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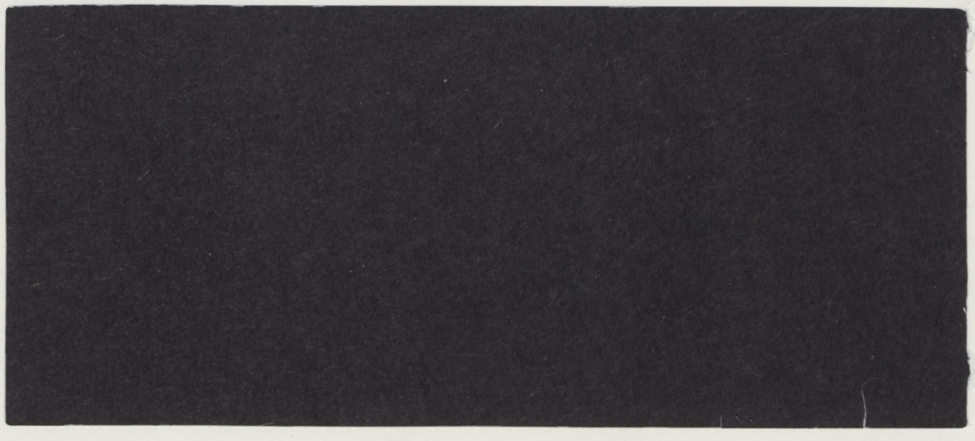

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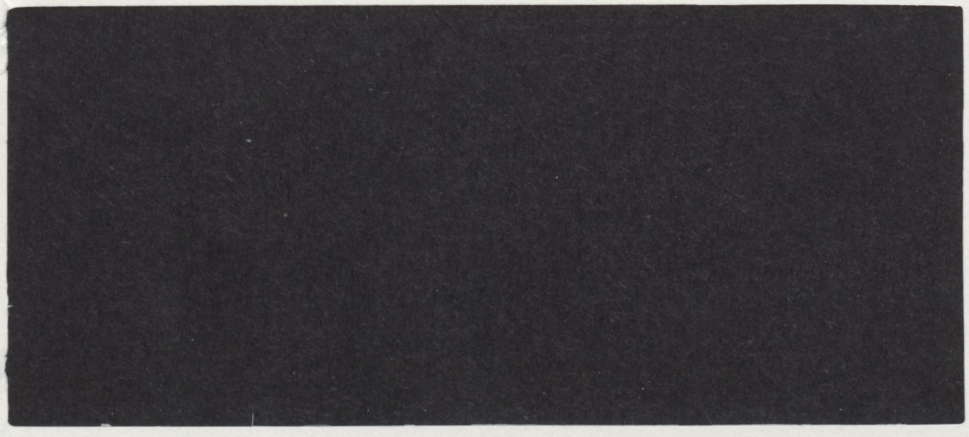

Impact Analysis of a Reduction in Market Sharing Quota on the Canadian Dairy Industry

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INTRODUCTION

The objective of this paper is to outline what the impact would be on the dairy industry should the Market Sharing Quota (MSQ) be further reduced and what can be done to avoid such cuts.

The first part will sketch some of the current problems affecting the industry and what factors have led to the present situation.

The second part of the paper will analyze the impact of a decrease of MSQ on producers, processors and the retailing and distribution sectors. The value of quota and the financial outlay to farmers, should they want to maintain production after a quota cut, will be considered.

The final part will look at ways to avoid quota cuts, through moderations in prices for specific products such as butter and cheese, or by establishing special classes of milk per specific products. The paper also looks at ways to reduce the cost of producing milk.

1. REASONS FOR MARKET SHARING QUOTA DECLINE FROM 1986 TO 1992

To control industrial milk production, the Canadian Milk Supply Management Committee (CMSMC) sets the national Market Sharing Quota (MSQ), based on domestic requirements of butterfat, and it allocates provincial shares according to the provisions of the National Milk Marketing Plan. Each province allocates its share to producers according to its own policies. The size of the MSQ is decided by the CMSMC each July for initial implementation on August 1, the beginning of the dairy year. Domestic requirements are established by estimating the market demand for dairy products in Canada, after allowing for certain exports and imports, and for butterfat from the fluid sector. The amount of quota is monitored by the Committee and adjusted periodically to reflect anticipated changes in demand. The CMSMC meets every two months and can make no more than 1 change to the MSQ during the year and usually not after February 1.

Over the last several years the MSQ has been significantly reduced. Most of the reduction was caused by the declining demand for butter and the increased fluid skim-off.

Table 1
INDUSTRIAL MILK PRODUCTION (MHL)

Dairy year	Market Sharing Quota*	Domestic Requirements	Production
1988-89	47.4	45.3	48.8
1989-90	46.1	44.1	47.0
1990-91	44.7	42.1	45.8
1991-92	42.4	39.5	44.6

* end year

For the 1992-93 dairy year, MSQ was set at 41.1 MhL down 3 percent from the previous year. This quota is made up of 39.5 MhL for domestic requirements plus a 4 percent sleeve. Production in the sleeve is usually exported at a significant loss.

The monthly tracking of butterfat requirements so far in the 1992-93 dairy year indicates that butterfat requirements for August 1992 to April 1993 are down 1.4 percent. Surprisingly, the requirements for solids-non-fat (which was expected to be more stable) are down 4.6 percent for the same period. This implies that the cross-over

point at which solids-non-fat requirements exceed butterfat requirements has moved further into the future and that butterfat is likely the basis for setting the 1993-94 MSQ. This decision must be taken by the CMSMC in July 1993. Current indications are that the 1993-94 butterfat requirements may show a decline in the 2 to 4 percent range. However, it is possible that the CMSMC will be hesitant to reduce the MSQ for fear of shorting either the butterfat or the solids-non-fat (SNF) market.

The decline in MSQ has put severe strain on the dairy industry, which was already in a period of rapid changes in terms of numbers of producers. However, up until 5 years ago, changes were made within a slightly expanding industry. This has now changed. Two main factors have contributed to this rapid decline: the decrease in butter consumption, and the increase in fluid milk skim-off.

1.1 Lower Demand for Butter

Although the long term demand for butter was on a downward trend, from 8.41 kg/person per annum in 1963 to less than 6 kg/person ten years later, demand held at close to 4.5 kg/person between 1977 and 1984. Since that time, however, per capita demand for butter has fallen to 3.08 kg/person in 1991. This rapid decrease in butter consumption has caused problems for the industry.

In comparison, the per capita demand for butter in the United States was less than 2 kg in 1991. Yet, wholesale prices for butter are significantly lower in the U.S. This indicates that demand for butter in Canada has a lot of room to decrease further.

1.2 Increased Fluid Milk Skim-Off

Fluid skim-off is created when low-fat milk is produced and the excess milk fat is shipped to the industrial milk market, mainly for the production of butter and/or ice cream. It is important to notice that butter produced from this skim-off does not have skim milk powder as its complement product, as would be the case if butter is produced from raw milk.

As low-fat milk is gaining in popularity, the fluid milk skim-off is becoming more and more important.

Fluid milk skim-off was calculated at 4.755 MhL in 1985 and at 6.785 MhL in 1990, sufficient to produce 30 Mkg of butter representing 38 percent of 1993's estimated domestic disappearance of butter. It is fair to assume that, given the recent introduction of 1 percent milk in several provinces, the fluid milk skim-off will continue to increase.

The other type of skim-off is the industrial skim-off, produced from the production of low-fat dairy products made from industrial milk, such as low-fat cheeses. The demand

for low-fat dairy products is increasing, but we do not yet have a good handle on the total amount of industrial skim-off. All we know for sure is that it is increasing.

2. IMPACT ON THE INDUSTRY

2.1 Production

One of the main problems associated with the decline in market sharing quota is the fact that farmers must buy additional quota from other farmers if they wish to maintain their existing level of production. This means that, in many cases, they replace free or inexpensive quota with expensive production quota. The capital invested in quota cannot be used in other parts of their operations, such as for modernization of the operations, and this can put quite a strain on the production unit. If this capital could be invested into modernization at the farm level, it may be put to more productive use in the short term. However, unless the farmer buys more quota, his fixed costs will have to be spread over less production and his fixed cost per unit of production would increase. Hence , if the producer wants to lower his long term COP, the herd size must be maintained at optimal levels and purchase of quota may be necessary.

There are two types of industrial milk quota: used MSQ and unused MSQ. Used MSQ is quota that cannot be used until the next dairy year. This quota is usually purchased for the purpose of expanding output or maintaining output despite MSQ reductions. In January 1993, it sold at $24 per kg of butterfat in Ontario and $29 in Quebec. Unused MSQ can be used in the current dairy year and is usually bought with the purpose of avoiding over-quota levies in the current year as well as for use in future years. It sells usually at a higher price than used quota.

2.2 Processing

Reductions in MSQ will mean that less raw milk is available to the processors. As a result, they will be underutilizing their plant capacity which has a very negative impact on their productivity, profitability, and competitiveness.

Studies have indicated that capacity utilization in Canadian dairy processing plants is much lower than in the U.S. For example, reported plant utilization rates for U.S. fluid milk and yoghurt and cheddar cheese plants were 81 percent, those for Canadian plants were 62 and 66 percent respectively (Price Waterhouse 1991). Further MSQ cuts would result in even lower plant utilization or in an increased rate of plant rationalization and closure.

Currently, there are strong indications that the processing margin in Canada is significantly higher than in the U.S., implying that the Canadian processing industry has benefitted from supply management. A study concluded that, in Canada, the 1990 processing margin in the butter and skim milk powder support price system was $7.15

per hectolitre. In the U.S. the inferred processing margin was $3.21 per hectolitre. while that for cheddar cheese was slightly more than 50 percent of the Canadian amount at $3.61 per hectolitre. (A. Jellis, 1993)

2.3 Conclusion

The above illustrates that quota cuts have a negative effect on the total dairy industry. It is, therefore, to the potential benefit of all parts of the dairy industry that they cooperate in searching for solutions. Also, it should not be up to one segment only to bear the brunt of costs of avoiding quota cuts.

Should the current situation continue, further cuts in MSQ seem inevitable. However, given a willingness on the part on the industry to face the problem, ways can be found to avoid further quota cuts.

3. POSSIBLE SCENARIOS IN 1993 AND 1994

The only way to avoid quota cuts is to expand markets, domestic or international. Ideally, new market niches would be developed that would allow producers and processors to produce at the full domestic price. However, in the short run, this may not be feasible. Niche markets are not always that easily identified and exploited. There usually is a significant lag involved before production impacts are felt, and the quantities are, certainly at the onset, rather limited. That is not to say that they are not important and should be disregarded.

Markets can be developed and/or expanded quite easily should the price be lowered. This would have an almost immediate effect and, depending on how sensitive demand is to a price reduction, the impact could be significant. The industry could consider some of the following options.

3.1 Moderating the Target Returns

Should the Target Returns be decreased, MSQ will have to be increased to take account of the increase in demand for dairy products.

To analyze the impact of a lower price, it was necessary to make several assumptions. As baseline for 1993-94, we used a Target Return of $50.26 per hectolitre (the current target return) and a MSQ of 40.00 MhL, 38.46 MhL domestic requirements and 1.54 MhL sleeve. Gross cash receipts were calculated as $2,010 million.

Assuming a price elasticity for industrial milk of -0.445, a one dollar decrease in the target return would increase the MSQ to 40.36 MhL. (Moschini 1993) Gross cash receipts would be $1,988 million, a $22 million decrease.

It must be pointed out, however, that is a macro result. An analysis at the individual farm level would have to include the fact that the producer will obtain additional quota. The increased production may allow the producer to lower his costs of production through a more productive use of resources. The increased production would also benefit processors.

The Farm Economic Analysis Division at Agriculture Canada analyzed the impact of a 1$ reduction in the target price on the Quebec industrial milk farm sector. The results are shown in Table 2. A price reduction would lead to an increase in production, a lower quota value and lower quota assets market value. Total revenue and net farm income would also decline slightly. These results should be considered as indicative of a direction rather than absolute in value. The impact in other provinces would similar in the direction but not necessarily in value.

3.2 Moderating the Cheese Price

Rather than changing the Target Return, it is possible for Provincial Boards to change the price of specific classes of milk thus targeting prices for specific dairy products. We analyzed the possibility of increasing MSQ by 2 percent through lowering the prices for individual products.

We looked first at what 2 percent of MSQ is equivalent to in terms of butter production and in terms of cheese production. Current MSQ is about 40.0 MhL which at 3.6 kg butterfat per hL represents 144 Mkg of butterfat. Two percent of this represents 2.88 Mkg of butterfat, which can be used to produce 9.11 Mkg of cheese or 3.49 Mkg of butter.

Assuming a price elasticity of -0.55 for cheese, the retail price of cheese must decrease by 5.94 percent in order to trigger an increase in demand of 9.11 Mkg. Assuming that the retail price for cheese is $12 per kg, a rebate of $0.71 per kg ($8.60/hL) is required, which would cost the dairy industry $198 Million.

However, a benefit deriving from this increased production would be that producers will not have to reduce their quota by two percent or, alternatively, buy two percent of quota to maintain their output levels. Two percent of current industrial milk quota is 2.88 Mkg of butterfat. At a price of $24 per kg, this represents a saving of $69M.

This saving is not distributed evenly across provinces because the price of used quota varies substantially from province to province (from $11.7/kg in Alberta to $29/kg in Quebec). Prices also vary during the year.

Table 2
Impacts on Quota Value and at the Farm Level of Target Price Changes in Quebec*

	Target Price $/hl	MSQ Quebec $/hl	Quota Value $/hl	Volume of Milk Sales HL/farm	Quota Assets Market Value $	Total Assets Market Value $	Total Revenues $	Net Farm Income $
EFFICIENCY								
Baseline	50.26	19.498	103.90	2,308	166,125	586,658	158,776	5,447
Bottom 1/3	49.26	19.671	99.31	2,325	161,095	581,628	158,054	4,726
Baseline	50.26	19.498	103.90	2,936	222,892	674,570	184,832	41,956
Top Third	49.26	19.671	99.31	2,954	217,421	669,099	184,073	41,197
BY SALES								
Baseline	50.26	19.498	103.90	1,380	94,208	356,123	93,485	13,076
Bottom 1/3	49.26	19.671	99.31	1,391	91,116	353,031	92,979	12,571
Baseline	50.26	19.498	103.90	4,122	310,346	939,452	259,613	34,117
Top Third	49.26	19.671	99.31	4,144	303,635	932,742	258,625	33,129

* an industrial milk price elasticity of -0.445 is assumed

Source: Le producteur de lait québécois
Canadian Dairy Commission
Groupe de recherche en économie et politique agricole (GREPA)

Forecast: Farm Economic Analysis Division, Agriculture Canada

3.3 Moderating the Butter Price

The same two percent MSQ can be transformed into 3.49 Mkg of butter, 4.91 percent of estimated 1994-95 domestic disappearance. Assuming a butter demand elasticity of -0.88, the retail price must fall by $0.36 per kg, which is equivalent to $1.58 per hectolitre. The total required rebate would be about $25 million. If the additional skim milk powder is exported at world prices, then an additional $9 million cost would be incurred. Total estimated costs would be $34 million. As was the case with cheese, producers would also gain $69 million because of quota they do not have to buy back.

It must be pointed out that the above analysis depends crucially on the size of the demand elasticities. It is also possible to combine the two scenarios although, given the analysis, it is clear that it would be better to lower butter prices in order to avoid a quota cut.

3.4 Moderating the Price of Milk for Ice Cream and/or Yoghurt

The same analysis can be conducted for ice cream and yoghurt. The problem, however, would be that because of the relatively small quantities of milk going into the production of these products, the production increase sufficient to absorb 2.88 Mkg of butterfat would have to be very high relative to current demand. This would necessitate a substantial decrease in the price. These products are also more value-added, and a change in the price of milk does not have the same impact on the retail price as is the case for butter.

The advantage of this scenario would be that we could lower the price for this class of milk to the U.S. level, which would protect that segment of our industry should we have to implement the GATT panel ruling on ice cream and yoghurt.

3.5 Moderating Export Prices

Maintaining production by increasing exports could also be considered, and this would have a different impact on the industry.

The Canadian Dairy Commission (CDC) has estimated that exports on the world market could mean a cost to the producers of approximately $28/hL.

3.6 Moderating Production Costs

Increasing the MSQ above current levels, or even maintaining it, will necessitate some form of price decrease, either for all milk classes, or for specified milk classes. However, there is no consensus in the industry on this issue. There are indications that some producers in Ontario and Alberta for instance favour price reductions over quota cuts, but Quebec producers have shown less interest in this solution. However, should

ways be found to reduce the cost of producing milk, then a decrease in prices would not have as dramatic an impact on the financial situation of the industry.

3.6.1 Producers

A description of the production sector is given in appendix 2.1.

The Farm Economic Analysis Division at Agriculture Canada has provided an economic overview of dairy farms in Canada, based on 1990 data. Following are some of the key results.

Average gross farm revenues of dairy farms were the mid range of all farm types in 1990, considerably lower than hog, poultry and potato farms, but higher than cattle, fruit & vegetable, and grain & oilseed farms. About 30 percent of the revenues were from farms with more than $250,000 which represent 12.2 percent of the farms. There were only 3.8 percent of dairy farms with revenues less than $25,000.

The average net operating income was $38,168, going from $1,446 for those farms in the $10,000 - $24,999 revenue class, to $145,050 in the largest revenue class of $500,000 and over.

During 1990, approximately 15 percent of the 29,060 dairy farms analyzed had net farm operating income of less than $10,000 and 1,715 of those farms actually incurred a loss. Five percent of the farms had net operating incomes in excess of $100,000 per farm.

Revenues from sales of milk, cream and dairy subsidies accounted for an average of 78 percent of the revenues of dairy farms.

On average, 25 percent of the total income of unincorporated dairy producers was derived from off-farm sources. Off-farm income was a significant source of income for operators of dairy farms across all revenue classes. In fact, off-farm income was the major source of income for farms with revenues less than $25,000.

About 11 percent of dairy farm operators were over 60 years old. The proportion of operators over 60 years old declined as revenue increased. Therefore, many of the small dairy farms will probably disappear over the next few years as older producers retire.

The above illustrates that dairy producers enjoy a reasonable income, and that some of the larger producers have substantial incomes. The data also illustrates that there are still many farms where income other than from the dairy enterprise is significant.

Analysis was also done to calculate the cost of production using approximate CDC methodology for Quebec and Ontario (see tables 3 and 4). The cost of production was calculated per decile COP.

The results indicated that the 10 percent lowest cost producers in Quebec could produce milk at $43.72 per hectolitre. The 10 percent highest cost producers produced at $85.07 per hectolitre. Only 30 percent of the producers were able to produce milk at a cost below $50 per hectolitre. This methodology does not include the value of the production quota. Given that the current target price for industrial milk is approximately $50, half of the producers may not cover their cost of production.

If we take into consideration the levies, transportation and other costs, the net cash receipts per hectolitre are about $42. The price farmers receive for their fluid milk is substantially higher which would improve the profitability of the overall dairy operation.

In the analysis, cash costs do not vary very much per decile, from $20.10 per hectolitre to $24.94. Return per capital varies more, from $10.66 to $15.36 per hectolitre. The return to labour, however, shows large fluctuations, from $13.55 to 45.51 per hectolitre, with the second highest decile's return to labour indicating $28.13 per hectolitre.

Similar conclusions can be reached for Ontario.

It must also be mentioned that, in comparison to other countries, the return to labour is rather high in Canada. Several studies compared milk production costs between North Eastern United States and Ontario. Most concluded that U.S. average cash costs were below Ontario's but that the difference was not overly large. Since the difference in total cost of milk is substantial, it is concluded that the opportunity cost for family labour as well as the return to equity a producer is willing to accept has a considerable impact on the competitiveness of the Canadian dairy sector. (Halpern et al. 1991)

A study by Brinkman, Romain, Lambert, and Stonehouse reviewed factors affecting the competitiveness of the Canadian dairy industry. They indicated ways that producers could become more competitive. (Brinkman et al. 1993)

Table 3
ONTARIO, 1990, DAIRY COW ENTERPRISE ONLY (excluding also the replacement enterprise)

	Unit	1st dec 14 farms	2nd dec 14 farms	3rd dec 14 farms	4th dec 14 farms	5th dec 14 farms	6th dec 14 farms	7th dec 14 farms	8th dec 14 farms	9th dec 14 farms	10th dec 14 farms	average 140 farms
Cash Cost Total	$/hl	22.48	23.18	25.12	24.31	25.03	24.04	24.94	27.31	24.53	35.25	25.62
Return to Capital Total	$/hl	9.00	10.40	13.56	15.07	12.62	13.55	11.48	14.45	16.66	22.60	13.94
Return to Labour Total	$/hl	5.18	9.54	8.16	10.67	14.27	16.40	20.24	18.56	24.02	25.81	15.28
Total COP	$/hl	36.67	43.12	46.84	50.05	51.92	53.98	56.66	60.31	65.21	83.66	54.84

Source: Ontario Dairy Farm Accounting Project

Table 4
QUEBEC, 1990, DAIRY COW ENTERPRISE ONLY (excluding also the replacement enterprise)

	Unit	1st dec 15 farms	2nd dec 15 farms	3rd dec 15 farms	4th dec 16 farms	5th dec 16 farms	6th dec 16 farms	7th dec 16 farms	8th dec 16 farms	9th dec 16 farms	10th dec 16 farms	average 157 farms
Cash Cost Total	$/hl	20.10	21.21	21.55	21.91	23.15	21.92	22.33	24.49	24.94	24.20	22.61
Return to Capital Total	$/hl	10.06	10.99	10.43	11.27	11.78	13.16	12.97	14.83	14.51	15.36	12.57
Return to Labour Total	$/hl	13.55	14.65	17.16	18.73	19.01	21.35	23.66	23.57	28.13	45.51	22.67
Total COP	$/hl	43.72	46.85	49.13	51.91	53.95	56.43	58.96	62.89	67.59	85.07	57.86

Source: GREPA

They concluded that there seem to be more economies associated with higher yield per cow than with farm size, but that labour productivity increases significantly with both farm size and yield per cow.

They found that improvements in technical efficiency (the maximum level of output that could be obtained from different combinations of input) can have a strong impact on lowering cost of producing. The greatest impact seems to be improved labour productivity. Good management practices, approximated by participation in management clubs, milk recording practices, the quality of forage and veterinarian and artificial insemination expenses, increase the quality of technical efficiencies. (Brinkman et al. 1993)

Analysis of the Ontario Dairy Farm Accounting Project (ODFAP) data has shown the hours required per hectolitre of milk, based on different technologies in terms of types of milking, manure handling, feeding, and housing. (Table 5)

The hours of labour required were obtained using time sheets. There were 68 herds included in the analysis.

The analysis indicated that the more advanced technologies resulted in less labour required per hectolitre. However, the analysis did not extend to the capital requirements for each technology and conclusions, therefore, must be drawn with extreme care.

The number of labour hours required was also considered for different combinations of technologies. As expected, the highest labour requirements are for farms using bucket milker in combination with manual manure disposal which required 6.52 hours per hectolitre. Although not shown, it can be safely assumed that those farms also had the least modern feeding technology. Average herd size was 25.5 cows.

The most efficient technology in terms of labour requirements was parlour milking in combination with free stall housing which required 1.12 hours of labour per hectolitre. Average herd size was 61.9 cows.

The results indicate that there is scope for labour saving technologies to be implemented at the farm level.

3.6.2 Processors

A description of the processing sector is given in appendix 2.2.

A study by Lambert and Romain (1992) showed that 81 percent of the evolution of labour productivity in Quebec can be explained by the variation in the ratio of management workers to total workers, the average plant size, the availability of milk, and the stock of capital.

The same study investigated the different constraints faced by processors in Quebec and Ontario. For cheese producers in Quebec and Ontario, insufficient

milk was by far the most important factor, followed by rules and regulations. For producers of other products, insufficient demand and insufficient milk were nearly equally important.

The utilization rate of dairy plants in Quebec and Ontario is only 60 and 64 percent respectively, which increases the costs of production and has a negative effect on the level of competitiveness. U.S. plants, on the other hand, are operating at 75 to 80 percent of capacity.

Further cutbacks in milk production may have serious impacts on the processing sector. In particular, the increased rate of plant rationalization of the cooperatives sector in Quebec will likely result in the closing of several plants.

Between 1977 to 1986, labour productivity (sales per worked hour) increased by $1.98 in Quebec, $3.71 in Ontario, $3.00 in the rest of Canada, and $7.86 in the U.S. (Lambert and Romain, 1992)

The cooperative sector in Quebec has shown a decreasing trend in labour productivity, while the trend increased in the non-cooperative sector. However, the cooperative sector still had a higher level of labour productivity at the end of the period. Labour productivity decreased for plants with less than 50 employees, while it increased for all other sizes.

3.6.3 Conclusion

The above illustrates that there is room to reduce production costs, both at the producers' and the processors' level. This would make it obviously much easier and palatable to accept lower prices. It may not be possible to lower production and processing costs in the very short term but, clearly, the potential for improvement of productivity exists.

We must reiterate, however, that it is important that all sectors, from producers' to retailers, work together and share the burden of becoming more competitive so that together they can benefit from a more dynamic and vibrant dairy industry.

The different segments of the industry cannot operate separately from each other; their futures are intertwined.

Table 5
LABOUR REQUIREMENTS UNDER DIFFERENT TECHNOLOGIES

	sample size	herd size	yield per cow	hours per hL
Bucket milker	7	26.6	3,753	4.85
Pipeline milker	49	41.6	5,950	1.90
Parlour milking	12	55.8	5,947	1.93
Manual manure	7	36.4	4,676	4.49
Gutter cleaner	48	39.6	5,891	1.93
Manure pack	8	52.4	5,563	1.71
Liquid manure	5	60.3	5,839	1.34
Manual feeding	15	35.6	4846	2.98
Some mechanical feeding	46	42.7	5966	1.94
High mechanical feeding	7	57.9	6013	1.48
Tie stall housing	55	38.7	5666	2.30
Free stall housing	10	64.5	6469	1.13
Loose housing	3	40.7	4292	2.16
All herds	68	42.5	5724	2.12

Source: ODFAP, Technical Committee

APPENDIX

1. POLICY OVERVIEW

There are two markets for milk in Canada, the fluid market (table milk and fresh cream) which, in 1991-92, accounted for 41% of the milk produced and the industrial market (butter, cheese, yogurt,...), which represented 59%. Those numbers have not varied much over the last years. Each province is responsible for the production and marketing of its fluid milk and sets pricing formulas, quota policies and other regulations. Marketing activities related to industrial milk are carried out jointly between the federal and provincial government, according to the terms and conditions of a federal-provincial agreement, the National Milk Marketing Plan.

Canada adopted a system of supply management for industrial milk in the early seventies. The purpose of milk supply management is to provide a balance, in terms of butterfat, between the supply of industrial milk and the demand for dairy products. The domestic market is primarily supplied by Canadian milk production, except for a fixed volume of cheese imports and small amounts of other dairy product imports.

The CMSMC oversees the application of the National Milk Marketing Plan. Chaired by the CDC, the Committee has representation from producers and government from all provinces except Newfoundland. National representatives of consumers and processors participate as non-voting members.

The CMSMC sets a national annual production target or MSQ, which is constantly monitored and adjusted periodically to reflect changes in demand. The Plan establishes each province's share of national quota, and contains provisions for the sharing of any increase or decrease in this quota. Each province allocates its share to producers according to its own policies.

The system allows for a small margin (called the sleeve) to be included in the national marketing quota to prevent shortages in the domestic market. In addition, as a result of meeting requirements for butterfat, Canada's dairy industry, in the past, faced a structural surplus of solids-non-fat. These surpluses are managed by export programs and a domestic animal feed program.

Under the Plan, producers assume responsibility for the costs of exporting dairy products that are not consumed in Canada. For this purpose, levies are collected by provincial authorities and remitted to the CDC.

2. BACKGROUND

The dairy industry is a major sector in the Canadian economy. It accounts for about 16% of total agricultural cash receipts and is third after grain and oilseeds and red meats in importance. This percentage has not varied a lot in the last 25 years. Dairy farming generated cash receipts of more than $3.4 billion in 1991, while dairy products shipped from processing plants were valued at over $7.3 billion.

Table 6
CHANGES IN STRUCTURE OF THE DAIRY INDUSTRY[1]

Dairy Years	Number of farms [2]	Number of dairy cows on farms [3] (thousands)	Average herd size	Average milk shipments per farm (000 L)	Average milk shipments per cow (litres)
1976-77	72,495	1,951.0	26.9	92.52	3,438
1977-78	66,766	1,860.0	27.9	104.37	3,747
1978-79	62,590	1,787.7	28.6	109.31	3,827
1979-80	56,370	1,761.9	31.3	126.65	4,052
1980-81	55,733	1,776.3	31.9	130.32	4,089
1981-82	52,567	1,775.1	33.8	141.95	4,204
1982-83	49,936	1,688.5	33.8	148.04	4,378
1983-84	46,859	1,659.6	35.4	157.42	4,445
1984-85	44,627	1,567.5	35.1	164.43	4,681
1985-86	42,325	1,440.1	34.0	172.55	5,071
1986-87	40,072	1,419.0	35.4	182.96	5,167
1987-88	37,949	1,399.9	36.9	198.16	5,372
1988-89	36,445	1,381.9	37.9	205.39	5,417
1989-90	34,620	1,362.5	39.3	211.20	5,366
1990-91	32,678	1,308.5	40.0	220.63	5,510
1991-92	31,200	1,287.6	41.3	226.78	5,495

[1] Without Newfoundland
[2] Number of farms registered at the CDC at the end of the dairy year.
[3] (July 1)
Source: Canadian Dairy Commission
Statistics Canada
Nota: Number of cows on farms is over estimated because it includes cows on farms that are not registered at the CDC. Hence, average herd size and average milk shipments per cow is over-estimated and average shipments per cow is under estimated.

2.1 Production sector

There were 31,200 dairy farms in the 1991-92 dairy year in Canada, 76% of those farms were in Quebec and Ontario. Although the number of farms have steadily declined over the last 15 years, as the number of cows, the amount of milk produced has remained essentially the same. The number of farms fell by 57% (from 72,495 to 31,200) between 1976-77 and 1991-92. The number of cows was reduced by 34% over the last 15 years to 1,287,600 in July 1992. Nevertheless, the number of cows per farm went from 26.9 in 1976-77 to 41.3 in 1991-92 and the production per cows increased from 3,438 litres to 5,495 litres for the same period.

Total milk sold off farm in 1991-92 was 5.5% higher than in 1976-77 but has dropped by 6% in the last 5 years. Sales of fluid increased by 16% from 1976-77 to 1991-92. Industrial milk deliveries were at the same level as 1976-77 after reaching a high of 48,4 MhL in 1981-82. Industrial milk deliveries as dropped by 9% in the last 5 years.

Table 7
TOTAL MILK SOLD OFF FARMS
000 L

Years	Total milk sold off farms	Delivered as industrial milk	Delivered as fluid milk
1976-77	6,707,294	4,347,506	2,359,788
1977-78	6,968,538	4,538,426	2,430,112
1978-79	6,841,806	4,321,396	2,520,410
1979-80	7,139,333	4,567,378	2,571,955
1980-81	7,262,975	4,651,145	2,611,830
1981-82	7,462,038	4,838,397	2,623,641
1982-83	7,392,574	4,814,137	2,578,437
1983-84	7,376,773	4,764,777	2,611,996
1984-85	7,338,092	4,748,099	2,589,993
1985-86	7,303,129	4,636,736	2,666,393
1986-87	7,331,470	4,624,399	2,707,071
1987-88	7,519,803	4,782,775	2,737,028
1988-89	7,485,489	4,773,889	2,711,600
1989-90	7,311,759	4,603,657	2,708,102
1990-91	7,209,688	4,495,279	2,714,409
1991-92	7,075,557	4,340,110	2,735,447

Source: Statistics Canada

Fluid milk

Sales patterns of fluid milk have changed over the years. Consumers have changed their eating habits; they increasingly prefer low-fat milk over standard milk. Sales of standard milk represented 41% of all milk sold in 1977-78 while in 1991-92, they only represented 19%. Sales of low-fat milk have increased by 58% during the same period.

Table 8
SALES OF FLUID MILK
(000 litres)

Years	Standard milk	2% milk	1% milk	Skim milk	Buttermilk	Chocolate milk	Cream *
1977-78	1,012,973	1,175,115		87,018	14,909	84,231	83,863
1978-79	1,003,113	1,260,478		90,987	15,030	91,429	90,868
1979-80	1,000,967	1,307,289		92,005	15,015	96,346	94,487
1980-81	980,677	1,350,789		86,783	14,339	97,034	103,495
1981-82	953,247	1,408,452		84,304	14,118	93,259	101,359
1982-83	897,750	1,452,712		86,182	13,791	84,397	102,570
1983-84	870,284	1,509,745		92,043	14,092	87,965	109,812
1984-85	824,016	1,523,675		102,914	13,623	87,338	117,231
1985-86	784,430	1,581,288		117,259	13,411	88,995	127,190
1986-87	766,802	1,634,578		134,018	13,875	99,498	130,700
1987-88	733,524	1,673,956		144,258	13,708	107,233	133,171
1988-89	683,981	1,677,885		149,232	13,621	106,325	133,825
1989-90	631,028	1,632,682		170,401	13,523	108,956	140,404
1990-91	582,683	1,573,134	209,732	177,531	13,229	100,506	145,227
1991-92	538,354	1,542,575	273,354	178,497	12,850	93,836	143,736

* includes sour, table, whipping and cereal cream

Source: Statistics Canada

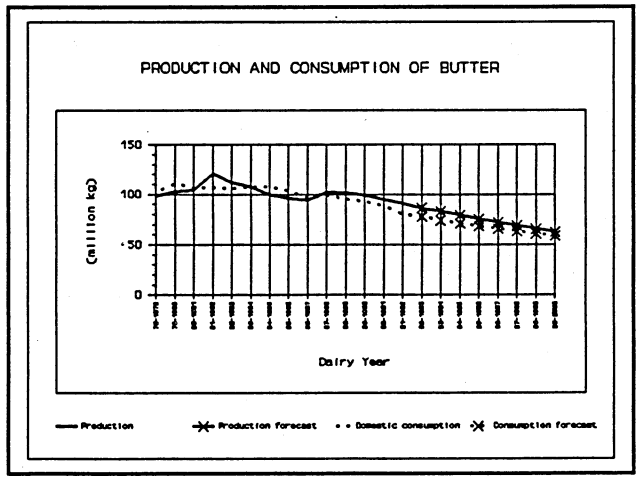
Butter

Domestic disappearance for butter was relatively stable during the seventies and the early eighties, but started to decrease from 1983-84 on. Per capita disappearance for butter has since fallen by 25 percent. Production on the other hand has decreased but at a slower pace. Butter stocks have remained relatively stable because of increased exports. The forecast for butter is not encouraging. Domestic disappearance is expected to continue its steady decline, and exports are expected to continue to be used to manage stock levels.

Table 9
BUTTER PRODUCTION AND CONSUMPTION
(000 kg)

Years	Production	Consumption
1976-77	103,158	108,763
1977-78	110,906	107,051
1978-79	98,767	102,641
1979-80	102,750	110,772
1980-81	104,456	107,164
1981-82	120,649	106,545
1982-83	111,843	106,281
1983-84	107,761	107,606
1984-85	99,606	107,342
1985-86	96,018	103,537
1986-87	93,978	96,692
1987-88	102,550	99,483
1988-89	101,482	95,448
1989-90	99,097	92,690
1990-91	94,379	87,848
1991-92	90,916	79,814

Source: Statistics Canada



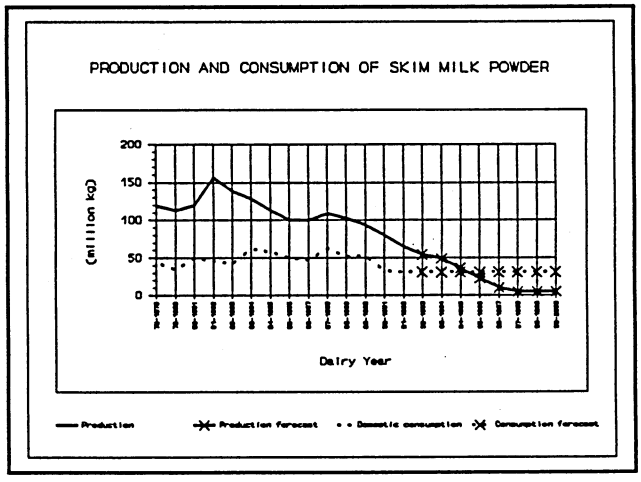
Skim Milk Powder

Over the last fifteen years, production of skim milk powder has been reduced by more than 50 percent. A major factor in this reduction is the increase in fluid and industrial skim off. As a result, exports have decreased substantially. The use of skim milk powder as animal feed has also decreased which is reflected in the lower domestic disappearance. Should the production of industrial milk continue to be determined on the basis of butterfat, then it may be necessary to import skim milk powder in the near future to supply at least the animal feed requirements.

Table 10
SKIM MILK POWDER PRODUCTION AND CONSUMPTION
(000 kg)

Years	Production	Consumption
1977-78	148,332	41,289
1978-79	118,971	44,266
1979-80	113,321	34,682
1980-81	119,605	50,403
1981-82	156,974	45,719
1982-83	138,879	42,433
1983-84	128,343	62,431
1984-85	113,188	58,014
1985-86	100,159	49,815
1986-87	100,285	47,556
1987-88	109,291	62,458
1988-89	103,200	50,972
1989-90	93,795	52,420
1990-91	80,069	32,902
1991-92	64,384	31,590

Source: Statistics Canada

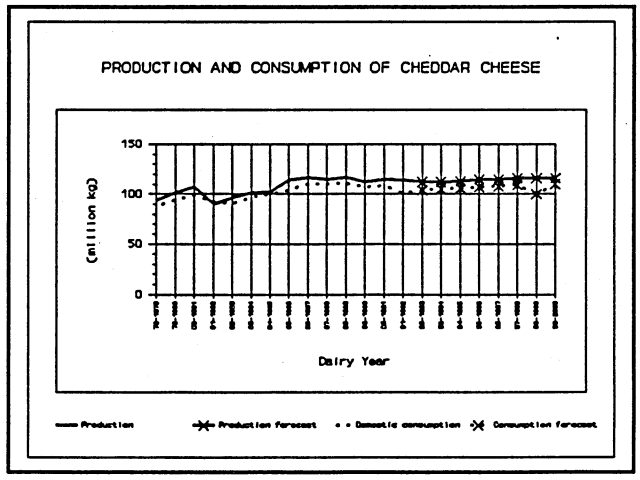


Cheddar Cheese

With the exception of the last three dairy years, domestic disappearance for cheddar cheese has steadily increased. The recent decrease may be due to the recession and substitution for lower prices varieties. Forecasts for cheddar cheese are optimistic and domestic disappearance and production should exceed those during the last three years.

Table 11
CHEDDAR CHEESE PRODUCTION AND CONSUMPTION
(000 kg)

Years	Production	Consumption
1977-78	82,392	81,071
1978-79	93,745	88,206
1979-80	101,474	94,598
1980-81	107,344	98,980
1981-82	89,989	91,886
1982-83	96,127	90,365
1983-84	101,678	96,827
1984-85	102,338	99,559
1985-86	114,128	104,323
1986-87	116,564	110,680
1987-88	114,858	110,792
1988-89	116,649	111,130
1989-90	112,249	107,170
1990-91	115,130	108,688
1991-92	114,337	101,027



Source: Statistics Canada

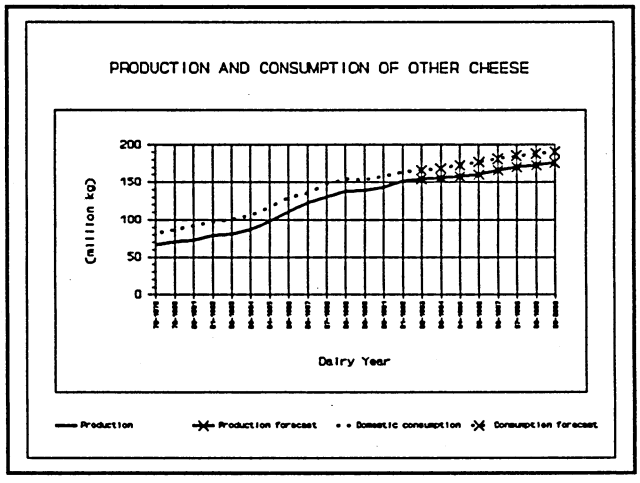
Specialty Cheese

Production and consumption of specialty cheeses have not decreased during the recession. During the last fifteen years, production and domestic disappearance have doubled. The forecast continues optimistic, as there is no indication that the past trend will not continue.

Table 12
SPECIALTY CHEESE PRODUCTION AND CONSUMPTION
(000 kg)

Years	Production	Consumption
1977-78	60,394	77,424
1978-79	66,514	81,724
1979-80	71,257	87,062
1980-81	72,970	92,338
1981-82	79,406	97,253
1982-83	81,132	100,561
1983-84	87,498	105,648
1984-85	98,601	117,370
1985-86	111,381	130,063
1986-87	122,691	135,776
1987-88	130,727	147,602
1988-89	138,483	154,607
1989-90	139,155	153,325
1990-91	143,262	158,059
1991-92	151,405	163,541

Source: Statistics Canada



Other Dairy Products

Among the dairy products that have seen a decrease in recent years are: concentrated whole milk, yoghurt (after having experienced very strong growth), cottage cheese, and ice cream and ice cream mix. Demand for some products such as partially skimmed concentrated milk, and soft and hard frozen yoghurt have increased. It is important to mention that the increase in frozen yoghurt was probably done at the expense of ice cream and yoghurt.

2.2 Processing Sector

The dairy processing industry is vital to the Canadian economy, ranking second in the agri-food sector after the meat industry. The industry employs approximately 26,000 people and generates thousands of jobs in related sectors such as transportation, packaging, handling, and marketing of dairy products.

The number of processing plants has fallen by 35% since 1976. In 1976, there were 491 plants compared to 316 in 1991. However, the total number of workers has dropped by only 2% from 1976. Fluid plants have dropped by 14% from 1982 compared to 27% for industrial plants. Nevertheless, total workers in fluid plants have dropped by 5% from 1982, while total workers in industrial plants have increased by 6%. Fluid production in the same period has increased by 4% while industrial milk production has dropped by 9%.

Table 13
PROCESSING SECTOR

Years	Number of plants	Number of workers in manufacturing activity	Number of workers in total activity	Fluid plants	Number of workers in manufacturing activity	Number of workers in total activity	Industrial Plants	Number of workers in manufacturing activity	Number of workers in total activity
1976	491	13,626	26,280						
1977	466	14,194	26,550						
1978	485	14,704	26,972						
1979	472	14,076	26,257						
1980	456	14,097	26,028						
1981	416	14,457	26,196						
1982	402	14,251	25,734	175	6,333	14,100	227	7,918	11,634
1983	400	14,170	25,306	168	6,287	13,759	232	7,883	11,547
1984	401	14,470	25,368	159	6,191	13,379	242	8,279	11,989
1985	394	14,520	25,445	164	6,283	13,440	230	8,237	12,005
1986	393	14,839	26,201	160	6,195	13,647	233	8,644	12,554
1987	375	NA	25,582	156	NA	13,300	219	NA	12,282
1988	364	15,149	25,870	156	6,301	13,239	208	8,848	12,631
1989	372	14,859	25,920	158	6,128	12,992	214	8,731	12,928
1990	339	14,422	25,328	147	5,992	12,842	192	8,430	12,486
1991	316	14,711	25,781	150	6,451	13,428	166	8,260	12,353

Source: Statistics Canada, Census of manufactures

There are fewer processing plants but the volume of milk processed per plant is increasing. In 1991, each plant processed an average of 21,771 kL, up from just 13,921 kL in 1976. Surprisingly, after reaching a high of 295 kL in 1982, the volume of milk processed by employee has decreased to 267 kL in 1991 which is an increase of only 3% from 1976.

On a financial level, the dairy processing industry recorded shipments of more than $8.8 billion in 1991, up from $3.3 billion in 1976. However, in real 1986 dollars it has dropped by 1%. Shipments per plants increased to $23.388 million in 1989 from $6.827 million in 1976 but increased by 53% in real 1986 dollars. Shipments per employee increased by 163% during the same period and stayed the same in 1986 dollars. The industry created more than $2.6 billion in added value in 1991, which is defined as the increase in the value of a commodity at each of the various stages of production.

In 1989, total shipments represented 1.34% of GDP, down from 1.69% in 1976. Value added for the processing industry rose from $701 million in 1976 to more than $2.6 billion in 1991.

Table 14
PRODUCTIVITY TREND IN THE PROCESSING SECTOR

Years	Number of plants	Number of workers in total activity	Total Value Added (real $86) (000 $)	Value Added per processing plants (000 $)	Value Added per processing plants employees (000 $)	Total shipments (real $86) (000 $)	Shipments per plants (000 $)	Shipments per employees (000 $)	Volume of milk processed per plant (000 L)	Volume of milk processed per employee (000 L)
1976	491	26,280	1,475,309	3,005	56	7,057,796	14,374	269	13,921	260.10
1977	466	26,550	1,535,957	3,296	58	7,069,834	15,171	266	14,989	263.08
1978	485	26,972	1,593,714	3,286	59	7,090,131	14,619	263	14,161	254.63
1979	472	26,257	1,624,895	3,443	62	7,218,700	15,294	275	14,617	262.76
1980	456	26,028	1,548,217	3,395	59	7,511,845	16,473	289	15,762	276.14
1981	416	26,196	1,613,478	3,879	62	7,584,066	18,231	290	17,616	279.74
1982	402	25,734	1,587,190	3,948	62	7,572,675	18,838	294	18,857	294.57
1983	400	25,306	1,642,432	4,106	65	7,579,990	18,950	300	18,084	285.85
1984	401	25,368	1,709,537	4,263	67	7,853,524	19,585	310	18,621	294.35
1985	394	25,445	1,921,419	4,877	76	7,874,706	19,987	309	18,435	285.46
1986	393	26,201	1,883,770	4,793	72	7,839,971	19,949	299	18,588	278.81
1987	375	25,582	2,019,791	5,386	79	7,910,315	21,094	309	19,674	288.40
1988	364	25,870	2,064,152	5,671	80	7,802,510	21,435	302	20,884	293.85
1989	372	25,920	2,073,683	5,574	80	7,631,896	20,516	294	19,735	283.23
1990	339	25,328	2,241,962	6,613	89	7,382,246	21,779	292	21,358	285.86
1991	316	25,781	2,105,647	6,663	82	6,988,303	22,115	271	21,771	266.84

Source: Statistics Canada, Census of Manufacturers

The industrial milk industry, with its 166 plants, is more important than the fluid milk industry in terms of manufacturing activity. In 1991, for example, industrial milk shipments totalled $4.8 billion, with an added value of $1.3 billion. Fluid milk shipments amounted to $3.7 billion in real 1986 dollars, with an added value of $0.9 billion. Industrial milk added value is higher because of the many steps products undergo during processing. For example, cheese requires more handling and processing than milk, which means that a higher added value is attributed to cheese production.

Table 15
PROCESSING SECTOR

Years	Fluid Plants	Total shipments ($000) (real $86)	Total value added ($000) (real $86)	Industrial Plants	Total shipments ($000) (real $86)	Total value added ($000) (real $86)
1982	175	3,274,723	741,231	227	4,297,952	845,959
1983	168	3,349,723	763,814	232	4,230,268	878,618
1984	159	3,509,673	827,080	242	4,343,850	882,457
1985	164	3,596,770	970,802	230	4,277,936	950,617
1986	160	3,611,407	921,552	233	4,228,564	962,218
1987	156	3,629,330	938,862	230	4,280,985	1,080,929
1988	156	3,640,483	889,585	208	4,162,028	1,141,912
1989	158	3,466,667	880,263	214	4,164,925	1,193,420
1990	147	3,198,786	848,360	192	4,184,460	1,393,582
1991	150	3,282,784	852,716	166	3,705,520	1,252,932

Source: Statistics Canada, Census of Manufactures

The dairy processing industry is divided up among three main groups. Co-operatives lead with nearly 48% of the market, followed by public companies with 36% and private companies with 16%. Co-operatives are owned and operated by milk producers and market dairy products with the help of managers. Co-operatives enable producers to sell their milk at a fair price and receive additional revenues, since the dividend is generally redistributed to members. In provinces where there is no marketing board, the co-operative proves very useful since it gives security to milk producers.

There are about 25 dairy co-operatives in Canada. Most of them are located in Quebec, the Prairies, the Maritimes and British Columbia. Generally, industrial milk plants are operated by co-operatives, and fluid milk plants are operated by public or private companies.

Quebec and Ontario, the two leading milk-producing provinces, have different structures. There are three major companies in Quebec: Agropur (an agri-food co-operative), Natrel, and the Lactel Group (a limited partnership including six co-operatives). Agropur specializes in the production of industrial milk, and Natrel in fluid milk. The Lactel Group also specializes in fluid milk. Private companies (Beatrice Foods Inc. and Ault Foods Ltd.) dominate in Ontario.

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