FARM LEVEL CONSEQUENCES OF CANADIAN AND U.S. DAIRY POLICIES

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Dairy farmers on both the U.S. and Canadian sides of the border have reason to be apprehensive about the future. From a U.S. perspective, the 1996 Farm Bill mandated a process of dairy policy reform that could lead to essentially free market conditions — something not seen in the U.S. dairy industry since the 1920s. Canadian farmers await the implementation of provisions which would allow limited movement of quotas across provincial lines. Unknown are the impacts of the next round of trade negotiations conducted under the auspices of the new World Trade Organization (WTO).

Dairy farmers and policymakers on both sides of the border need to know where they stand from a competitiveness perspective in order to evaluate the impacts of policy change — whether they be intra- or inter-country. Studies of the impacts of dairy policy reform have not been consistently illuminating in terms of impacts of major policy change on the competitive relationships between Canadian and U.S. dairy farmers. As a general principle, U.S. economists have found there to be a 25-30 percent cost advantage in favor of U.S. dairy farms (Baker, Halbrook, Tanjuakio, Elterich, Beck and Liebrand, and Nicholson and Knoblaugh). Canadian economists conclude that their farms would be cost competitive, particularly considering anticipated increases in farm size resulting from eliminating its production controls (Barichello and Stennes and Barichello and Romain).

From a trade perspective, the research results likewise conflict. In this case, U.S. economists disagree among themselves. A study by Hallberg and Baker indicates a sharp drop in Canadian production would result from a lifting of the two countries' dairy trade restrictions. On the other hand, a study by Novakovic, Doyon and Bishop indicates net exports of manufactured products (primarily cheese) from Ontario and Quebec to the Northeast U.S. markets. While the U.S. manufacturers would serve Western Canada markets, a net positive balance of trade in dairy would exist for Canada. Bromfield, Jenness and Justus utilized the Hallberg results to conclude that the welfare of Canadian dairy farmers would be significantly reduced. Meilke, Sarker and

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LeRoy attribute these differences in conclusions to the assumptions of the models utilized in each study.

U.S. Dairy Policy

The 1996 Farm Bill brought about monumental change in U.S. dairy policy — the biggest change since 1933. Arguably, dairy was the biggest loser in the U.S. farm bill debate. This occurred because the producer side of the industry was regionally fragmented while the processor side was unified.

Since 1949, U.S. dairy policy included the following three components which were modified by the Uruguay Round requirements and the 1996 Farm Bill:

- Federal Milk Marketing Orders (FMMO) price milk on the basis of use (classical price discrimination) and distance from Eau Claire, Wisconsin (classical basing point pricing). Arguably, this pricing system may have conformed with economic conditions of the 1930s, when Wisconsin was generally recognized as the least cost production area and it cost more to produce Grade A than Grade B milk. Since at least 1975, the earliest year in which uniform data is available, the area with the lowest total economic cost of production has shifted out of Wisconsin to the West (Betts). Moreover, Grade B production has virtually disappeared, even though the Minnesota-Wisconsin Price Series (M-W) for Grade B milk served as the price setter for milk used in manufacturing cheese (Class III) and as the price mover for soft (Class II) and fluid products (Class I) (University Study Committee). In a word, the U.S. dairy industry has been operating with an antiquated pricing system for at least 20 years (Milk Pricing Advisory Committee).
- Under the Milk Price Support Program, USDA has stood ready to purchase butter, nonfat dry milk and cheese at a price designed to achieve a minimum producer price support level. Until 1988, the support level, often based on the economically antiquated parity concept, effectively set the manufactured product price and, therefore, the M-W price. The M-W price was used for pricing milk for manufacturing cheese under Federal orders. Beginning in 1983, the producers were required to pay for a portion of the cost of operating the price support program (Blaney, Miller and Stillman). This policy was

implemented through an assessment per cwt of milk marketed. The assessment which, at its peak, was $0.50 per cwt was extremely unpopular.

- To assure that the Milk Price Support Program was not effectively undergirding the price of milk throughout the world, import quotas were established by a combination of legislation (Section 22 of the Agricultural Adjustment Act of 1933) and executive orders.

The combination of the Uruguay Round trade agreement and the 1996 Farm Bill radically changed U.S. dairy policy in the following ways (Economic Research Service):

- Import quotas were reduced consistent with the Uruguay Round requirements. In contrast with Canada, the U.S. dairy industry received little or no special consideration — perhaps because the U.S. dairy farmer lobby has been in political disarray.
- The price support program is scheduled to be completely eliminated on December 31, 1999. This was the price U.S. dairy farmers paid for eliminating the assessment. Section 22 import quotas were replaced by tariff rate quotas agreed to under the WTO provisions resulting from the Uruguay Round. Substituting for the Price Support Program is a Recourse Loan Program which will allow manufactured product processors to obtain government loans using manufactured dairy products in storage as collateral. Since a recourse loan is no different than a private sector inventory loan, it will have no price supporting virtues. Therefore, on January 1, 2000, the only source of price support protection will be the tariff rate quota operating on manufactured products. Most likely, the volume level at which the tariff is imposed will be increased by the next round of trade negotiations, moving the U.S. dairy industry further in the direction of free trade in dairy products.
- Reform of the FMMO system was mandated. The only dimension of this reform process that is known at this time is that the number of orders will be reduced from 38 to 14 or less. The most recent USDA proposal is for 11 orders. The Secretary of Agriculture has also indicated that a substitute must be found for the M-W price series. A manufactured product based formula, a component pricing procedure, a Grade A competitive price series, and a Four Class combination of component pricing cheese and a product formula for butter and nonfat dry milk are under consideration. Product pricing proposals were poisoned by a controversial University of Wisconsin study indicating that the price of

cheese is monopolistically manipulated (Mueller, Marion, Sial and Geithman) — a conclusion that has been disputed (Gardner). Also being considered is a modification of the Eau Claire based Class I price surface with options ranging from a flat price to various multiple basing point concepts.

The point to be derived from this summary is that U.S. dairy policy is being modernized and appears to be moving decisively in the direction of less government involvement in pricing.

Canadian Dairy Policy

Like the United States, Canadian dairy policy was affected by the Uruguay Round (Barichello and Romain). However, the basics of supply management, which have been in existence since 1970, remain intact.[1] The primary implementing agency is the Canadian Dairy Commission, although provincial policy is more important in Canada than state policy is in the United States.

Prior to Uruguay Round-induced modifications, Canadian dairy policy included the following components:

- A national market sharing quota for milk used for manufacturing (industrial milk) was allocated among the provinces based on historical market shares. The industrial quota reflects estimated domestic requirements plus exports (a small percentage) at the established price. Until 1995, fluid milk quotas and pricing were determined at the provincial level. In most provinces, a public quota market has existed for both fluid and industrial milk and quotas are traded among producers. However, provincial limits generally have existed on the quantity of quota held by a producer.
- The established target price for industrial milk is set on the basis of the average cost of production as determined from survey data. This target price has been achieved by a combination of a support price for butter and nonfat dry milk (NDM) in conjunction with a direct federal subsidy which was $C 6.03/hl (approximately U.S. $2.20 per cwt) until 1992.
- Different classified pricing systems were practiced by the provinces.

[1]See Coffin, Flaten, Rosaasen and Proulx for an excellent description of the origin and evolution of the Canadian supply management system.

- Surplus removal/price support and adequate fulfillment of seasonal market demand were achieved by a combination of processor sale to the Canadian Dairy Commission (CDC) and repurchased within the year, and by CDC purchases of butter and NDM. Manufactured products not needed were exported at the world market price and producers paid the loss.
- Funding for CDC activities resulted from a combination of within-quota and over-quota levies on a per hl basis.

Subsequent to the Uruguay Round Agreement, the following changes were made in Canadian dairy policy, with an effective date of August 1995 except where otherwise indicated:

- All provinces accepted five milk classes. Because producer levies for export were not acceptable under the Uruguay Round, Class 5 was established as an export class. In order to share the cost of exporting among all producers, provinces agreed to pool milk revenues at the national level. Interestingly, a similar plan has been proposed for U.S. FMMOs. However, the USDA has determined that such a plan would violate the spirit, if not the letter, of WTO policy. Some provinces have employed a classic two-price plan whereby producers are allowed to contract with processors for export, accepting the export price for milk.
- While a common quota exchange market policy has been agreed upon by six provinces, until now it has been implemented only between Quebec and Nova Scotia. Fear apparently exists of the potential for substantial interprovincial quota transfer — a fear that may be well-founded. However, most provincial limits on quantity of quota held or purchased by a producer appear to have been eliminated.
- CDC price support purchases are limited to ensuring an adequate seasonal supply of milk products during deficit periods. When surpluses are anticipated, CDC contracts with processors for products suitable for export with the margin being negotiated. Milk used to process dairy products sold under this program is paid the Class 5 price.

Anticipated Policy Impacts

The key dairy policy difference between the United States and Canada involves the Canadian practice of supply management over the past 25 years. Concurrently, the CDC and its provincial

dairy board counterparts have administered/set prices. While the U.S. dairy policy, from time to time, has attempted to overtly bring production in line with consumption, through programs such as buying farmers out of production, price has been the primary means of adjusting production to market needs. Economic theory provides considerable insight into the expected impacts of these policy differences.

Profit Maximization. Consider a profit maximizing producer endowed with a given size of fixed equipment which can accommodate a maximum number of cows n*. In a competitive market, the problem can be expressed as:

$$\underset{(n,\,Y)}{\text{Max}}\ \Pi = nPY - nC(Y) - nW - F, \quad \text{subject to } n \le n^*,$$

where Π is profit, P is the price of milk, n is the number of cows, C(Y) is the variable cost function per cow (mainly feeding cost), W is the purchase price of a cow, and F is fixed cost. The Kuhn-Tucker conditions are:

$P - C'(Y) = 0$ where $C'(Y)$ is marginal cost;

$PY - C(Y) - W - \lambda \le 0$; $n \ge 0$; and $n(PY - C(Y) - W - \lambda) = 0$; where λ is the Lagrange multiplier;

$n^* - n \ge 0$; $\lambda \ge 0$; and $\lambda\,(n^* - n) = 0$.

Assuming a positive gross margin ($PY - C(Y) - W \ge 0$), then $\lambda > 0$ and the optimal decision for the producer is, of course, to produce where marginal cost equals marginal revenue for all cows and to use its fixed equipment (barn for example) to full capacity ($n = n^*$).

Under a whole farm quota restriction, associated with high levies for over quota production, the profit maximizing problem is the following:

$$\underset{(n,\,Y)}{\text{Max}}\ \Pi = nPY - nC(Y) - nW - F, \quad \text{subject to } n \le n^* \text{ and to } nY = Q.$$

The Kuhn-Tucker conditions are:

(1) $P - C'(Y) - \mu = 0$ where μ is the Lagrange multiplier associated with the quota constraint;

(2) $PY - C(Y) - W - \lambda - \mu Y \le 0$; $n \ge 0$; and $n(PY - C(Y) - W - \lambda - \mu Y) = 0$;

(3) $n^* - n \ge 0$; $\lambda \ge 0$; and $\lambda\,(n^* - n) = 0$;

(4) and finally $Q - nY = 0$.

The first equation implies $\mu = P - C'(Y)$ and, assuming a positive number of cows, the second equation implies $\mu = (PY - C(Y) - W - \lambda)/Y$. Therefore, this implies the equality:

(5) $C'(Y) = (C(Y) + W + \lambda)/Y$.

Equation 5 implies an interesting result with respect to the optimal level of yield per cow that the profit maximizing producer would target. If n* is not binding, $\lambda = 0$ and equation 5 implies that the optimal level of production per cow is at the level where marginal cost equals average variable cost plus the purchase price of the cow per unit of production. This optimum yield per cow may be close to the point where average variable (feeding) cost is at its minimum, hence lower than the competitive market equilibrium. In fact, the above result merely says that under a quota system that is produced with independent production units (cows), the maximum profit when n* is not binding will be obtained by maximizing average profits from each production unit. The quota of the farm is then fulfilled by buying the appropriate number of cows. If n* is reached before the quota is fulfilled, producers will then begin increasing yield per cow with extra feeding. λ will become positive and reflect the shadow profit that could be earned with extra fixed facilities.

When n* is not binding, the comparative statics of the above results show that yield per cow is not affected by a variation in quota. At the optimum, a decrease in quota would imply a decrease in the number of cows ($\partial Y/\partial Q = 0$ and $\partial n/\partial Q = 1/Y$). However, when n* is binding, the optimal solution is to first diminish yield per cow until n* is no longer effective ($\partial Y/\partial Q = 1/n$ and $\partial n/\partial Q = 0$), and then decrease the number of cows if needed. If Canadian farmers maximize profits, the above results would suggest that producers can rationally choose to decrease yield per cow rather than the average farm size.

Size of Farm. With respect to farm size, both national and provincial regulations have contributed to discourage/reduce growth in farm size. At the national level, there was a limit on the federal subsidy per farm. Each farm would not receive the subsidy on milk produced over 18,000 kg of butterfat unless they had special permission. This legislation was abolished in 1996. Until recently, in some provinces, other regulations were either reducing growth or fixing limits on farm size. The following regulations may have had a significant impact on the evolution in farm size in Quebec and Ontario, as will be shown in a forthcoming section.

- In Quebec, purchases of quota (MSQ) could not exceed 2,500 kg of butterfat per year, or 250 liters per day of fluid milk. This regulation was abolished a few years ago and since then, an increasing number of transactions have exceeded the limit according to the Federation of Dairy Producers.
- In Ontario, at the beginning of the 1990s, no operations could have more than 3,000 liters per day of combined quota without permission of the Ontario Milk Marketing Board. Permission for increasing farm size above 4,400 liters per day was likely to be refused, and it was definitely refused when increases in farm size above 5,000 liters per day were sought. This regulation was modified a few years ago with the current limit being 50,000 kg of butterfat per year. Permission must be obtained for each subsequent 25,000 kg of butterfat although permission is easily granted, according to Dairy Farmers of Ontario.
- Manitoba had a limit of 400 kg of butterfat per day until December 31, 1995. This limit does not appear to have been effectively enforced and no longer exists.
- Saskatchewan has a limit of 4,500 liters per day. However, farmers can request more quota and if the requesting party is determined to be a privately-owned family farm, the permission is always granted. A spokesperson for the Saskatchewan Milk Marketing Board indicated that several farmers were over the limit.
- Alberta has no quota limits.
- British Columbia has no quota limits.

Even without considering the provincial regulations mentioned above, economic theory suggests that increasing average farm size would be slowed under supply management. Over the years, levies on over-quota production were at a level high enough to discourage over-quota production completely. Therefore, farmers have to buy quota to increase production and the demand for quota originates from the following two sources:

- The demand to meet the increase in cow productivity from one year to the next, due to improved management practices as well as improved genetic quality of the herd, results in a shift in the production function.
- The demand for expansion of the herd (increase in size), which requires an extra set of fixed inputs (barn, land, etc.).

Utilizing the model presented, these two types of demand would not lead producers to bid the same maximum price for quota. Note that μ in equations 1 and 2 is the maximum rental value for quota that one particular profit maximizing producer is willing to pay, and this translates into a maximum bidding price for quota on the market. Similarly, λ in equations 2 and 3 is the marginal profit that would be earned with fixed facilities for one extra cow. Therefore, λ is the maximum amount a producer is willing to invest to obtain these facilities. Now, consider a shift in the production function. This has a direct impact on the cost function. Therefore, at a given quota level, the maximum rental price for extra quota is increased by the total decrease in cost due to the shift in technology.

On the other hand, extra facilities to increase the maximum number of cows, n*, without a shift in technology, do not translate into a shift in the variable cost function. Keeping the quota level constant, comparative static analysis shows that the decrease in yield per cow is less than one when n* is increased ($\partial Y/\partial n^* = -1/n$), which implies that the increase in the maximum rental price for extra quota is less than that due to the shift in technology. Moreover, fixed facilities would have to be bought and financed, which would dampen total profit as compared to the shift in technology. Therefore, a producer would be able to bid a higher price for extra quota when he enjoys a shift in technology than when the producer wants to increase the maximum number of cows, n*, unless significant economies of size occur (this case is not dealt with in this paper). Considering that quota prices are determined at the provincial level where both types of demand for quota meet, only producers with lower cost functions will be able to afford buying quota for expansion. This fact alone would slow the average growth of farm size in the dairy sector.

Structural Characteristics

From a U.S. perspective, the most basic structural characteristic of the dairy industry has been the trend toward fewer but larger farms. The driving force in this trend has been economies of size. Some of the most extensive research on U.S. economies of size in dairying was undertaken by the Office of Technology Assessment. It demonstrated that, in the early 1980s, reductions in costs per unit were evident up to at least 1,300 cows and that the drops in costs were substantial up to 500 cows (U.S. Congress, p. 192).

The trend toward fewer but larger farms has been revealed in both the United States and Canada. From the early 1970s to the early 1990s, the number of dairy farms declined by 63 percent in the United States compared with 73 percent in Canada (Table 1). State/provincial changes reveal the same basic trends. A slower rate of decline is indicated for New York (46 percent) versus Ontario (51 percent) and for Vermont (39 percent) versus Quebec (51 percent). British Columbia and Washington both experienced a 57 percent decline in number of farms from the late 1970s through the early 1990s.

As farm numbers have declined, the average number of cows per farm has increased (Tables 1 and 2). For the United States, cows per farm increased by 144 percent from the early 1970s through the early 1990s, while the Canadian increase was 113 percent. From the late 1970s through the early 1990s, the Canadian increases in the three largest milk producing provinces were less than half that of the United States. To the extent that farm size is an indicator of efficiency, these data suggest that Canada is falling further behind the United States in terms of competitiveness.

A key variable influencing profitability in the United States is the level of milk output per cow. Figure 1 indicates that the average Canadian output per cow is 79 percent of average U.S. output over the period 1976-95. While U.S. output per cow increases at an annual average rate of 8.4 percent over the period, Canadian output increases at 7.6 percent. The result is an increasing gap between Canadian and U.S. output per cow. The gap widens in the period since 1989 when the national quota (MSQ) was reduced to cut surplus production and program costs.

Table 1. Structural Characteristics of U.S. and Canadian Dairy Farms, 1971-1992

Year	Number of Farms		Average Number of Cows/Farm	
	United States	Canada	United States	Canada
1971-72	475,000	145,000	25	16
1974-76	403,754	97,000	26	21
1981-82	277,762	68,000	39	26
1986-87	202,068	50,000	54	29
1991-92	155,339	39,000	61	34
Percent Change	-67.30	-73.10	144.00	112.50

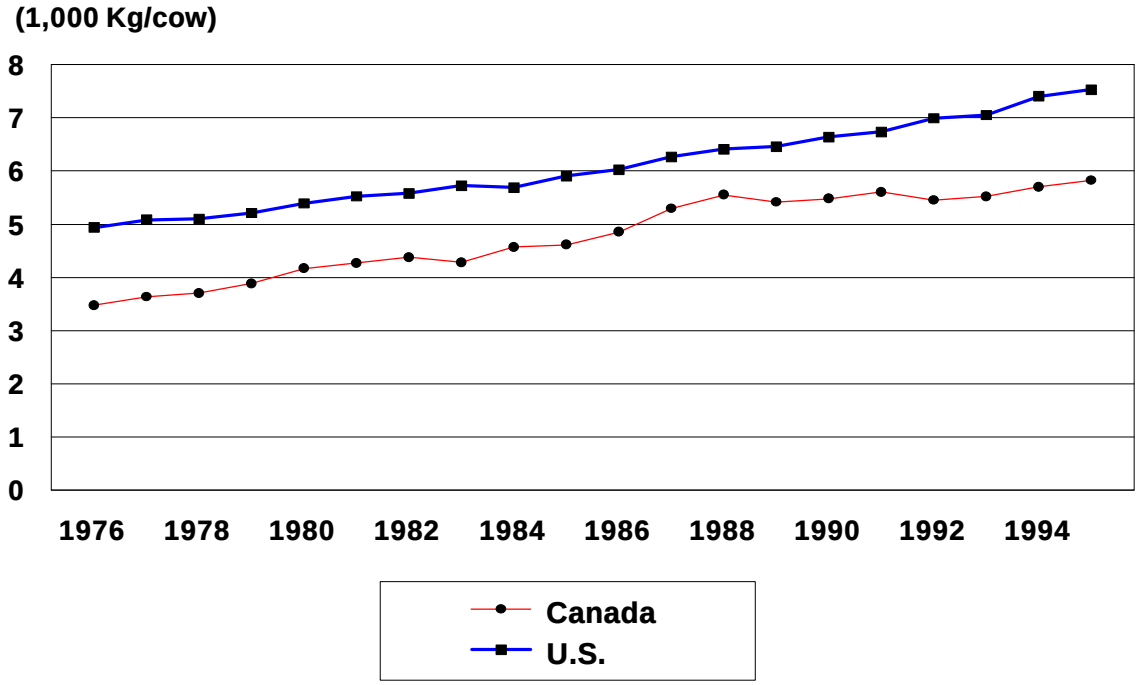
Sources: USDA, Agriculture and Agri-Food Canada

Table 2. Structural Characteristics of U.S. and Canadian Farms by State and Province, 1976-1992

Year	N.Y.	Vt.	Wa.	Que.	Ont.	B.C.
Number of Farms						
1976-78	19,674	3,919	4,353	29,075	23,628	4,818
1981-82	17,236	3,585	3,608	22,175	17,637	3,695
1986-87	13,840	2,846	2,410	17,633	14,025	2,601
1991-92	10,696	2,373	1,842	14,110	11,644	2,038
Percent Change	-45.63	-39.45	-57.68	-51.47	-50.72	-57.70
Average Number of Cows/Farm						
1976-78	44	48	45	31	36	62
1981-82	51	53	58	34	38	76
1986-87	59	63	92	33	39	71
1991-92	67	71	132	38	43	76
Percent Change	53.81	48.45	193.02	22.58	19.44	22.58

Source: USDA, Agriculture and Agri-Food Canada

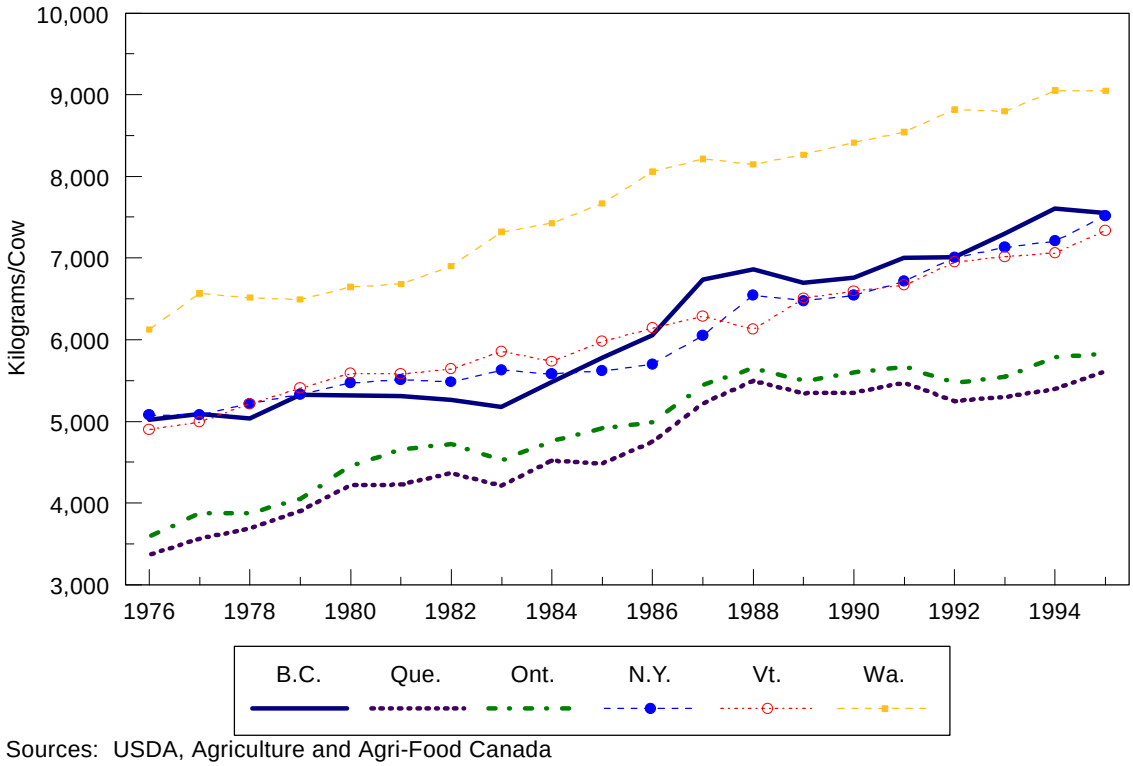
Figure 1. Canadian and U.S. Output per Cow, 1976-95.



Therefore, as suggested by economic theory, the Canadian output per cow is less than for the United States because, with the quota being binding and considering the extra cost of buying quota or the much reduced revenue from over quota production, the level of feeding is reduced to the point where the desired output per cow is realized. This output per cow could be expected to approximate the minimum feed costs.

Comparisons across provinces and with U.S. cross-border states are more revealing of competitive relationships than the average output per cow (Figure 2). Washington has an output per cow about 1,500 kg greater than British Columbia with the gap having widened over the 1976-1995 period. The New York output per cow is about 1,900 kg larger than Ontario while Vermont is about 1,700 kg higher. Once again, the gap appears to be widening between U.S. and Canadian dairy farms. The binding nature of quota transfers, the cost of the quota, and the lower revenue from over quota milk not only results in lower milk output per cow (Figure 2), but also restrains the growth in size of farm (Table 2). The consequences of the different policy environments are very apparent from these data.

Figure 2. Output per Cow by Province and by State, 1976-1995.



Sources: USDA, Agriculture and Agri-Food Canada

Representative Farm Analysis

In January 1997, data for two representative Quebec dairy farms were developed. Quebec producers provided data for a moderate and large dairy farm. The producers judged that 70 and 125 milk cows were representative of moderate and large farms in the province.

The Agricultural and Food Policy Center had previously developed representative dairy farms in Vermont and Central New York. Table 3 contains selected descriptive statistics for the four U.S. representative farms and their close counterparts in Quebec. The moderate and large farms in Vermont respectively have 85 and 350 cows while the New York farms have 110 and 300 cows. The two large U.S. farms are nearly three times as large as their Quebec counterpart.

In terms of assets per cow, the Canadian farms are more highly capitalized than the U.S. representative farms. The critical issue in determining how much more highly capitalized involves whether to include quota values. Quotas were originally given to farmers who were in dairying. Most farms are transferred from father to son, which is illustrated by the moderate size panel where all panel members were relatively young sons or daughters of retired dairy farmers. In this case, the father foregoes most of the quota value to ensure that the successor generation will be set up in dairying. When the quota value is ignored, the moderate and large Quebec farms have assets per cow of $C 10,786 and $C 12,329, respectively. That compares to assets per cow on the Central New York and Vermont farms ranging from $C 6,612 to $C 10,379, respectively. With quota fully valued, the moderate and large Quebec farms have assets per cow of $C 20,786 and $C 21,993 respectively.

Table 3. Characteristics of Representative Quebec, Central New York, and Vermont Dairy Farms.

	Central New York		Vermont		Quebec	
	Moderate	Large	Moderate	Large	Moderate	Large
No. of Cows	110	300	85	350	70	125
Milk Prod/Cow (hl)	97	95	99	97	70	77
Hectares[1/]	140	485	101	303	123	165
Assets/Cow Without Quota $C	7,373	6,613	10,379	7,023	10,786	12,329
Assets/Cow With Quota $C	NA	NA	NA	NA	20,786	21,993

[1/] 1 ac. = 0.404 ha.

The moderate and large representative Quebec farms have milk production per cow of 70 hl and 77 hl, respectively. Milk production per cow on the four U.S. farms ranges from 95 to 99 hl. The U.S. farms had an output per cow that was 37 percent (moderate) and 29 percent (large) higher than the Quebec counterparts. It is important to note that the difference in the provincial and state output per cow is in the range of 31-34 percent. However, these representative farms would be above average compared to the rest of the province. DHIA data for Canada indicated production per cow to be about 75 hl. That is within the range of the two representative Quebec farms.

Simulation Results

To examine the economic outlook for these representative dairies, the data was used in a whole farm simulation model, FLIPSIM (Richardson and Nixon). FLIPSIM simulates the annual activities of a farm using accounting equations, identities, and probability distributions. The financial performance of the farm is simulated over a planning horizon using agricultural sector and macroeconomic projections.

Price and economic projections were developed for the United States and Canada by FAPRI and Ag Canada, and are summarized in Table 4 for the period 1996-2002. For the U.S. and Canadian dairy farms, the baselines suggest generally lower feed costs, particularly in the middle of the period. For the U.S., FAPRI projects lower milk prices throughout the period due to the combination of lower feed costs and the benefits of larger farm size leading to lower average costs of production. Canada, on the other hand, is projected to experience persistent increases in milk prices throughout the period.

The Quebec farms experience increasing gross receipts throughout the study period caused by steadily increasing milk prices and higher cattle prices. Total cash expenses decline due to falling feed prices that overwhelm higher inflation-driven costs for other purchased inputs. Cash costs per hl of milk over the study period averaged about $C 39 and $C 37 per hl for the moderate and large Quebec farms, respectively. The U.S. farms also experience declining expenses as feed costs fall. The four U.S. farms' cash costs averaged between $C 20 and $C 26 per hl. The baseline projections indicate that U.S. milk prices decline through 2001.

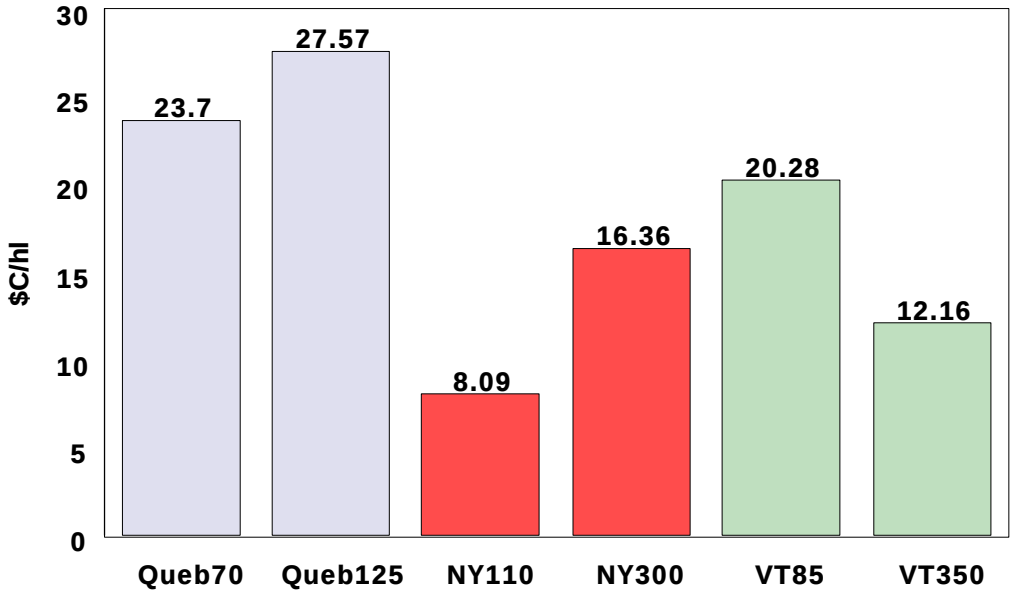
Table 4. Canadian and U.S. Projected Prices.

	1996	1997	1998	1999	2000	2001	2002
United States							
All Milk ($C/cwt)	20.21	18.62	18.27	18.34	17.55	17.39	17.43
New York ($C/cwt)	20.39	18.82	18.47	18.56	17.78	17.65	17.70
Vermont ($C/cwt)	21.07	19.48	19.13	19.25	18.43	18.29	18.33
Feeder Steers ($C/cwt)	84.08	92.30	101.66	114.38	121.80	124.51	114.84
Corn ($C/bu)	3.77	3.22	3.19	3.32	3.29	3.42	3.50
Soybeans ($C/bu)	9.38	8.47	7.87	7.95	7.99	8.01	8.15
Hay ($C/ton)	126.63	117.49	112.81	113.94	111.69	108.00	106.06
Canada							
Fluid Milk ($C/hl)	60.76	60.79	61.30	62.05	62.81	64.08	65.48
Feeder Calf ($C/cwt)	79.0	82.2	102.3	120.0	132.5	134.2	138.7
Corn ($C/t)	177	145	133	128	130	134	141
Soybeans ($C/t)	352	352	325	300	293	304	317
Hay ($C/t)	133	118	116	120	123	125	129

Source: FAPRI and Agriculture and Agri-Food Canada.

Figure 3 contains the average net cash farm income of the six representative farms. The moderate and large Quebec farms averaged $C 24 and $C 27 per hl, respectively. The U.S. farms ranged from $C 8.09 to $C 20.28 per hl. Net cash farm income increases over the period for the Quebec farms as milk and cattle prices increase and feed costs decline. The U.S. farms experience relatively stable net cash farm income as revenues and feed costs decline for most of the period. However, the moderate size Central New York farm begins to experience cash flow deficits by 2002.

Figure 3. Average Net Cash Farm Income for Quebec, New York, and Vermont Representative Dairy Farms, 1996-2002.



Conclusions

Dairy policies in both countries are moving in a direction consistent with freer trade. U.S. policies are being modernized with less government involvement. The Canadian system is moving toward less regulated quota transfer rules and more uniform regulations across provinces. But, prices and returns do not indicate a trend toward convergence.

The Canadian supply management system appears to have directly impacted the structure of dairy farming in Canada, compared with the United States. The quota system and transfer regulations have limited Canadian farm size and milk output per cow. Projections indicate that two representative Quebec dairies would experience increasing net cash farm income over the 1996-2002 horizon, while four representative Northeast U.S. dairies would see stable income.

Both the Canadian and U.S. dairy industries are being subjected to the increasing pressures of evolving global market forces. In this process of inevitable change, one would hope that the dairy economies of the two countries would be converging. These analyses instead indicate a divergence in several critical measures — output per cow, size of farm, costs of production and milk prices. This divergence appears to be a direct result of differences in policy. It suggests that once the policy of harmonization begins, substantial adjustments are likely to occur in both industries with the magnitude of adjustment being much greater on the Canadian side.

References

Agriculture and Agri-Food Canada. *Medium Term Baseline*. December 1996.

Baker, Derek, M. C. Hallberg, Rodolfo Tanjuakio, Joachim Elterich, Robert L. Beck, and Carolyn Betts Liebrand. 1990. *Estimates of the Cost of Producing Milk in Seven Major Milk-Producing Countries, 1986.* Commodity Economics Division. Economic Research Service, United States Department of Agriculture. August.

Barichello, Richard R. and Robert Romain. 1996. "Prospects for the Canadian Dairy Sector Following the Upcoming NAFTA Panel Ruling" in *Understanding Canada/United States Dairy Disputes*. Proceedings of the Second Canada/U.S. Agricultural and Food Systems Information Workshop. Editors R. M. A. Loyns, Ronald D. Knutson, and Karl Meilke, University of Manitoba, Winnipeg, pp. 162-196. December.

Barichello, Richard R. and Bradley K. Stennes, 1994. "Cost Competitiveness of the Canadian Dairy Industry: A Farm Level Analysis" in *Supply Management in Transition Towards the 21st Century*. Proceedings of a Conference held on June 28-30 at Macdonald Campus of McGill University, Ste-Anne-de-Bellevue, Quebec. Editors Coffin, Garth, Andrew Schmitz, and Ken Rosaasen.

Betts, Carolyn. 1987. *Costs of Producing Milk, 1975-84*. Agr. Econ. Rpt. No. 568, ERS/USDA, Washington, D.C., February.

Blaney, Don P., James J. Miller and Richard P. Stillman. 1995. *Dairy: Background for the 1995 Farm Legislation*. Agr. Econ. Rpt. 705, ERS/USDA, Washington, D.C., April.

Bromfield, Geoff, Robert Jenness, and Martha Justus. 1995. *NAFTA TRA Panel - Economic Impact Analysis*. Informetrica Limited, Ottawa, October.

Coffin, G., G. Flaten, K. Rosaasen, and Y. Proulx. 1994. "The Origin, Evolution and Issues of Supply Management — Canadian Style" in *Supply Management in Transition Towards the 21st Century*. Proceedings of a Conference held on June 28-30 at Macdonald Campus of McGill University, Ste-Anne-de-Bellevue, Quebec. Editors Coffin, Garth, Andrew Schmitz, and Ken Rosaasen.

FAPRI. *1997 FAPRI Baseline*. University of Missouri. FAPRI-UMC#01-97. February 1997.

Gardner, Bruce. 1996. *Review of Econometric Findings in the University of Wisconsin Study of Prices on the National Cheese Exchange*. Department of Agricultural Economics, University of Maryland, College Park, July.

Hallberg, M. C. and A. Derek Baker. 1994. *Consequences of Free Trade in Dairy Products Between Canada and the United States*. Staff Paper 267. Department of Agricultural Economics and Rural Sociology, Pennsylvania State University, University Park, October.

Meilke, Karl, Rakhal Sarker and Danny LeRoy. 1996. "Analyzing the Potential for Increased Trade in Dairy Products: A Canadian Perspective" in *Understanding Canada/United States Dairy Disputes*. Proceedings of the Second Canada/U.S. Agricultural and Food Systems Information Workshop. Editors R. M. A. Loyns, Ronald D. Knutson, and Karl Meilke, University of Manitoba, Winnipeg, pp. 241-272. December.

Milk Pricing Advisory Committee. 1973. *Milk Pricing Policy and Procedures, Part II, Alternative Pricing Procedures.* AMS/USDA, Washington, D.C., March.

Mueller, Willard F., Bruce W. Marion, Maqbool H. Sial and F. E. Geithman. 1996. *Cheese Pricing: A Study of the National Cheese Exchange.* Food Research Group, Department of Agricultural Economics, University of Wisconsin, Madison, March.

National Research Council. 1988. *Nutrient Requirements of Dairy Cattle.* Sixth Revised Edition. National Academy Press. Washington, D.C.

Novakovic, Andrew M., Maurice Doyon and Phillip Bishop. 1996. "Potential Implications of Freer Trade for the United States and Canadian Dairy Sectors: A Spacial Analysis" in *Understanding Canada/United States Dairy Disputes*. Proceedings of the Second Canada/U.S. Agricultural and Food Systems Information Workshop. Editors R. M. A. Loyns, Ronald D. Knutson, and Karl Meilke, University of Manitoba, Winnipeg, pp. 207-239. December.

Richardson, J. W. and C. J. Nixon. 1986. *Description of FLIPSIM V: A General Firm Level Policy Simulation Model.* Texas Agricultural Experiment Station Bulletin B-1528.

United States Congress. Office of Technology Assessment. *Technology, Public Policy, and the Changing Structure of American Agriculture.* 1996. OTA-F-285, Washington, D.C. March.

University Study Committee, 1997. *An Economic Evaluation of Basic Formula Price (BFP) Alternatives*. Agricultural and Food Policy Center Working Paper 97-2. Department of Agricultural Economics, Agricultural and Food Policy Center, Texas A&M University, College Station, June.

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