy heifers is greatly diminished relative to May, 2003. Many of the individuals and organizations engaged in exporting dairy cattle to the US are out of business, have converted facilities to milk production, or have gone into another line of business.
- The empirical analysis of past market data as it relates to the impact of US imports of Canadian dairy cattle produced surprisingly clear conclusions. First, it is evident that US heifer prices have the effect of pulling Canadian cattle into the US market. This is evident from the positive relationship that exists between US imports of Canadian cattle and US heifer prices.
- A positive relationship was also observed between the US milk-feed price ratio and US dairy heifer imports from Canada, which suggests that enhanced profitability in US milk production supports demand for dairy heifers. No relationship was found to exist between US imports of Canadian dairy heifers and US milk prices.
- US imports of dairy heifers from Canada exhibited a strong relationship with the exchange rate. Clearly, as the Canadian dollar weakened relative to the US, US imports from Canada increased. The data from 2003 were truncated by the border closure, so evidence regarding the impact of the strengthening Canadian dollar less clear.
- An empirical investigation was completed as to the direction of causation of US imports from Canada in US dairy markets. The results showed that imports from Canada had no statistically significant impact on the US dairy cow herd. Imports of dairy heifers from Canada also had no statistically significant impact on heifer prices in the US, nor on US milk prices. These findings were robust to a wide range in potential time lags tested in the analysis of causation.

The findings show that, prior to the May 2003 case of BSE in Canada, essentially one integrated North American market existed for dairy cattle. The US imported dairy cattle from Canada based on demand, price, exchange rates, and preferences for premium quality. The effects of imports of dairy cattle from Canada were insignificant (as shown by the empirical results) relative to the US cow herd, US dairy heifer prices, and US milk prices.

The situation is markedly different today. Much of the productive capacity for raising dairy heifers for export has been lost, heifer raisers hold relatively fewer heifers, and the infrastructure that facilitated dairy heifer exports has declined. Many of the individuals and businesses operating in the Canadian dairy heifer export business have gone out of business or shifted into other activities. Current exchange rates are less favorable for Canadian

exports of dairy cattle than they were prior to BSE. Thus, market participants on both sides of the border anticipate that it would take time for trade to resume following a border opening, and are uncertain as to whether it could recover to its former level.

TABLE OF CONTENTS

1.0 Introduction and Background

Under the current BSE-influenced trade environment, trade in dairy cows and replacement heifers has ceased. This stands in sharp contrast to trends in recent years in which Canadian exports of dairy breeding stock to the US increased markedly in both volume and relative value. This trend ended abruptly in May, 2003.

In the interim, the US dairy industry has been forced to rely on US dairy replacements. This market reality has persisted for the last thirty months. However, the USDA has recently announced a process that could result in the Canada-US border reopening to trade in live cattle over 30 months of age, and presumably to Canadian replacement heifers. The process for opening the border to dairy breeding animals over 30 months of age relative to slaughter cattle under 30 months is still evolving.

However, the specific impact of the border reopening for dairy heifers and breeding animals on the North American market in dairy cows and replacement heifers is uncertain. A better understanding in this regard will create a more informed dialogue as discussions on the border reopening occur.

1.1 Purpose and Objectives

The purpose of this study is to determine the economic effects of Canada-US trade in dairy cattle, and to provide an economic assessment of the impact of the border reopening to dairy cattle trade.

The objectives of this project are:

- To provide an understanding of the magnitudes and historic trade flows in dairy heifers and breeding stock in the US and Canada
- To determine the nature of the demand for dairy cows and heifer replacements in the US market
- To determine the nature of the supply of dairy cows and replacement heifers in the US dairy industry, and what role imports from Canada have played
- To assess how conditions in the dairy industry and dairy cow/heifer markets in the US and Canada have changed since the border closure

1.2 Methods and Approach

This study is conducted in three phases. In the first phase, the markets in dairy heifers and breeding stock in the two countries were profiled. This establishes the relative magnitudes of dairy cattle markets in the two countries, the trends that existed prior to the first Canadian case of BSE in May, 2003, and the historic levels of trade between the two countries and between Canada and the US and third countries. In the second phase of the study, interviews were undertaken with US and Canadian industry participants to understand how the market conditions have changed since the border closure, and what the anticipated effects would be of the border reopening. In the third phase, the detailed market dynamics of dairy replacement heifer pricing in the US are assessed by collecting and empirically analyzing data on the factors that influence US dairy heifer prices.

1.3 Organization of the Report

Section 2 below provides an empirical description of the dairy industries in the US and Canada. Section 3 provides a discussion of consultations conducted with producers and livestock dealers in the US and Canada related to this issue. Section 4 provides an empirical analysis of the market impacts of past trade in dairy heifers between the US and Canada. Section 5 concludes the report.

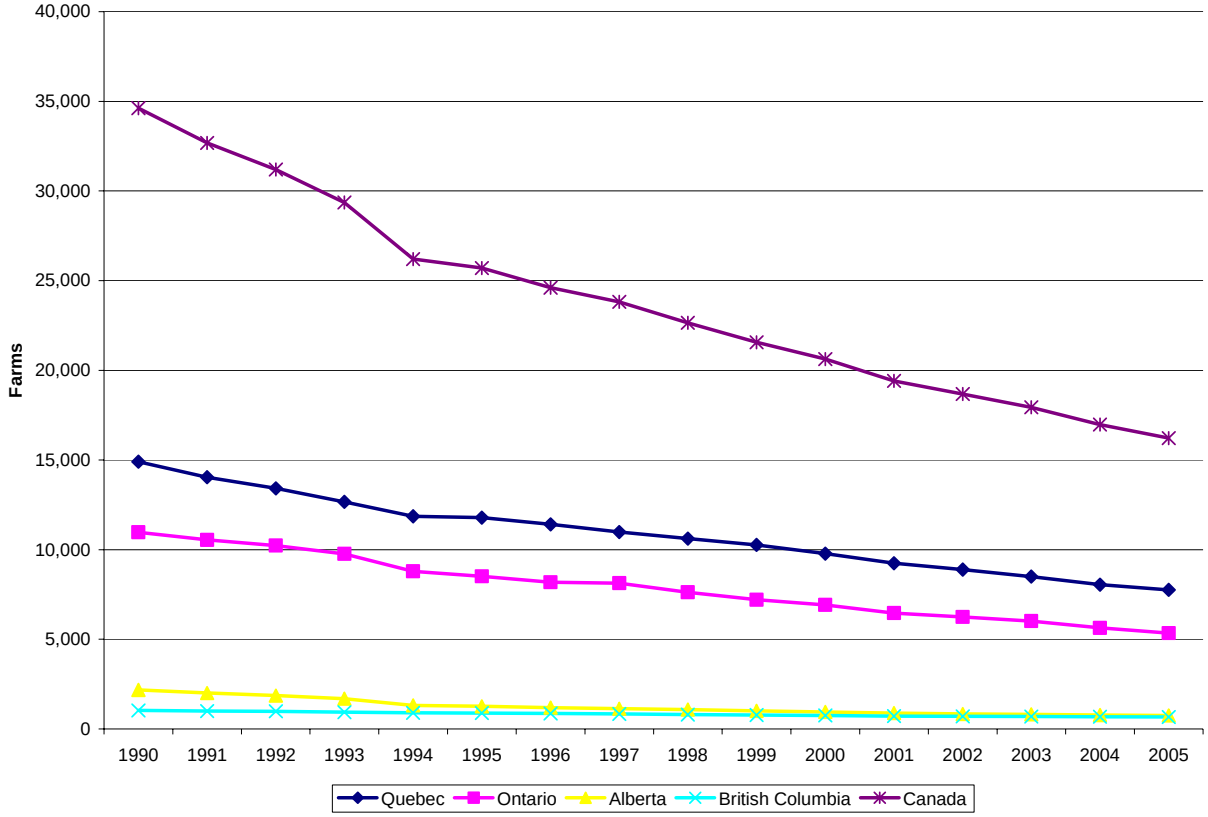
2.0 Demographics of the Canadian and US Dairy Industries

The Canadian and US dairy industries existed in a long trading relationship in dairy breeding stock and replacement heifers prior to the discovery of BSE in Canada in 2003. An understanding of the demographics of the two industries and the historic trade between them is important in developing expectations as to the dynamics that are likely to occur following a border opening. Section 2.1 below provides a demographic description of the Canadian dairy herd. Section 2.2 provides a demographic description of the US dairy herd. Section 2.3 provides a review of historic trade in dairy breeding stock and heifers. Section 2.4 makes observations on historic demographics and trade.

2.1 Demographics of the Canadian Dairy Herd

The Canadian dairy industry is a central-Canada focused industry. This is illustrated in Figure 2.1 below. There are just over 16,000 dairy farms in Canada, almost half of which are located in the province of Quebec. Approximately 5300 dairy farms are located in Ontario, with most of the balance of the reminder in Alberta and British Columbia.

Figure 2.1 Farms With Shipments of Milk or Cream, Canada and Top 4 Provinces

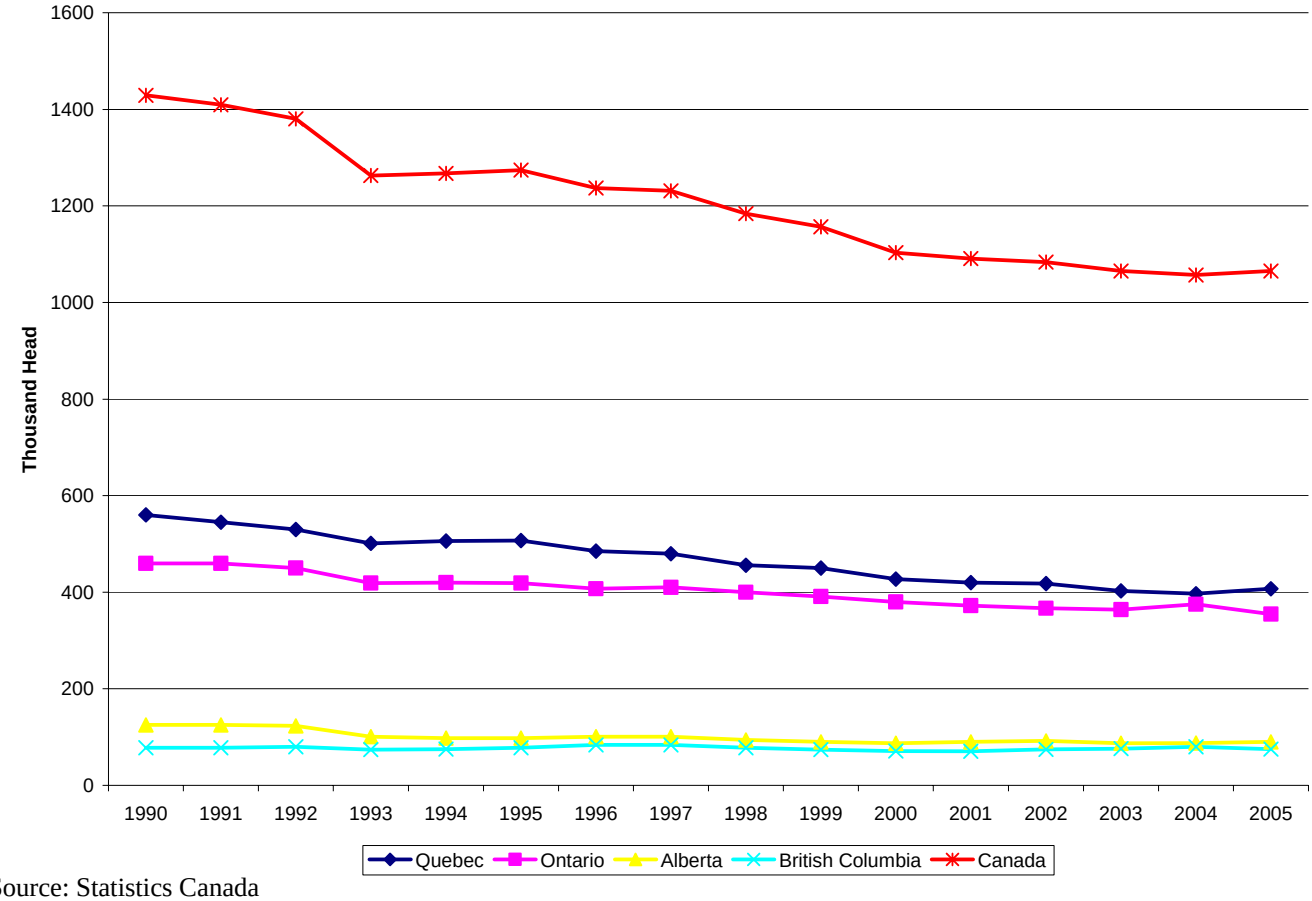


Source: Canadian Dairy Commission

There are currently just over 1 million head of dairy cows in Canada. The distribution of dairy cows is largely consistent with the distribution of farms observed above, as illustrated in Figure 2.2 below. The figure shows that the majority of dairy cows are in Quebec, Ontario, Alberta, and British Columbia. Quebec has proportionately somewhat fewer dairy cows relative to the number of farms, due to a structure of relatively small farms. Quebec and Ontario each have dairy herds of close to 400,000 head. Alberta has just under 90,000 head of dairy cows, and British Columbia has about 80,000 head.

Figure 2.2 also makes clear the trend in the Canadian dairy cow herd. As recently as 1990, the Canadian dairy herd exceeded 1.4 million. Since 1990, the dairy herd has been in steady decline, and now numbers just over 1 million head. The largest proportional declines in the dairy herd since 1990 have been in Alberta and Quebec.

Figure 2.2 Dairy Cow Inventory, Canada and Top 4 Provinces, January 1 Inventory

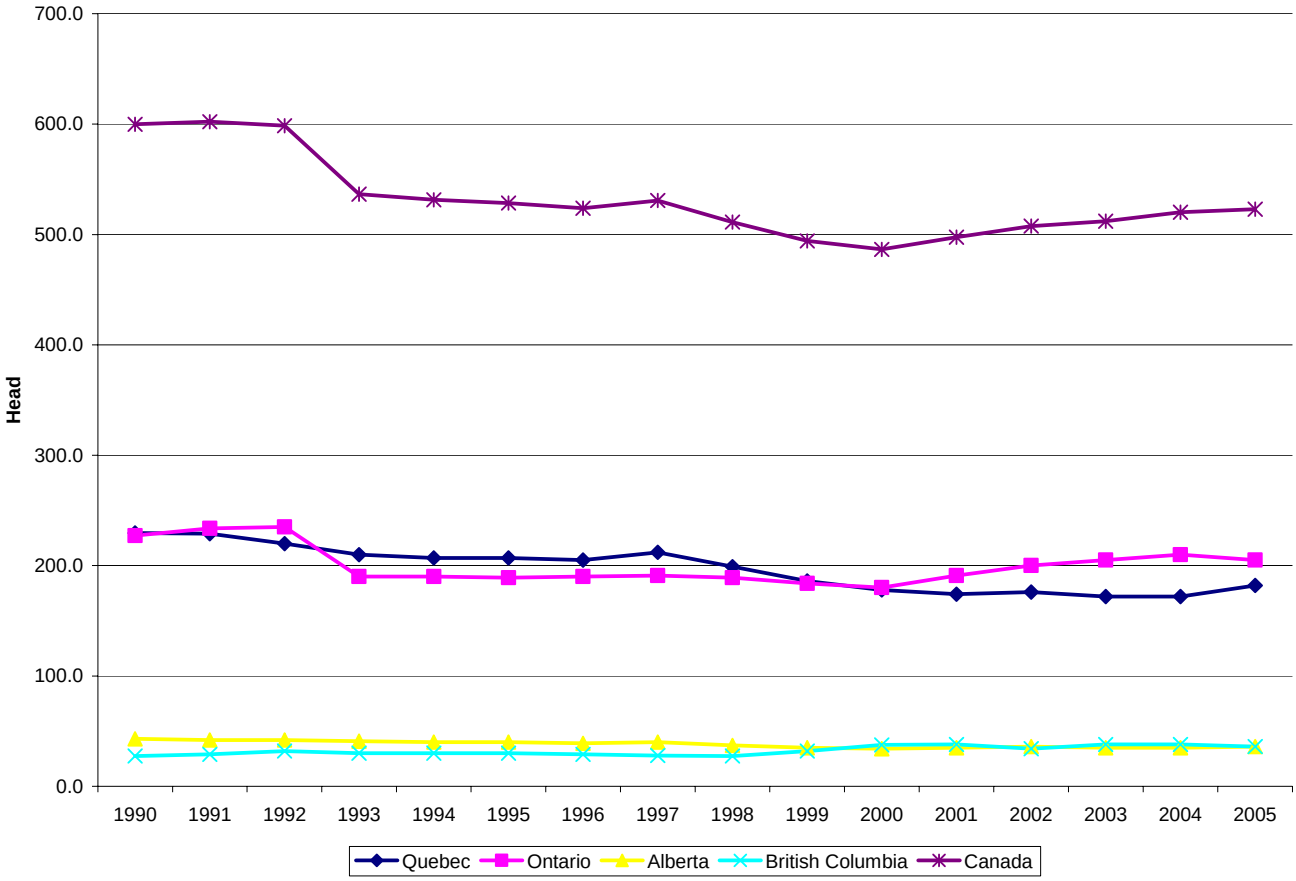


Source: Statistics Canada

Figure 2.3 below presents the trends in the Canadian dairy heifer population. The figure shows that, consistent with the dairy cow herd, the Canadian heifer population has been in long run decline. In 1990-91 there were around 600,000 dairy heifers in Canada. This has since declined to less than 500,000, and then recovered to about 523,000.

Since 2000, Ontario has had the greatest number of dairy heifers in Canada, surpassing Quebec. The regions with the next largest heifer populations are Alberta and British Columbia.

Figure 2.3 Canadian Dairy Heifer Inventory, January



Source: Statistics Canada

To put the Canadian heifer inventory in context, the apparent domestic consumption of Canadian heifers must be understood. One measure of Canadian consumption of Canadian dairy heifers is the cull rate. The cull rate measures the number of cows farmers remove from the herd, as a proportion of the herd size. In a supply managed market, in order to maintain a constant milk supply in the immediate term, culled cows must be replaced. Thus, not accounting for increases in milk production per cow and the effect of farm expansions, domestic heifer consumption is equal to the cull rate.

The implication of this is presented in Table 2.1 below. The table shows that according to dairy herd improvement records, since 2000 the effective cull rate has ranged between 34% and 41%. The cull rate multiplied through by the Canadian cow inventory provides a rough estimate of the consumption of Canadian dairy heifers as replacements. When compared with the heifer inventory, the data suggest that use as dairy replacements in Canada explains around 79% of recent heifer inventories. The remainder are either used in dairy expansions

or other dairy uses in Canada, slaughtered in Canada or the US, or are exported to the US as dairy replacements.

Table 2.1 Cull Rate and Implied Domestic Heifer Consumption

	Dairy Heifer Inventory (Thousand)	Dairy Cow Inventory (Thousand)	Cull Rate*	Domestic Heifer Consumption (Thousand)	Implied Domestic Consumption Rate
2000	490.3	1,103.40	38%	424.8	87%
2001	507.4	1,091.00	36%	389.0	77%
2002	510.2	1,083.90	38%	407.4	80%
2003	510.1	1,065.30	34%	359.6	70%
2004	524.5	1,077.10	41%	437.5	83%
Weighted Average					79.4%

*Source: CanWest DHI, Ontario averages.

2.2 Structure of Canadian Dairy Heifer Inventories

The structure of the Canadian dairy and dairy heifer industries in Canada impacts the interpretation of the above data. Based on Statistics Canada reporting, dairy cows are female dairy animals that have had a calf. Dairy heifers are reported as female dairy animals over one year of age that have not calved. Female dairy animals under one year of age are classified by Statistics Canada as calves.

Because the dairy industry in Canada is supply managed, which in practice means that milk volumes are restricted to slow or even negative growth, the cow herd is stable to slightly declining in the short run. It is reasonable to assume that each cow has a calf every year and that approximately 50% of calves are heifers. Lang (2003) reports Ontario dairy heifer mortality and culling rates of around 15%, and that the age of first calving in Ontario averages 26.7 months. Cull calves typically enter the veal stream and cull heifers move into feedlots in Eastern Canada, with cull calves moving through feedlot channels in Western Canada.

The January, 2005 cow inventory of 1,066,400 head is representative of the Canadian dairy cow herd in recent years. Given this relatively stable cow herd base, projections can be made of the heifer inventory implied by it. This is presented in Table 2.2 below. Based on the 2005 dairy cow inventory, about 533,000 heifer calves would be born. Approximately 15% would be lost to mortality or culled, leaving about 453,000 to be raised as replacement heifers. However, because of the open-ended statistical definition of heifers and because the age at first calving exceeds two years old, more than one year's worth of heifers will be counted in the heifer inventory at a point in time. Thus, about 504,000 head of heifers would be in inventory at any one time. This estimate compares favorably with Statistics Canada estimates in recent years.

Table 2.2 Steady-state Canadian Heifer Population

Births (thousand head)	1066.4
Births of heifer calves (thousand head)	533.2
Production of heifer calves, with mortality and cull allowance of 15% (thousand head)	453.2
Average age at first calving (months)	26.7
Implied heifer inventory (thousand head)	504.2

Another aspect of structure in understanding dairy heifer inventories is the type of farm on which they are held. Dairy heifer calves are born on dairy farms. They can remain on dairy farms, they can be moved to specialized dairy heifer raisers, or they can moved into beef feedlots operated as stand-alone enterprises or as mixed dairy and beef farms. In Ontario and Quebec, specialized dairy heifer raisers tended to be the primary suppliers to the dairy export trade.

Table 2.3 below provides a summary of dairy heifer holdings according to farm type for Ontario and Quebec for the period 2000 to 2005. The table shows that on January 1, 2004 the heifer holdings of specialized heifer operations fell precipitously, and has since stabilized or rebounded. In Ontario, it is evident that the dairy heifers lost by heifer raisers as of 2004 were held back on dairy farms. A sharp increase in heifer holdings by Ontario dairy farms is coincident with the decrease in inventory by heifer raisers. In Quebec, it appears that the heifer inventory lost by heifer raisers went to mixed dairy and beef farms, presumably for feedlot finishing.

Secondly, as the inventory of heifers held by heifer raisers declined, many of them were driven out of the business. This can be seen from the number of operations reporting dairy heifers by farm type in Table 2.4. According to Table 2.4 below, less than half of the heifer raisers in Ontario reporting dairy heifers in 2003 were still reporting heifers in 2004; the decline was even more dramatic in Quebec. However, the number of dairy farms in Ontario reporting heifers increased following 2003, breaking a long-term trend.

Table 2.3 Dairy Heifer Holdings by Farm Type as of January 1

	Heifer Operations		Dairy Farms		Mixed Dairy and Beef	
	Ontario	Quebec	Ontario	Quebec	Ontario	Quebec
2000	9,500	2,000	154,600	164,900	15,900	11,100
2001	9,200	2,300	160,900	161,600	20,900	10,100
2002	10,800	3,000	169,400	163,000	19,800	10,000
2003	11,000	4,100	172,200	158,700	21,800	9,200
2004	7,600	1,600	181,200	144,100	21,200	10,300
2005	10,200	1,600	175,200	145,100	19,600	11,300

Source: Statistics Canada

Table 2.4 Number of Farms Reporting Dairy Heifers, by Farm Type, January 1

	Heifer Operations		Dairy Farms		Mixed Dairy and Beef	
	Ontario	Quebec	Ontario	Quebec	Ontario	Quebec
2000	271	77	6,442	6,731	757	572
2001	184	77	6,188	6,362	839	406
2002	216	120	5,944	6,151	792	361
2003	355	132	5,837	5,668	928	420
2004	150	40	6,060	5,146	800	736
2005	232	64	5,939	5,374	713	383

Source: Statistics Canada

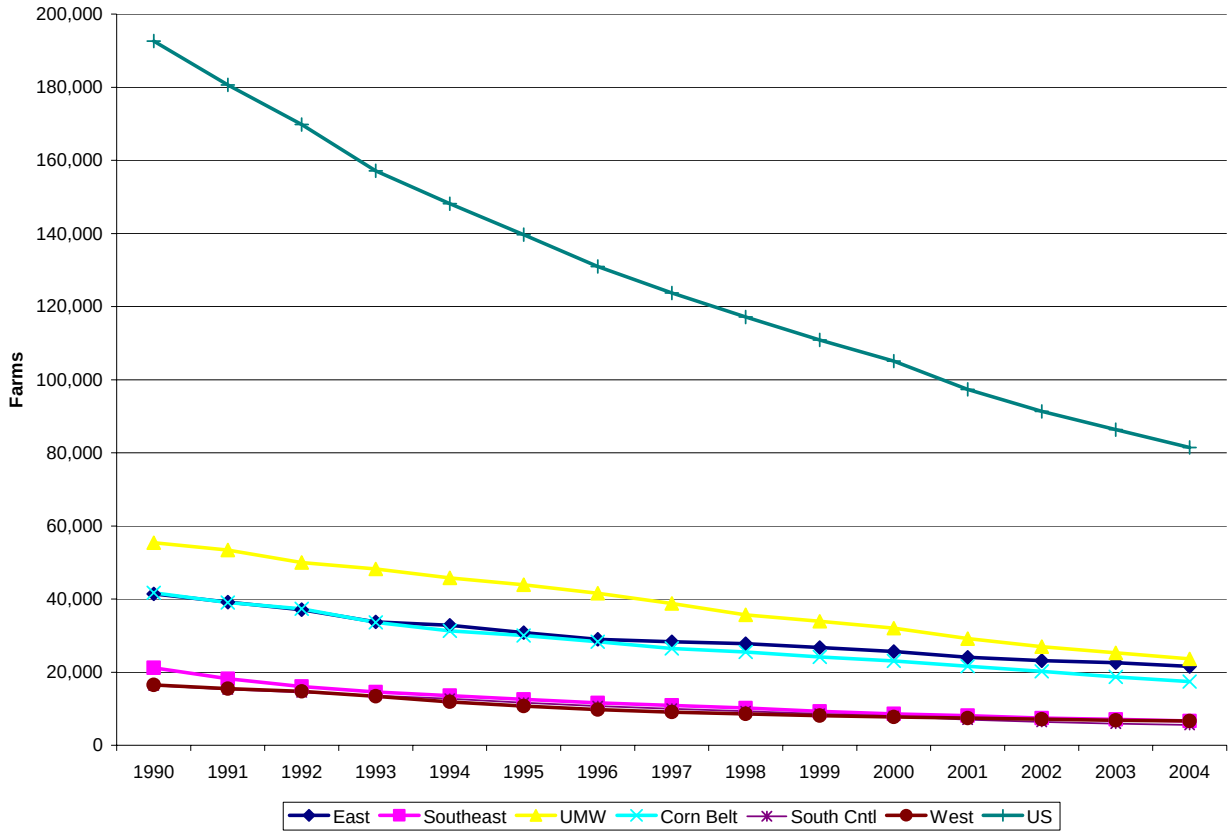
In Quebec, the number of mixed beef and dairy operations reporting dairy heifers initially increased sharply following 2003, and has since stabilized.

The implications of the above are the following. First, the dairy heifer inventory is relatively fixed according to the dairy cow herd, which is itself relatively fixed due to supply management in milk marketing. Second, while the Canadian heifer inventory is stable, the structure of heifer ownership changed following the 2003 border closure, with fewer heifers owned by heifer raisers and relatively more being held on dairy farms. Finally, it appears that many of the specialized dairy heifer raisers have exited the industry.

2.3 Demographics of the US Dairy Herd

The US dairy industry is concentrated in four regions; the Upper Midwest (Wisconsin, Minnesota, Michigan, and the Dakotas), the West (particularly California and the Pacific Northwest), and the East (Massachusetts, New York, Pennsylvania, and New Jersey) and the Cornbelt (Iowa, Missouri, Indiana, Illinois, and Ohio). This is illustrated in Figure 2.4 below. Most farms are located in the Upper Midwest, East, and Cornbelt regions, although the number of farms in these regions has declined rapidly. The West, which is a

Figure 2.4 Farm Operations With Milk Cows, US and Regions



very significant region in milk production, shows up as having among the lowest number of farms. However, the number of farms in the West is relatively stable, and the farms themselves are relatively large.

The US dairy herd has declined in number, much as the Canadian herd has. However, there are sharp regional differences within the overall decline in the US herd. This is illustrated in Figure 2.5 below. The figure shows that there are about 9 million dairy cows in the US, down from almost 10 million in 1990. The West, Upper Midwest, and East are the regions with the largest number of cows. The pattern of a declining number of cows is consistent regionally, with the clear exception of the West. The West has been expanding rapidly in dairy since 1990; this has largely occurred due to herd expansions as the number of cows increase but the number of farms are stable or even declining.

The US dairy heifer inventory has also declined relative to the early 1990's, but has firmed in recent years. The current US inventory is just under 4 million head of dairy heifers, down from almost 4.2 million in 1990. However, as noted with the dairy cow herd, there are distinct regional trends. The heifer inventory in the West is up markedly to well over 1

million head, from around 850,000 in the early 1990's. Heifer inventories in the Upper Midwest and East are essentially stable.

Figure 2.5 Dairy Cow Inventory, US and Regions

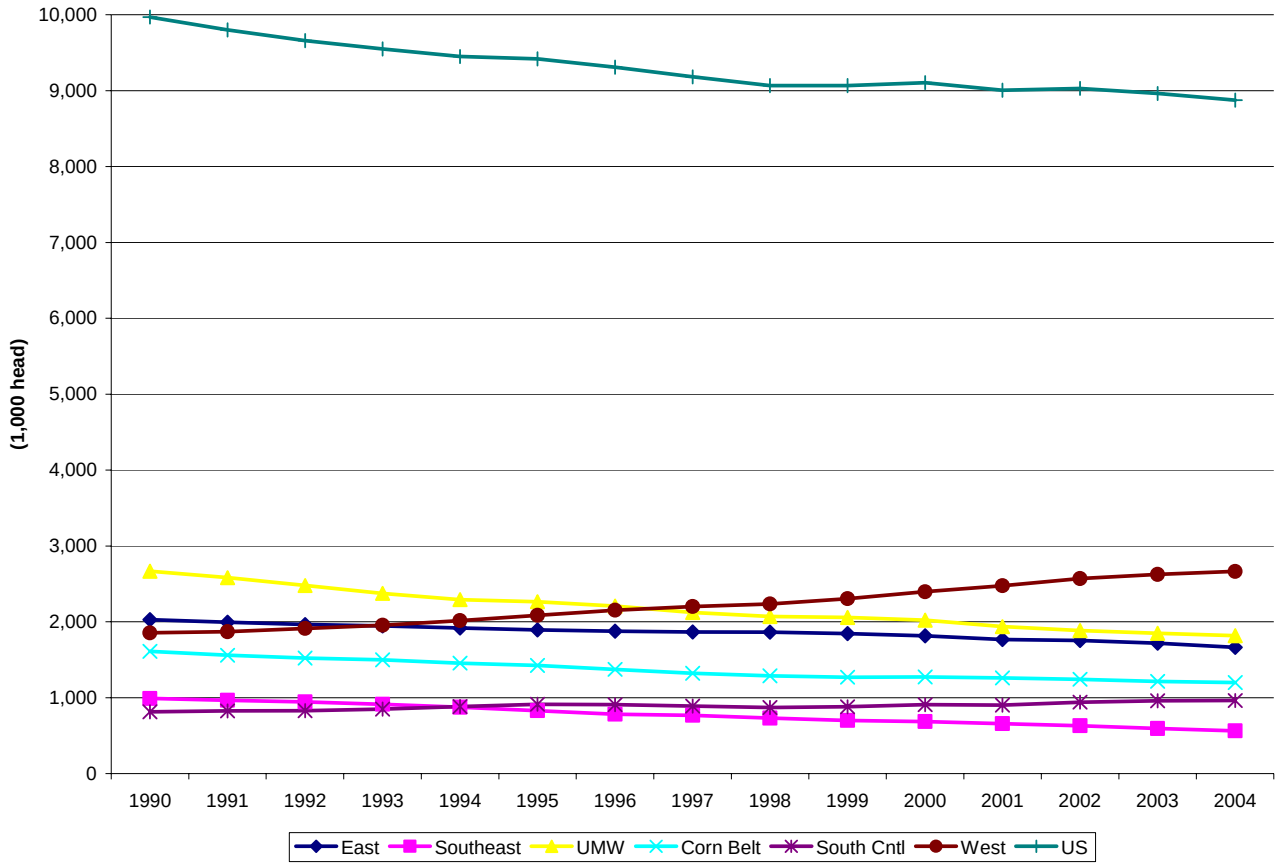
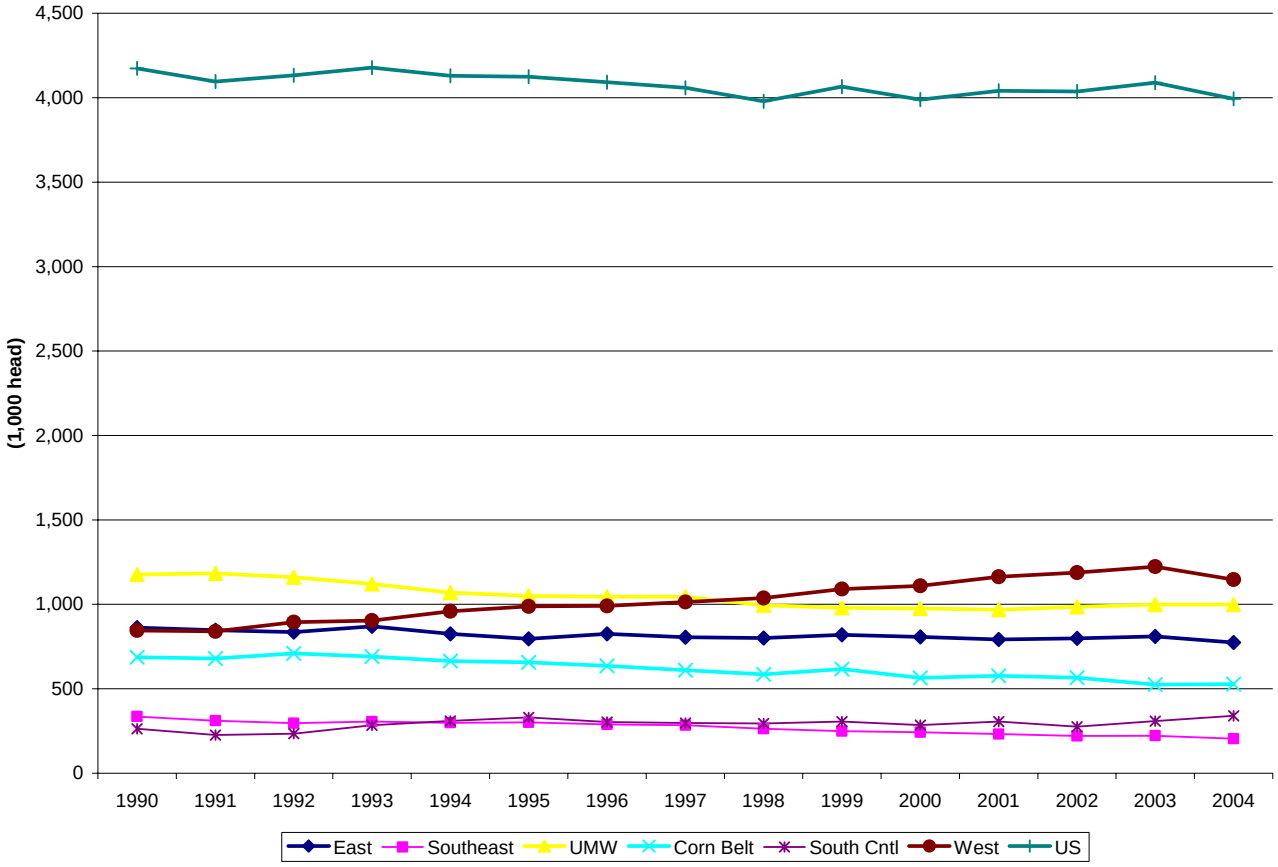


Figure 2.6 Dairy Heifer Inventory, US and Regions



As identified above, the demand for dairy replacement heifers derives from culling and from dairy expansions. Culls are manifested as cow slaughter, cow resale, and mortalities. Table 2.5 below presents aggregate data on the US dairy cow slaughter for 2000-2004. The table shows that the dairy cow slaughter in US federally inspected establishments has run between 2.4 million and 2.9 million head. As a percentage of the US cow inventory, the federal dairy cow slaughter is 27%-32%. Note that this is conservative because it does not account for the slaughter in plants that are not federally inspected, nor does it include mortalities or selective culls that are sold to other producers. This is an important distinction, because the cull data for Canada presented above cannot be compared directly against data obtained only from dairy cow slaughter.

Table 2.5 US Dairy Cow Slaughter and Implied Cull Rate

	US Cow Inventory	US Dairy Cow Slaughter*	Implied Cull Rate**
2000	9,104,300	2,631,500	28.9%
2001	9,003,500	2,581,900	28.7%
2002	9,028,700	2,606,900	28.9%
2003	8,962,200	2,859,900	31.9%
2004	8,874,100	2,362,700	26.6%

Source: USDA
* in Federally Inspected Plants
**Exclusive of mortalities and culls that are not slaughtered

2.4 The CWT Program

Among the factors influencing the US dairy heifer inventory is the CWT program. The CWT program (Cooperatives Working Together) is a multidimensional, farmer-funded national program, developed and administered by the National Milk Producers Federation (NMPF). The objective of CWT is to raise milk prices to dairy farmers by tightening the supply and demand balance for milk. Its inception was mainly a result of very tough financial times for milk producers in 2002 and 2003.

The original three main components of the program were:

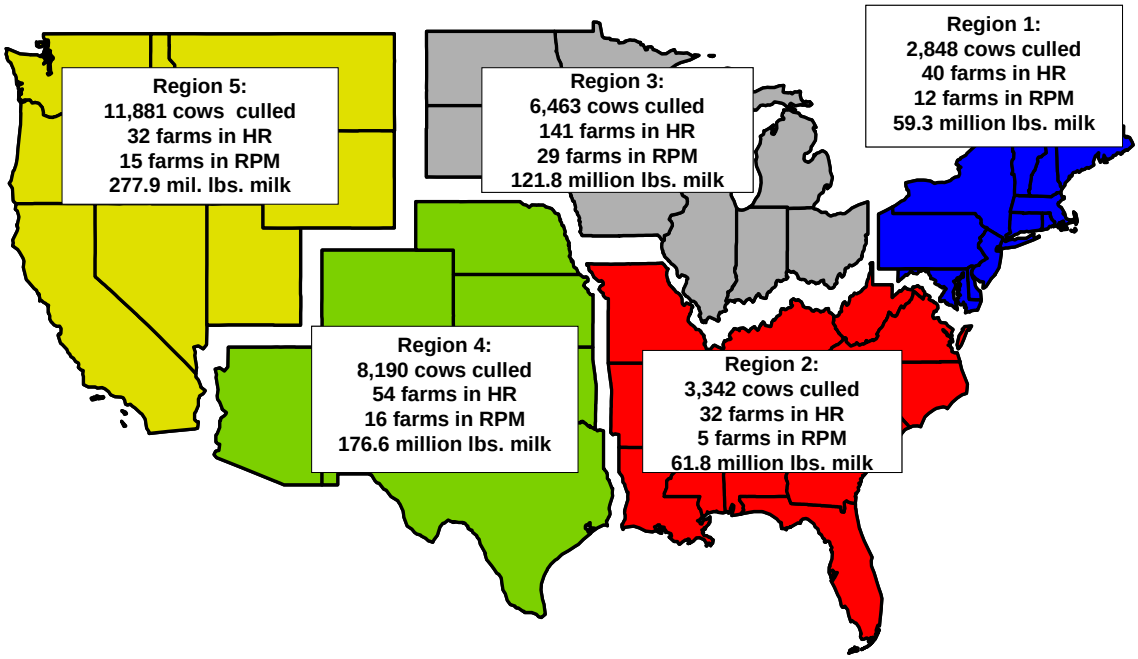
- Herd Retirement (HR) - pays producers to sell their entire herd for slaughter. However, no effort is made to keep farmers out of future dairy production. To participate, interested farmers from across the nation submit bids to be compensated for selling their herds.

- Export Assistance - operates during those periods when the U.S. price of cheese, as listed on the Chicago Mercantile Exchange, is $1.40 per pound or lower, or $1.30 per pound or lower for butter. CWT accepts bids from member organizations to export cheese and butter, and awards export bonuses based on the lowest bid prices. These bonuses make up the difference between U.S. prices and lower world prices.

- Reduced Production Marketings (RPM) - provides incentives for producers to decrease their milk marketings by at least 10 % compared to the previous year.

The first round of the program began in July 2003 and lasted 12 months. Two-thirds of the nation's production participated in the program and contributed 5¢ per cwt. to CWT. The funds were used in the following ratios: 45% for herd retirement, 35% for export assistance, 10% for reduced marketings, and 10% for discretionary use.

The herd retirement program had the biggest impact on the supply side. CWT's goal was to retire 32,000 head of cattle to yield a 660 million pound reduction in milk production. By the end of the first round, the program had exceeded its original target, as 32,724 head of cattle were retired, which represented approximately 696 million pounds of milk production. The average accepted bid across the country was $4.02/cwt. Regional limits were placed on the herd retirement that kept the bulk of the culling in the growth-oriented Western region. The breakdown of milk removed from production in the first year of operation is shown in the map below. The same basic regional proportions have been maintained since the first year.



Source: NMPF, CWT

Based on the NMPF calculations, the CWT program delivered a 12-fold return on the money contributed by dairy farmers. They estimated that the All-Milk Price from October 2003 through August 2004 was $0.59 per hundredweight higher per month on average.

In the second year of CWT operation, the reduced production marketings section of the program was dropped, and the funds were apportioned 80% toward the second herd retirement, and 20% toward export assistance. CWT's second herd retirement program started in winter 2004 and targeted to remove 49,000 head of cattle to yield an 870 million pound reduction in milk production. As in the first year, the program exceeded its original target, and resulted in 50,478 head of retired cows.
NMPF forecast that the cumulative effect of the second run would also create more than $1 billion in additional farm income by the end of 2005, as it did in the first round. The second CWT program averaged $5.24 per hundredweight with a range of $4.76 to $5.47 for the 4 regions.

As a result of the two-year old CWT program's success, NMPF voted for a third term of operation. The program will run July 2005 through December 2006 and funding will remain at 5¢ per cwt. The program's activities will remain focused on both reducing cow numbers and boosting exports of manufactured dairy products. The allocation of funds and emphasis of the program will remain on the herd reduction, which seems likely to take place again this winter.

2.5 Historic Trade in Dairy Heifers

Data on US dairy cattle imports are collected by the Animal and Plant Health Inspection Service (APHIS) of the US Department of Agriculture. At border ports of entry into the US, shipments of cattle are directed to an APHIS inspection station for health inspection purposes; at this point, data on shipments from Canada to the US are collected. Table 2.6 below presents the annual volume of dairy cattle imports to the US from Canada. The volume of exports has ranged around 62,000-65,000 head/year up until the border closure in May, 2003. Figure 2.7 presents the weekly volume of US imports from Canada. The figure shows the typical US import volume has ranged around 500-2000 head per week. There has also been a strong seasonal trend in US imports, with imports tending to peak in the spring and decline through the fall and winter.

Table 2.7 presents trends in the value of exports of Canadian dairy cattle, measured in Canadian dollars. The table shows that the bulk of the value of Canadian exports derives from export sales to the US; exports of commercial dairy cattle are almost entirely to the US. In addition, the value of Canadian exports has increased at a faster rate than the volume of cattle themselves. The sharp drop in sales value in 2003 reflects the border closure in May, 2003.

Table 2.6 US Imports of Live Canadian Dairy Animals, Head

	Total Bulls	Total Heifers and Cows	Total Dairy Cattle Exports
2000	339	61,244	61,583
2001	742	63,458	64,200
2002	800	64,354	65,154
2003	194	27,074	27,268

Source: USDA APHIS

Figure 2.7 US Weekly Imports of Dairy Cattle from Canada

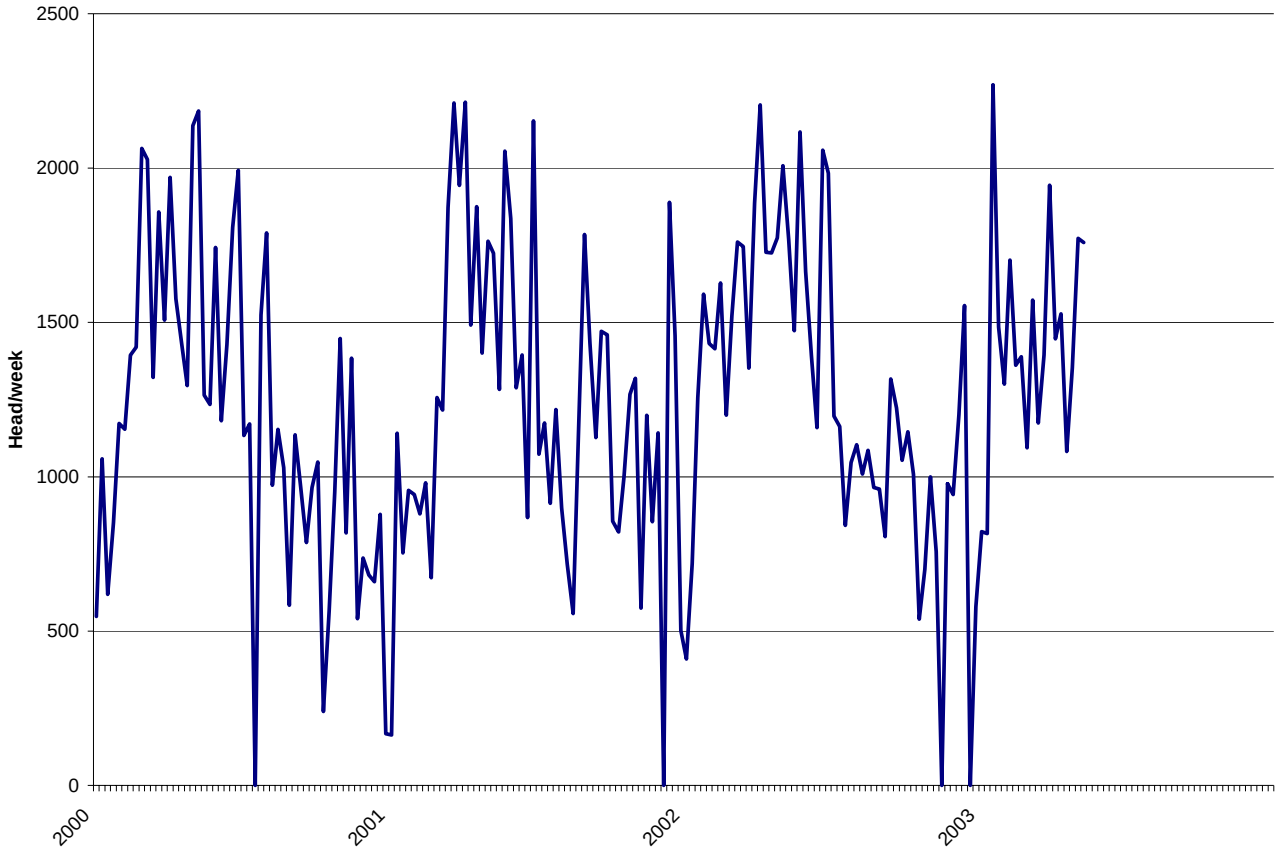


Table 2.7 Value of Canadian Purebred and Commercial Dairy Cattle Exports; Canadian Dollars

	Purebreds		Commercial Cattle		
	US	**Total**	**US**	**Total**	**Total Purebred and Commercial Exports**
2000	$8,482,622	$10,214,831	$83,106,857	$83,118,857	$93,333,688
2001	$13,199,410	$15,186,343	$107,731,296	$107,761,296	$122,947,639
2002	$11,020,581	$17,752,683	$115,893,897	$115,893,897	$133,646,580
2003	$4,858,036	$5,487,232	$39,741,767	$39,747,767	$45,234,999

Source: Statistics Canada TIERS

3.0 Perception of Industry Stakeholders on US Imports from Canada

To understand producer perceptions related to the border closure to US imports of Canadian dairy cattle, interviews and mail surveys were conducted to assess the impact of the border closure on industry stakeholders. Surveys and telephone interviews were conducted with producers and livestock dealers in the US, and a narrower set of interviews were conducted with a group of the more significant dairy cattle exporters. Section 3.1 below presents a description of the survey and interviews with US dairy industry stakeholders. Section 3.2 presents a summary of discussions with major Canadian dairy cattle dealers .

3.1 Consultations with the US Dairy Industry

The first mail survey, which was undertaken in the late spring of 2005 addressed U.S. livestock dealers, auction houses and producers. The survey is presented in Appendix A. Altogether 84 questionnaires were mailed, resulting in a 15% response rate. Many of the respondents' trading activity focused on domestic markets only, even before the BSE in N. America. Therefore, in order to obtain a representative sample, another round of mail surveys was sent out in early September. The 32 additional questionnaires to producers and dealers who traded internationally prior to the border closure resulted in a 25% response rate.
In addition to the mail surveys, telephone interviews were also conducted over the summer to get a better insight of the stakeholders' perception on the issue. A good cross-section of producer/dealers and good-sized producers were interviewed.

Overall, producers got a slightly larger representation (56%) than dealers in the survey. Both producers and dealers primarily handled dairy cows and heifers, but about 1/3 of the respondents also dealt with purebred dairy cattle, slaughter cattle and calves. The average annual imported volume by respondent showed a wide range, running from as low as 15 to as high as 3,000 head per year. The respondents indicated that the highest volume was imported during the 1999-2001-time period; while the least amount of animals entered the country back during 1990-92.

On a scale 1 to 5 (1 being the lowest, 5 the highest) the importance of the animals' genetic quality ranked 4.2, which shows that both dealers and producers put high emphasis on the quality of the replacement animals. There was a high satisfaction with the genetic quality of Canadian animals.

To the question "What factors routinely impact your company's import/export decision the most?" both the dealers and producers unanimously answered: demand, price, quality and exchange rate (not in order of importance).

When the industry representatives were asked about the "Impact of border closing on your business" the responses were mixed. Most dealers (70%) said however, that their business was hurt substantially by not being able to import heifers from Canada. Half of the producers on the other hand found that the border closure had a positive impact on their business, by

elevating the milk price and helping the domestic cattle price. On a negative note, 35% of the producers mentioned that the cost of finding replacement animals has gone up and the quality of animals may have suffered.

To the question "How much reduction in number of animals handled have you experienced?" most producers gave the answer "none". Dealers on the other hand quoted a 50-70% decrease, while one dealer said that his business actually picked up since the border closure. Quite a few lamented about the devastation to their Canadian counterparts.

When respondents were asked about "What will be the biggest restraint or adjustment in returning to normal business level?" some of the dealers listed the availability of animals and the fact that the government would monitor the imports too closely. Most of the producers however did not see any problem returning to the normal business level once the borders were open.

To the question "What do you believe the perception is of Canadian dairy cattle and genetics in the U.S.?" The dealers unanimously answered that Canadian cattle are of high quality and many noted their sturdy structure was a plus. Producers also thought that Canadian cattle are good quality, but not everyone agreed that there is a huge difference in quality between the U.S. and Canadian animals.

Both producers and dealers agreed, that the role of imports of dairy cows and heifers to the U.S. dairy industry is to stabilize the price of dairy cattle in the country, maintain the animal units and provide good genetic material to the dairy herds. Producers and dealers also had similar opinion about the impact of the border closure on the U.S. dairy industry. While the majority of both sides of the stakeholders think that the border closure resulted in higher milk and cattle prices, 40% of the respondents thought it had no impact on the dairy industry at all.

Similarly to the question "what would be the impact if the border reopened to import Canadian dairy cows and heifers tomorrow?" about 40% of the respondents said that nothing would happen, as the border had been closed too long, but nearly half of the respondents thought that dairy cattle and milk prices would drop.

When the dealers and processors were asked about "what do they hear from the marketplace concerning the issue" mixed answers were received.

"The dairy industry would like to see the border opened. Beef producers are against opening".

"Live stock dealers in favor – smaller U.S. dairies against opening"

"Farmers & dealers have adjusted to the new situation"

"The best producers are lacking quality replacements – making cost of U.S. heifers too high"

"Everybody is just waiting. This is now political and you cannot foresee what and when something will happen"

"Most U.S. people wish it would remain closed – Canadians want it open."

"Canada has built facilities now – boxed beef – taken jobs from the U.S."

"Producers think its OK to open, hurts more on beef"

"No talks now - no care on part of farmers, want to know when however"

"Time to reopen – but producers don't really care"

"Fearful that the U.S. dairy herd would be exposed to BSE"

To the question "Do you believe that the existing border closure is an appropriate response to the cases of BSE in Canada?" dealers responded almost unanimously with NO, while producers were slightly more divided; 44% of the responding producers still believe that the existing import policy is appropriate, 1/3 of them agreed with the policy at the beginning but disagree now with it, and 22% were against the policy from the very beginning. Therefore, well over ½ believe the border should be opened.

As far as recommendations to government authorities regarding the resumption of trade in dairy cows and heifers, the majority of the respondents think that putting a cattle tracking system in place would help to overcome the problem. A smaller proportion of the producers (37%) think however, that the safest resolution would be to keep the borders closed. The dealers are more unanimous with their answer regarding the border re-opening, however their responses differ somewhat in the method of achieving the most efficient tracking system. Some recommend a point of origin identification, while some suggest putting tariff on dairy cattle to pay for the tracking costs. Another respondent was for mandatory testing as no health papers are requested for movement between provinces in Canada.

3.2 Consultations with the Canadian Dairy Heifer Segment

To understand the current status of conditions facing former diary heifer exporters, structured interviews were solicited with 14 of the most significant exporting and dairy cattle handling organizations in Canada. The interview followed the format of a survey, which was sent out to respondents in advance (full survey is presented in Appendix B). Contact was successfully made with 10 of these firms, located in Ontario, Quebec and western Canada. Two of the firms contacted were strictly livestock dealers and eight described their activities as dairy producers and dealers. The organizations contacted generally handled both purebred and

commercial cattle, with two firms handling strictly commercial cattle. Two of the firms had a cattle import operation in addition to exporting, and three firms had a significant domestic sales business in addition to exporting. The balance of firms were strictly exporters. The pre-May 2003 annual export volumes reported ranged between 10 head and over 18,000, with most in the range of 2000-5000 head. All had exports to the US, with 5 reporting exports to Mexico. On a five point scale, most exporters ranked genetic quality of animals as either a 4 or 5, indicating that genetic quality was an important attribute to export customers.

To the question, "What do you feel was your US customers' most important consideration in purchasing Canadian dairy cattle?" the following characteristics were identified. First, literally all respondents indicated that their export customers placed value on the quality of Canadian livestock. This related to improved conformation as related to size, feet and legs, etc., a perception that Canadian cattle were easier to get back in calf, and a perception that customers simply valued having Canadian pedigrees in their herds. Another general response was that the exchange rate was an important factor influencing export customers' purchases. A number of respondents indicated that there was simply a chronic shortage of bred heifers in the US market, and that US export customers sought Canadian cattle to alleviate this shortage. Several respondents indicated that ready access to full loads of dairy heifers was of value to their customers.

When asked, "Do your American counterparts perceive differences between US and Canadian dairy cattle? If so, what are they?" the broad answer was that customers (typically producers rather than dealers according to respondents) saw Canadian cattle as improved in quality. This related to improved conformation of feet, legs and udder, an improved ability to perform in a freestall environment, consistency of product, and the ability to obtain more information on cattle than is possible in the US. One respondent indicated that there was no difference in quality.

To the question, "If the border opened to dairy heifers and cows tomorrow, what would be the impact on your business? What about on the Canadian dairy genetics industry as a whole? How long do you believe it would take for these impacts to occur?", literally all respondents believed it would be a positive effect for Canadian exporters. However respondents differed with regard to the nature of the benefit, and the time period over which it would occur. Some respondents indicated that the benefit of the border would be immediate, and had accumulated unfilled orders pending the border opening. However, the majority indicated that the benefit would take some time to materialize. The biggest factor cited was that the infrastructure for the heifer export business has been decimated. Custom heifer raisers have generally left the business or have shifted into milk production, so the basic supply infrastructure is lacking. Others indicated that the combined effects of a stronger Canadian dollar and sharply increased export freight rates will hamper renewal of the export business. Most respondents estimated that renewed exports would take anywhere from 30 days to several months to coordinate.

To the question "Have there been changes in the availability of cattle trade infrastructure (trucking services, border inspection, etc.) since May, 2003? If so, what significance does it have?, literally all respondents indicated issues exist with cattle export infrastructure that did not exist in May, 2003. The most commonly mentioned issue was trucking infrastructure, and that transporters formerly engaged in exports have moved into other lines of business. Secondly, there were concerns that border inspection and general veterinary infrastructure for cattle export would not exist at the same level or quality that was in place prior to the border closure. Finally, several respondents reiterated that the basic infrastructure- the specialized heifer raisers- is largely gone and it will take considerable time to rebuild it.

Finally, when asked what they had heard from industry peers regarding the border closure issue, almost all respondents indicate that the Canadian cattle export industry is hanging by a thread financially. Several mentioned that if the border was not opened by the end of 2005, they would be out of business. Some described how they and others had re-oriented their businesses to hold on to dairy heifers in a shift from cattle dealer to dairy farmer. One respondent indicated that his contacts in the US, mostly large herds in Wisconsin and California, desperately wanted the border open to supply needed heifer replacements.

Based on the mention made by respondents of the decline suffered by heifer raisers, an interview was conducted with a major heifer raiser and executive member of an Ontario dairy heifer raisers' association. This individual indicated the Ontario Holstein Heifer Raisers' Association had 103 members as of May 2003, and that as of today only 20 members remain. It is believed that 350-400 individuals, many of whom were Mennonites, were supplying dairy heifers from Ontario in the spring of 2003 with some exporting directly to dairy operations in the US, and others through dealers. Many of these operations were former cream producers. This infrastructure of specialized dairy heifer raisers was unique to Ontario, and did not exist elsewhere.

4.0 Impact of Imports from Canada on US Dairy Replacement Heifer Prices: An Empirical Analysis

To test the empirical impact of US imports of Canadian dairy cattle on the US dairy industry, statistical analyses were conducted relating US dairy heifer prices to a variety of dairy price and cost factors, including imports from Canada. A set of statistical regression procedures were developed in which key dependent variables (US dairy heifer prices and US dairy heifer imports) were regressed on the following independent variables:

- US dairy milk-feed ratio
- US dairy cow slaughter
- US dairy herd inventory
- Canada-US currency exchange rate

Initially, regressions were run using annual frequency data. Figures 4.1 to 4.4 below illustrated patterns in the data over the period 1995-2003, with the 2003 data reflecting exports up to May prior to the border closure. Figure 4.1 presents US dairy heifer prices relative to the volume of dairy cattle imports from Canada. The figure shows what would

appear to be a weak positive relationship between US dairy heifer prices and the level of imports from Canada. Indeed, in 2003 when US imports of Canadian dairy cattle stopped, US dairy heifer prices decreased. In 2004, heifer prices rebounded, and no imports from Canada occurred.

Figure 4.2 presents the pattern of US imports of Canadian dairy cattle relative to the US milk-feed price ratio, which measures the US price of milk (in $/cwt) relative to the cost of feed required to produce 1 cwt of milk. The milk feed ratio can be interpreted as the excess over feed cost that forms the budget for cattle purchases, labour and other variable costs, overhead costs, and profit. The figure suggests a stronger, positive relationship between the milk-feed ratio and the level of cattle imports from Canada.

Figure 4.3 considers US milk prices relative to dairy cattle imports from Canada. It is thus a component of the pattern observed in Figure 4.2, since the milk price is the numerator of the milk-feed price ratio. The figure suggests little relationship between milk prices and imports. For example, periods of high milk prices in the US have seen extremely variable cattle import levels. In 1996, when imports of Canadian cattle were about 11,800 head, high milk prices of well over $14/cwt were experienced; in 1999, when imports of Canadian cattle were about 69,000 head, high milk prices of well over $14/cwt were also experienced.

Figure 4.4 presents trends in US imports of Canadian dairy cattle relative to the Canada-US currency exchange rate. Throughout much of the period presented in the figure, the Canadian dollar was weakening relative to the US dollar, which gave US buyers relatively more purchasing power in importing Canadian cattle. The figure shows a very strong and positive relationship between the exchange rate and dairy cattle imports.

Figure 4.1 US Dairy Heifer Prices vs. Imports of Canadian Dairy Cattle

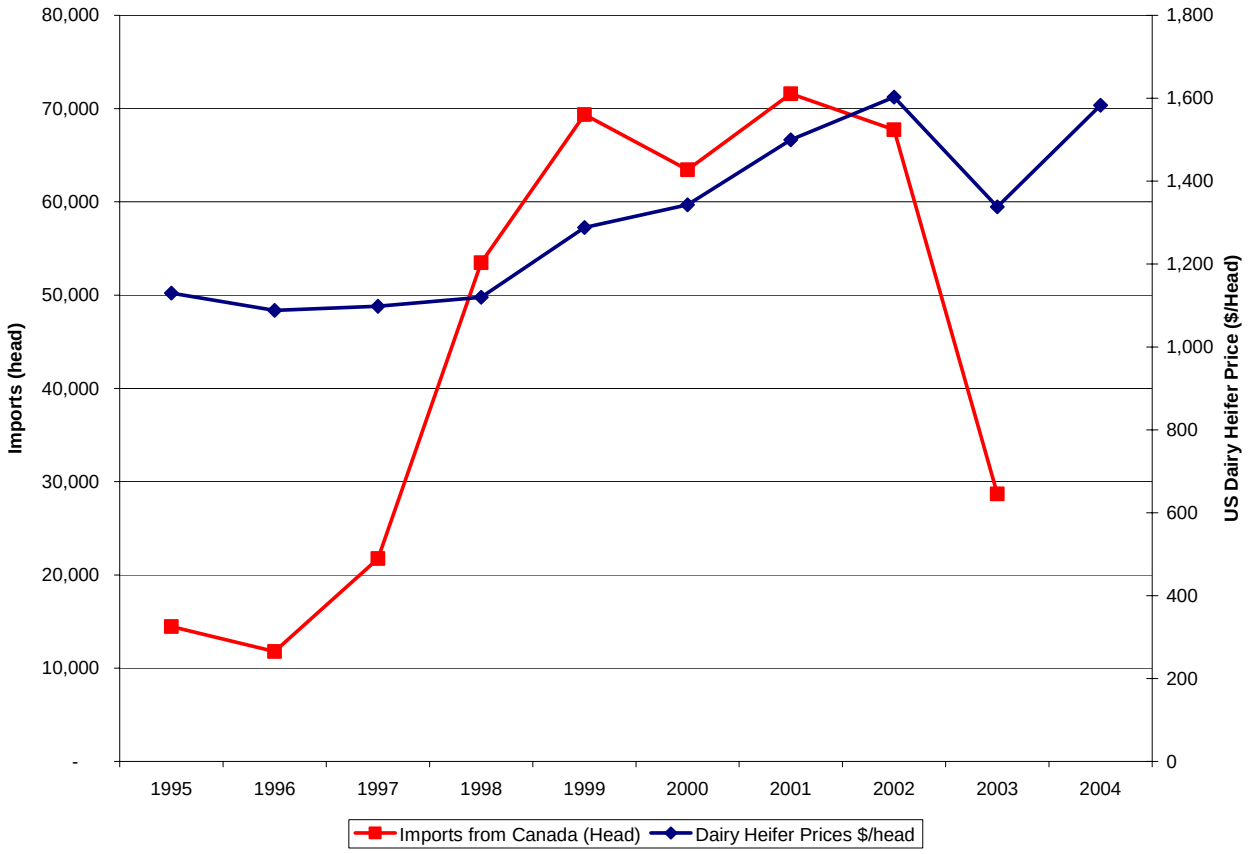


Figure 4.2 Imports of Canadian Dairy Cattle vs. US Milk-Feed Price Ratio

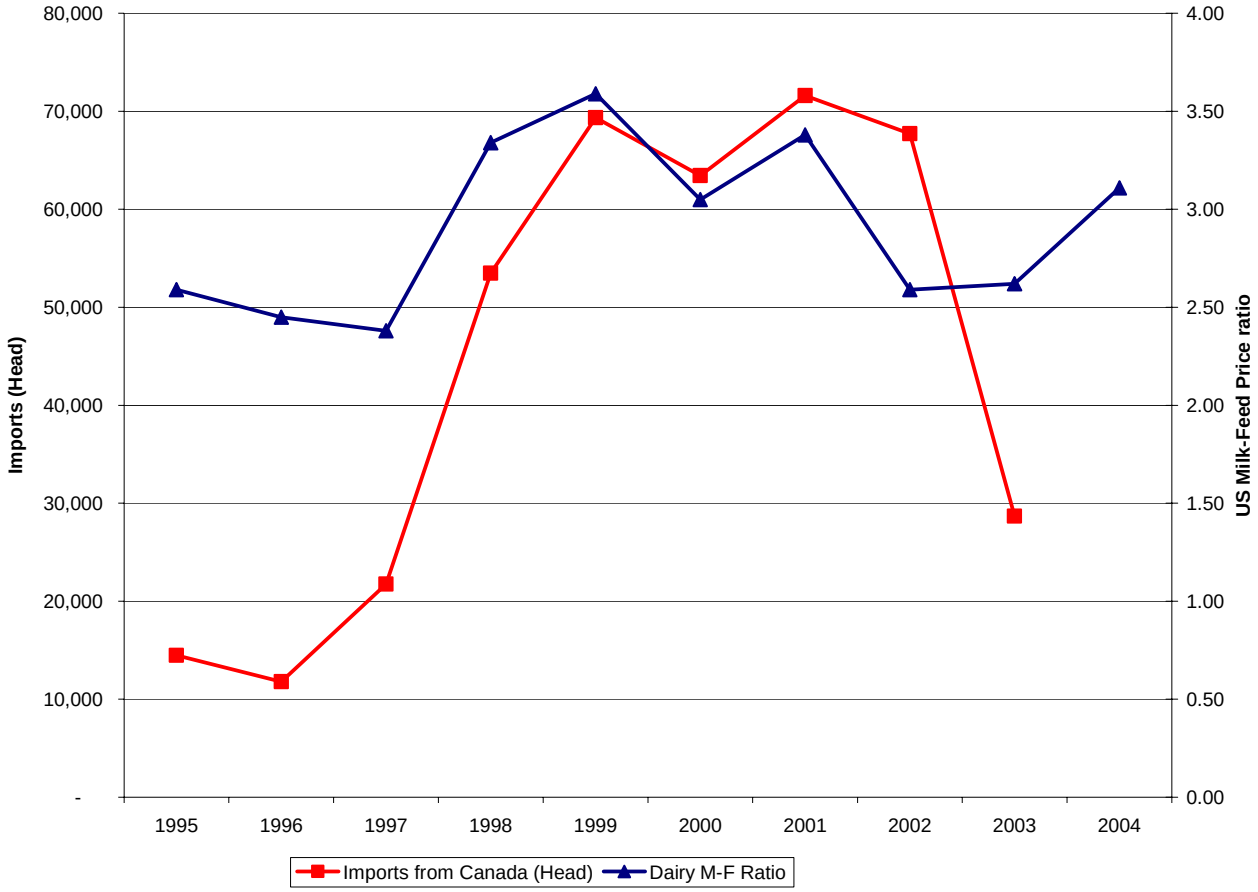


Figure 4.3 Imports of Canadian Dairy Cattle vs. US Milk Prices

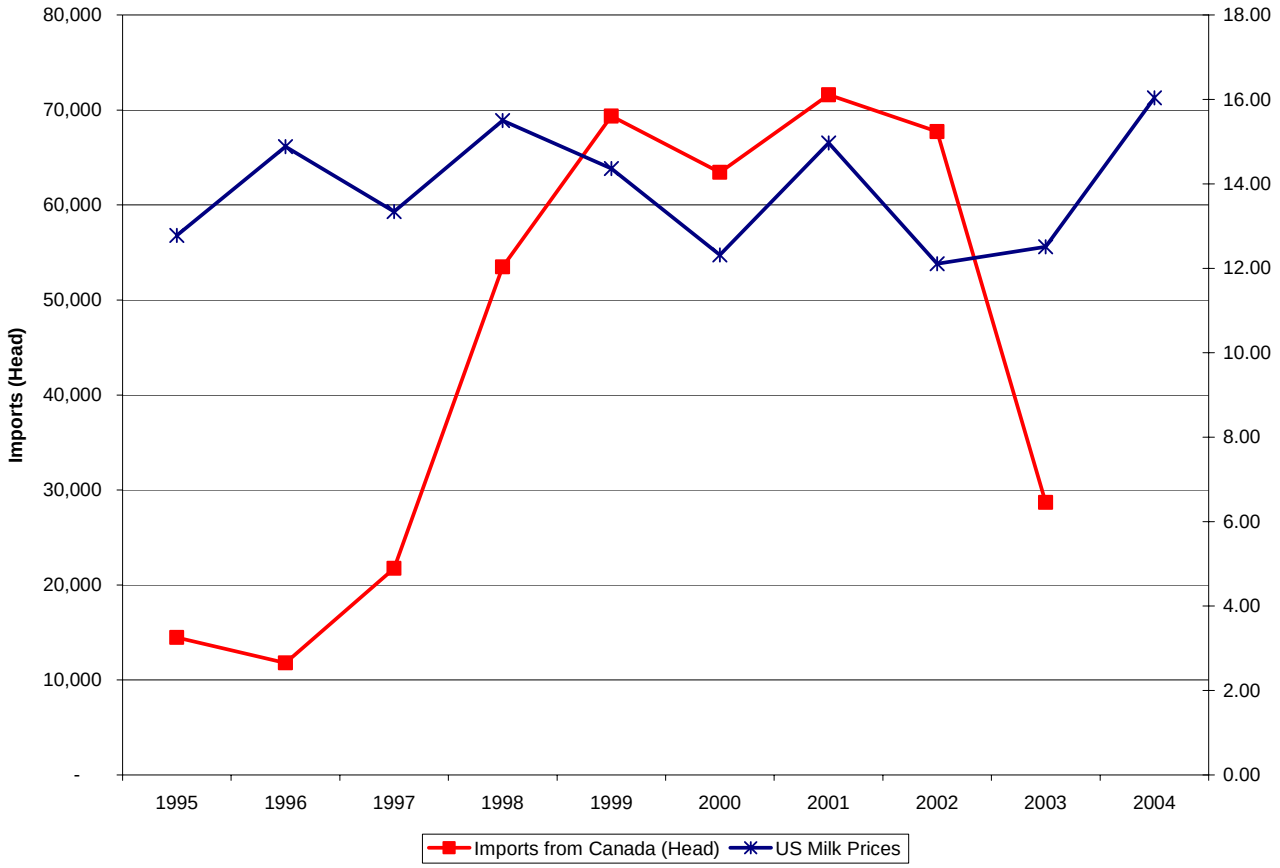
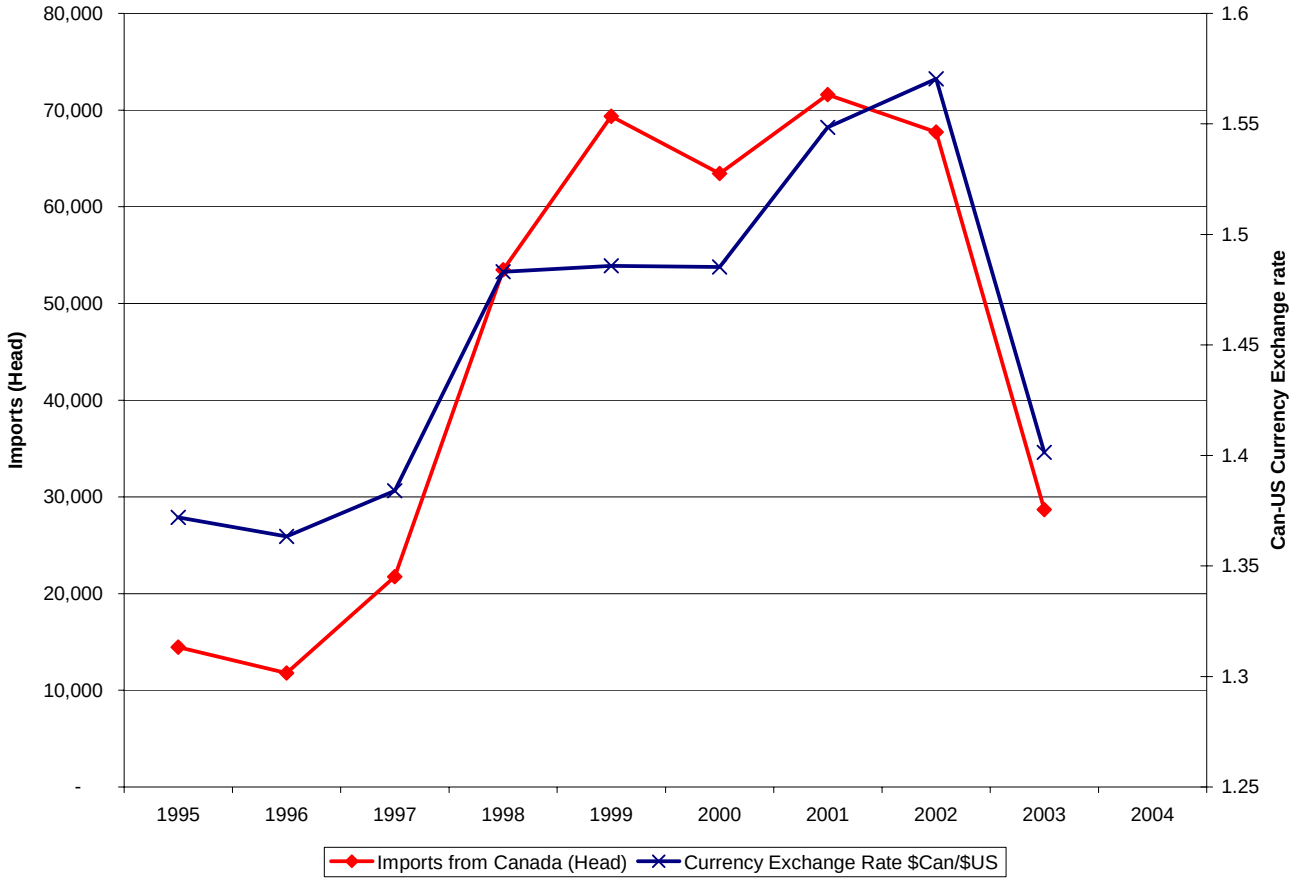


Figure 4.4 Imports of Canadian Dairy Cattle vs. US-Canada Currency Exchange Rate



4.1 Statistical Testing of Relationships Among US Imports of Canadian Cattle and Other Market Observations

To test the empirical impact of U.S. imports of Canadian dairy cattle on the U.S. dairy industry, a series of statistical regression models were estimated. Quarterly time series data from Q1-1995 through Q2-2003 (just prior to the stoppage of Canadian imports) was used. The variables examined were (with name in parentheses) U.S. total cow numbers in thousand head (COWNUM), U.S. average replacement heifer prices in dollars per head (HFRPRC), U.S. average milk price received by farmers in dollars per hundredweight (MLKPRC), and U.S. imports of dairy cattle from Canada in total head (CANIMPORTS). In the regression models, COWNUM, HFRPRC, and MLKPRC were specified as dependent variables, and CANIMPORTS was specified as the independent variable. To allow for delayed impacts of Canadian imports; lags of up to 4 quarters were also included as independent variables.

Preliminary linear regression results indicated a problem with autocorrelation in the residuals as indicated by Durbin-Watson (DW) statistic values significantly less than 2.0 (i.e., the value indicating no serial correlation). To correct for this problem, the models were respecified to include lagged values of the dependent variable as independent variables in the regression equation. This is similar to the model specification used in vector autoregression (VAR) models used in time series analysis. This was successful in correcting the autocorrelation in all of the models as evidenced by DW values closer to 2.0 critical value. Also, the autocorrelation graph of the residuals of each equation was examined for possible autocorrelation problems. Analysis of the graphs for each equation did not provide any conclusive proof of autocorrelation problems with the residuals. An F-test was conducted on each regression model to test the null hypothesis that all of the Canadian import regression coefficients are simultaneously equal to zero.

4.1.1 Impact on U.S. Cow Numbers

The estimated model for U.S. dairy cow numbers is as follows (t-statistics in parentheses, 2 stars for significance at 95% confidence level, one star for significance at 90% confidence level):

$$COWNUM_t = 1.717*COWNUM_{t-1} - 0.956*COWNUM_{t-2} + 0.093*COWNUM_{t-3} + 0.144*COWNUM_{t-4}$$
$$(8.33^{**}) \qquad (-2.45^{**}) \qquad (0.24) \qquad (0.64)$$

$$+ 0.002*CANIMPORTS_t - 0.001*CANIMPORTS_{t-1} + 0.001*CANIMPORTS_{t-2}$$
$$(1.62) \qquad (-0.73) \qquad (0.39)$$

$$- 0.001*CANIMPORTS_{t-3} + 0.001*CANIMPORTS_{t-4}$$
$$(-0.40) \qquad (0.58)$$

$$R^2 = 0.985 \quad \text{Adj. } R^2 = 0.979 \quad DW = 1.979 \quad F(5,21) = 2.489^*$$

Results: These results indicate that the amount of Canadian dairy cattle imports had little, if any, impact upon the size of the U.S. milking herd. T-statistics on all of the Canadian import variables were statistically insignificant. The F-statistic does indicate rejection of the null hypothesis at the 90% confidence level; however, it cannot be rejected at the more strict 95% confidence level. The coefficient values indicate that Canadian imports may have a very small contemporary impact; however, the insignificance of the lagged coefficients indicates no lasting impact.

4.1.2 Impact on U.S. Heifer Prices

The estimated model for U.S. heifer prices is as follows:

$$HFRPRC_t = 1.195*HFRPRC_{t-1} - 0.377*HFRPRC_{t-2} + 0.245*HFRPRC_{t-3} - 0.086*HFRPRC_{t-4}$$
$$(4.29^{**}) \qquad (-0.89) \qquad (0.45) \qquad (-0.25)$$

$$+ 0.005*CANIMPORTS_t + 0.001*CANIMPORTS_{t-1} - 0.006*CANIMPORTS_{t-2}$$
$$(1.17) \qquad (1.04) \qquad (-0.91)$$

$$- 0.002*CANIMPORTS_{t-3} - 0.002*CANIMPORTS_{t-4}$$
$$(-0.35) \qquad (-0.42)$$

$$R^2 = 0.928 \quad \text{Adj. } R^2 = 0.901 \quad DW = 1.752 \quad F(5,21) = 2.510^*$$

Results: These results show that Canadian imports had a negligible effect upon U.S. heifer prices. The t-statistics on the Canadian import variables were all statistically insignificant. The F-statistic was significant at the 90% confidence level which indicates the possibility of a small effect at lags zero and one; however, the signs of the coefficients indicate that it is more likely that high U.S. replacement heifer prices were encouraging more Canadian imports rather than imports having any impact upon heifer prices.

4.1.3 Impact on Milk Prices Received by U.S. Producers

The estimated model for U.S. milk prices received by producers is as follows:

$$MLKPRC_t = 1.186*MLKPRC_{t-1} - 0.660*MLKPRC_{t-2} + 0.790*MLKPRC_{t-3} - 0.306*MLKPRC_{t-4}$$
$$(5.86^{**}) \qquad (-2.28^{**}) \qquad (2.66^{**}) \qquad (-1.43)$$

$$- 0.00001*CANIMPORTS_t - 0.0001*CANIMPORTS_{t-1} + 0.00003*CANIMPORTS_{t-2}$$
$$(-0.14) \qquad (-1.04) \qquad (0.27)$$

$$- 0.000001*CANIMPORTS_{t-3} + 0.0001*CANIMPORTS_{t-4}$$
$$(-0.01) \qquad (0.93)$$

$R^2 = 0.575$ Adj. $R^2 = 0.413$ DW = 1.785 F(5,21) = 0.632

Results: These results show that Canadian imports had almost no effect upon U.S. milk prices. The t-statistics on the Canadian import variables were all statistically insignificant. The F-statistic clearly supports the null hypothesis that all of the Canadian import coefficients are effectively equal to zero. The lower value of the R-squared statistic indicates that there are other explanatory variables at work in determining the milk price received by U.S. producers.

4.1.4 Impact on Milk Prices Received by U.S. Producers

In lieu of a dummy variable technique, an alternative approach was used to estimate the impact of the CWT program. To quantify the effects of the CWT program on heifer price and milk price, actual national herd size and milk production were adjusted in the models The following model was developed, using quarterly data from 1995Q1 to 2003Q1.

Heifer Price Model

The estimated heifer model is as follows (t-statistics in parentheses, 2 stars for significance at 95% confidence level, 1 star for significance at 90% confidence level):

$$HEFPRC_t = 1374.7 - 167.379*MFRATIO_{t-1}$$
$$(14.7^{**}) \qquad (-4.54^{**})$$

$$+ 0.0322*CANIMPORTS_{t-1} - 0.3739*COWNUM\%CHG_{t-1}$$
$$(8.88^{**}) \qquad (-1.32)$$

$R^2 = 0.79$ Adj. $R^2 = 0.77$ F(3,28) = 35.90**

HEFPRC is the US price per head for heifers. MFRATIO is the milk feed ratio. CANIMPORTS are the number of Canadian cows imported. COWNUM%CHG is the percentage change in the number of cows in the national dairy herd. All three are lagged a quarter. An estimated price was obtained from the model. Then COWNUM%CHG was reduced to produce an estimated of the price with the CWT's market intervention. The results showed the CWT retirements do have a positive impact on heifer price. Our model shows a $7.34 increase in per heifer price if the intervention is spread over the entire year, or a $55.85 increase if the retirements all take place in a single quarter and the effects are limited to a single quarter.

Milk Price Model

The estimated milk model is as follows (t-statistics in parentheses, 2 stars for significance at 95% confidence level, 1 star for significance at 90% confidence level):

$$MLKPRC_t = 12.76 - 0.0007*MILKPROD_t + 6.267*BARELCHEE_t + .846*MFRATIO_{t-1}$$
$$(3.60^{**}) \quad (-3.10^{**}) \quad (8.44^{**}) \quad (3.74^{**})$$

$R^2 = 0.865$ Adj. $R^2 = 0.85$ $F(3,29) = 62.10^{**}$

MLKPRC is the all US all milk wholesale producer price. MILKPROD is all US milk production. BARELCHEE is the CME barrel cheese price. MFRATIO is the milk feed ratio. An estimated price was obtained from the model. To attempt to quantify the CWT's impact, the estimated amount of milk removed via cow retirements was removed from the MILKPROD variable, and a new estimate of price was obtained. If the milk were removed evenly over a year, the impact would prop up prices by 16.7 cents per cwt. If the milk were removed in a single quarter, it would increase the price by 66 cents.

Summary

The regression models only modeled the effects of the CWT's retirement program on the dairy herd and subsequent milk production. No effort was made to determine the effect of their export activities on cheese and butter prices, and in turn, milk prices. The results show the CWT has propped up heifer and milk prices through their herd retirement program.

4.1.5 Summary

The regression results clearly provide evidence that, prior to the import stoppage, the amount of dairy cattle imports from Canada had little, if any, impact upon U.S. dairy cow numbers, U.S. replacement heifer prices, and the milk price received by U.S. producers. Given this evidence, it would be hard to argue that the stoppage of Canadian imports would be responsible for the higher U.S. milk prices observed in the past two years. It is more likely that the higher prices were the result of the reduction in milk production that occurred as a result of very low milk prices observed in the 2002-2003 time period followed by strong demand for dairy products due to a recovering economy and personal income growth. The statistical evidence supports the contention that resuming dairy cattle imports from Canada at prior levels would have little, if any, impact upon U.S. milk prices. Rather, it would appear that the CWT program has affected US milk and heifer prices in the manner attributed to US imports of Canadian dairy heifers.

4.2 Causal Analysis of U.S. Milk Prices, U.S. Cow Numbers, and Canadian Dairy Imports

In the previous section, it was suggested that changes in the U.S. milk price cause changes in the U.S. cow numbers which in turn, caused further changes in U.S. milk prices. In other words, the primary driver of milk price dynamics is a feedback loop between prices and cow numbers (i.e., production). Higher milk prices result in higher real and perceived producer profitability which results in an expansion in cow numbers. Higher cow numbers result in higher milk production (since production per cow is generally an increasing trend) which results in lower prices and therefore, lower profitability. Therefore, producers contract the size of their herds which results in lower production and higher prices. It is basically the cobweb theorem of price and production adjustment. Whether imports of Canadian dairy cattle play a role in this feedback loop is the question we would like to address in this section.

To analyze the dynamics of this system, we apply a standard time series technique called Granger Causality. This technique uses F-tests on the coefficients of a vector autoregressive (VAR) time series model to test the hypothesis that changes in one variable statistically appear to "cause" changes in another variable. To set up our model, we used a dataset of monthly values for average U.S. milk price received by producers in dollars per hundredweight (MILKPRC), U.S. dairy cow numbers in thousand head (COWNUM), and total U.S. imports of Canadian dairy cattle based on APHIS data (CANIMP). The monthly values run from January 1985 through August 2005. To account for the stoppage of imports from Canada, a dummy variable is constructed which is equal to zero prior to June 2003 and is equal to one thereafter. The dummy variable (POSTBAN) is included as an exogenous variable in each of the VAR equations.

The VAR equations are estimated with lags up to 12 months for each variable. This allows plenty of time for adjustments to be made throughout the system. The forms of the VAR equations are as follows:

COWNUM = f[COWNUM(lag 1 to 12), MLKPRC(lag 1 to 12), CANIMP(lag 1 to 12), POSTBAN],

MLKPRC = f[MLKPRC(lag 1 to 12), COWNUM(lag 1 to 12), CANIMP(lag 1 to 12), POSTBAN],

CANIMP = f[CANIMP(lag 1 to 12), COWNUM(lag 1 to 12), MLKPRC(lag 1 to 12), POSTBAN].

Table 4.1 below summarizes the F-statistic values for VAR equations (two stars indicates significance at the 95% level, one star indicates significance at the 90% level)

Table 4.1 F-Statistic Values From Granger Causality Test

	Independent Variable		
Dependent Variable	COWNUM	MLKPRC	CANIMP
COWNUM	---	1.836*	0.859
MLKPRC	2.092**	---	1.187
CANIMP	1.328	1.534	---

The dummy variable for the import stoppage, POSTBAN, was only statistically significant in the Canadian import equation. Therefore, the import stoppage does not appear to have had any statistically significant impact upon the dynamics of U.S. milk prices and cow numbers.

These results show that the primary driver of milk prices during this time period was the feedback loop between overall U.S. cow numbers and milk prices. Canadian imports did not appear to provide any statistically significant impact upon the U.S. milk price dynamics during the January 1985 through August 2005 time period that was examined.

5.0 Conclusions

The purpose of this study was to consider the economic impacts of a reopening of the Canada-US border to trade in dairy heifers and breeding stock. To do so, the following was undertaken. First, a complete review of data describing the demographics of the Canadian and US dairy herds was undertaken. Next, a set of surveys and structured interviews were undertaken with producers and livestock dealers in the US to gauge their impressions of Canadian dairy cattle and the border closure, and former Canadian exporters were interviewed. Finally, the data relating market outcomes to US imports of Canadian dairy heifers was described and statistically analyzed.

The following observations emerged from this analysis:

- Prior to the border closure in May, 2003 the Canadian inventory of dairy heifers was steady at around 500,000 head. Since the border closure, inventories have increased to around 525,000 head.
- Data on cull rates in eastern Canada suggest that the maximum proportion of the heifer inventory that would be available for export is around 20%. In other words, not accounting for dairy expansions or cow mortalities, 80% of the Canadian heifer inventory is needed for replacements in Canada.
- Because the dairy market in Canada is supply managed, the Canadian dairy cow herd is stable to slightly decreasing. This makes the inventory of dairy heifers stable at around 500,000 head.
- Dairy heifers are held by dairy farmers, specialized heifer raisers, and mixed dairy/beef enterprises. The dairy heifer raising business is unique to Ontario and Quebec. The bulk of heifers exported, particularly commercial breeding cattle, come via dairy heifer raisers. Data from Ontario and Quebec suggest that heifer raisers held relatively fewer heifers

after the May, 2003 case of BSE, and relatively more heifers were held by dairy farmers and dairy/beef enterprises. The number of farms in the heifer raising business has declined.

- The US dairy heifer inventory has been steady in recent years in the range of 4 million head. At its height in 2002, US imports of Canadian dairy heifers numbered 65,000 head, or about 1.6% of US dairy heifer inventory.
- According to US dairy producers and cattle dealers, most value the quality and relative sturdiness of Canadian cattle. However, past purchases of Canadian cattle by the US have been dependent on the demand/shortage of dairy heifers in the US, the price of Canadian dairy heifers, and the Canada-US currency exchange rate.
- Most US producers and dealers believe that the border closure to trade in dairy breeding animals is inappropriate and should removed. A minority of producers supported the border measure, and connected the border closure with increased milk prices.
- The former dairy cattle exporters in Canada largely validated the market factors identified by US producers and dealers in influencing purchases of Canadian cattle. Most said that Canadian cattle were perceived by US customers to be of premium quality, but that heifer pricing and (especially) the exchange rate were critical factors driving sales to American customers in the past.
- Former Canadian exporters also agreed with American producers and dealers that if the border opened immediately to trade, time would be required before meaningful trade resumed. In particular, former Canadian exporters indicated that the capacity to custom raise, transport, and inspect dairy heifers is greatly diminished relative to May, 2003. Many of the individuals and organizations engaged in exporting dairy cattle to the US are out of business, have converted facilities to milk production, or have gone into another line of business.
- The empirical analysis of past market data as it relates to the impact of US imports of Canadian dairy cattle produced surprisingly clear conclusions. First, it is evident that US heifer prices have the effect of pulling Canadian cattle into the US market. This is evident from the positive relationship that exists between US imports of Canadian cattle and US heifer prices.
- A positive relationship was also observed between the US milk-feed price ratio and US dairy heifer imports from Canada, which suggests that enhanced profitability in US milk production supports demand for dairy heifers. No relationship was found to exist between US imports of Canadian dairy heifers and US milk prices.
- US imports of dairy heifers from Canada exhibited a strong relationship with the exchange rate. Clearly, as the Canadian dollar weakened relative to the US, US imports from Canada increased. The data from 2003 were truncated by the border closure, so evidence regarding the impact of the strengthening Canadian dollar less clear.
- An empirical investigation was completed as to the direction of causation of US imports from Canada in US dairy markets. The results showed that imports from Canada had no statistically significant impact on the US dairy cow herd. Imports of dairy heifers from Canada also had no statistically significant impact on heifer prices in the US, nor on US

milk prices. These findings were robust to a wide range in potential time lags tested in the analysis of causation.

The view that emerges from the analysis is of a market for dairy heifers that was essentially North American in scale, and one in which US-driven demand for heifers resulted in imports from Canada. Discussions with market participants on both sides of the border indicate that quality of Canadian cattle was an element to this trade; however, basic supply and demand and the currency exchange rate were of greater importance. In other words, prior to May, 2003 it appears that the North American dairy heifer market was operating as one might expect, with Canada serving as a residual supplier of dairy replacements when either a shortage existed, when a preference for premium quality existed, or when the combination of price and exchange rates favored importation from the perspective of US dairy producers and dealers. The data suggest that this trade was essentially immaterial to the larger workings of the US dairy industry in terms of the US cow herd, US heifer prices, and US milk prices.

The situation is markedly different today. After a thirty month prohibition on trade, it appears that the participants involved in Canadian dairy cattle exports are largely out of business or have shifted into other ventures. The productive capacity and infrastructure that facilitated trade in dairy heifers has declined sharply. Just as importantly, the currency exchange rate conditions that both Canadians and Americans suggested were critical to trade flows are entirely different than prior to 2003. Given these factors, discussions on both sides of the border suggested that even if the border were opened to trade tomorrow, some time would be required for adjustment to a resumption in trade, and it is entirely unclear (and indeed unlikely, because of the aforementioned factors) that the trade would resume at its previous levels.

References

Lang, Brian. *The Real Cost of Raising Heifers*, Ontario Ministry of Agriculture and Food Factsheet. September, 2003.
http://www.omafra.gov.on.ca/english/livestock/dairy/facts/info_costraisheif.htm

Appendix A
Questionnaire Provided to US Cattle Dealers and Producers

Dairy Imports/Exports
U.S.-Canadian Questionnaire

As the BSE crisis in the North American cattle industry continues and the US/Canada border remains closed to trade in cattle, Informa Economics and the George Morris Centre have been asked to investigate the impact of this closure on the dairy industries in the two countries.

All individual responses will remain confidential, and results will only be reported in summary format**.** Thank you for your assistance.

Name:…… **Address**: ……

Company Name: ……... ……...

……... ……..

Phone: ……. **E-mail**:……..

1. Your company's primary business: (Please circle correct answers)

a) Producer c) Transporter e) Gov't official
b) Dealer d) Association f) Other:…….

2. The type of animals handled:

a) Dairy cows & heifers c) For slaughter e) Calves
b) Purebred dairy d) For feeding out f) Other:……..

3. Company's trading activities (before BSE in N. America):

a) Import b) Export c) Domestic only

If your answer to this question is c) please stop here.

4. Number of animals imported/exported annually:

	Average	Highest	Lowest
Imported	…….	……..	……..
Exported	…….	……..	……..
Indicate year at highest & lowest number		……..	……..

5. Breakdown of animals imported/exported annually:

	Imported	**Exported**
a) Dairy cows & heifers	……	……
b) Purebred dairy	……	……
c) For slaughter	……	……
d) For feeding out	……	……
e) Other	……	……

6. Importance of genetic quality of animals (1-lowest 5-highest): 1 2 3 4 5

Questions related to Canadian border closure – Please discuss

7. What factors routinely impact your company's import/export decision the most?
……
……
…..……
……
……..

8. Impact of border closing on your business (be as specific as you can)
……
……
…..……
……
……..

9. How much reduction in number of animals handled have you experienced?
……
……
…..……
……
……..

10. What will be the biggest restraint or adjustment in returning to normal business levels?
……
……
…..……
……
……..

11. What do you believe the perception is of Canadian dairy cattle and genetics in the US?
……
……

12. What role do you believe that imports of dairy cows and heifers have in the US dairy industry?

……
……
……
……..

13. What impact do you think the border closure is having on the US dairy industry?
……
……
……
……..

14. What do you think the impact would be if the border were reopened to imports of Canadian dairy cows and heifers tomorrow?
……
……
…..……
……
……..

15. What do you hear from the market place – such as farmers, processors, or livestock dealers concerning this issue?
……
……
…..……
……
……..

16. Do you believe that the existing border closure is an appropriate response to the cases of BSE in Canada? In other words, is existing policy appropriate?
……
……
……..

17. What recommendations would you make to government authorities regarding resumption of trade in dairy cows and heifers?
……
……
……..

PLEASE FAX THE COMPLETED QUESTIONNAIRE BACK TO 651-635-0857

OR USE THE ENCLOSED PREPAID ENVELOPE

THANK YOU!

Appendix B
Questionnaire Provided to Canadian Cattle Exporters

U.S.-Canadian Questionnaire

As the BSE crisis in the North American cattle industry continues and the US/Canada border remains closed to trade in cattle, Informa Economics and the George Morris Centre have been asked to investigate the impact of this closure on the dairy industries in the two countries.
All individual responses will remain confidential, and results will only be reported in summary format**.** Thank you for your assistance.

Name:…… **Address**: ……

Company Name: ……... ……...

……... ……..

Phone: ……. **E-mail**:……..

1. Your company's primary business: (Please circle correct answers)

a) Producer c) Transporter e) Gov't official
b) Dealer d) Association f) Other:…….

2. The type of animals handled:

a) Dairy cows & heifers c) For slaughter e) Calves
b) Purebred dairy d) For feeding out f) Other:……..

3. Company's trading activities (before BSE in N. America):

a) Import b) Export c) Domestic only

If your answer to this question is c) please stop here.

4. Number of animals imported/exported annually:

	Average	Highest	Lowest
Imported	…….	……..	……..
Exported	…….	……..	……..
Indicate year at highest & lowest number		……..	……..

5. Breakdown of animals imported/exported annually:

	Imported	**Exported**
a) Dairy cows & heifers	……	……
b) Purebred dairy	……	……
c) For slaughter	……	……
d) For feeding out	……	……
e) Other	……	……

6. Importance of genetic quality of animals (1-lowest 5-highest): 1 2 3 4 5

Questions related to Canadian border closure – Please discuss

7. What do you feel was your US customers' most important consideration in purchasing Canadian dairy cattle? (be as specific as you can)
……
……
…..……

8. Do your American customers perceive differences between US and Canadian dairy cattle? If so, what are they?
……
……
…..……

9. If the border opened to dairy heifers and cows tomorrow, what would be the impact on your business? What about on the Canadian dairy genetics industry as a whole? How long do you believe it would take for these impacts to occur?
……
……
…..……

10. Have there been changes in the availability of cattle trade infrastructure (trucking services, border inspection, etc.) since May, 2003? If so, what significance does it have?
……
……
…..……

11. What have you heard from your industry peers and competitors related to this?
……
……
…..……

THANK YOU!