



The Economic Impact of the Dairy Industry in Canada

Dairy Farmers of Canada

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Experts in environment and natural resource economics

Highlights

The dairy industry is one of the most important sectors of Canadian agriculture. The country's 12,965 dairy farms recorded milk sales of \$5.4 billion and total farm revenue of \$6 billion in 2009. These farm activities have direct, indirect and induced spin-offs involving over 125,000 Canadian jobs and \$7.2 billion of GDP.

The 452 dairy processing plants had sales of \$13.7 billion. They generated over 85,000 jobs in Canada, and \$7.9 billion of GDP.

Production and processing within the dairy industry thus account for over 215,000 direct, indirect and induced jobs and generate economic spin-offs totalling \$15 billion in Canada. Dairy activity also generated \$3 billion in tax revenue for municipal, provincial and federal government.

Substantial as they are, the economic spin-offs from Canada's dairy sector compare favourably with a number of leading elements of the Canadian economy. Moreover, they are constant over time, and this stability supports a significant flow of investment and revenue on which every province in Canada, and many rural regions, can rely.

The economic impact of the dairy industry was assessed using the Dynatec 2009 intersectoral model. The model calculates direct spin-offs (sectoral labour), indirect spin-offs (corporate purchases of goods and services) and induced spin-offs (spending by consumers whose employment depends on spending by Canada's dairy sector), and is based among other things on the input/output tables prepared by Statistics Canada.

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Table of Contents

HIGHLIGHTS	I
INTRODUCTION	1
1. PORTRAIT OF CANADA'S DAIRY INDUSTRY	2
1.1 PRODUCTION.....	2
1.2 PROCESSING.....	4
2. THE ECONOMIC IMPACT OF CANADA'S DAIRY INDUSTRY	7
2.1 METHOD	7
2.2 DATA USED	8
2.2.1 <i>Production sector</i>	9
2.2.2 <i>Processing sector</i>	12
2.3 RESULTS FOR THE ECONOMIC IMPACT OF THE DAIRY PRODUCTION SECTOR	14
2.4 RESULTS FOR ECONOMIC SPIN-OFFS FROM THE DAIRY PROCESSING SECTOR.....	17
2.5 RESULTS FOR ECONOMIC SPIN-OFFS FROM THE DAIRY INDUSTRY	19
2.6 MULTIPLIER EFFECTS OF THE DAIRY INDUSTRY IN CANADA AND THE REGIONS	22
3. ANALYSIS	24
CONCLUSION	28
BIBLIOGRAPHY	29
APPENDICES	31
APPENDIX 1. DETAILS OF THE INTERSECTORAL MODEL USED	32
APPENDIX 2. DETAILS OF THE METHODS USED TO DEFINE INPUT DATA FOR THE MODEL	33

List of Tables

TABLE 1. NUMBER OF DAIRY FARMS PER PROVINCE IN CANADA AND PERCENTAGE OF THE NUMBER OF FARMS IN RELATION TO THE TOTAL FOR CANADA, 2010	2
TABLE 2. NUMBER OF DAIRY PROCESSING PLANTS IN CANADA, 2009	4
TABLE 3. DIRECT JOBS IN DAIRY PRODUCTION IN CANADA AND IN THE REGIONS,	10
IN FULL-TIME EQUIVALENTS (FTEs), 2009	10
TABLE 4. REVENUE FROM SALES AT THE FARM OF MILK, CREAM, DAIRY GENETICS, REPLACEMENT CATTLE AND OTHER REVENUE IN CANADA AND IN THE REGIONS, IN MILLIONS OF DOLLARS, 2009	11
TABLE 5. INDUSTRIAL PURCHASES IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009	12
TABLE 6. DIRECT, INDIRECT, INDUCED AND TOTAL SALES OF DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009.....	14
TABLE 7. DIRECT, INDIRECT AND INDUCED JOBS GENERATED BY DAIRY PRODUCTION IN CANADA AND THE REGIONS, 2009.....	15
TABLE 8. DIRECT, INDIRECT AND INDUCED GDP GENERATED BY DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009.....	15
TABLE 9. TAX REVENUE FROM DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009.....	16
TABLE 10. RECIPIENTS OF TAX REVENUES FROM DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009.....	16
TABLE 11. DIRECT, INDIRECT AND INDUCED SALES FOR DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009	17
TABLE 12. DIRECT AND INDIRECT JOBS IN DAIRY PROCESSING IN CANADA AND THE REGIONS, 2009.....	18
TABLE 13. DIRECT, INDIRECT AND INDUCED GDP GENERATED BY DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009.....	18
TABLE 14. TAX REVENUES FROM DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009	19
TABLE 15. RECIPIENTS OF TOTAL TAX REVENUES FROM DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009	19
TABLE 16. DIRECT, INDIRECT AND INDUCED JOBS GENERATED BY THE DAIRY INDUSTRY IN CANADA AND IN THE REGIONS, 2009	20
TABLE 17. DIRECT, INDIRECT AND INDUCED GDP FOR THE DAIRY INDUSTRY IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009	20
TABLE 18. TAX REVENUES FROM THE DAIRY INDUSTRY IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009.....	21
TABLE 19. RECIPIENTS OF TOTAL TAX REVENUES FROM THE DAIRY INDUSTRY IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009	21
TABLE 20. ESTIMATED IMPACT ON THE ECONOMY IN CANADA AND THE REGIONS OF ADDITIONAL SALES OF \$100,000 IN THE DAIRY SECTOR	23

List of Figures

FIGURE 1. NUMBER OF DAIRY OPERATIONS AND MILK OUTPUT IN CANADA, 2002-2010.....	3
FIGURE 2. NUMBER OF DAIRY COWS PER FARM AND OUTPUT PER COW IN CANADA, 2000-2009	3
FIGURE 3. FARM CASH RECEIPTS FROM DAIRY PRODUCTION, PORK AND BEEF IN CANADA, IN THOUSANDS OF DOLLARS, 1995-2009	26

Introduction

The dairy sector is one of the most important components of Canadian agriculture. With milk sales worth \$5.456 billion and farm revenues totalling \$6 billion in 2009, dairy production ranks third in Canada's agricultural sector, after grains and red meat. In 2010, there were 12,965 dairy operations in Canada: 529 in British Columbia, 1,144 on the Prairies, 4,191 in Ontario, 6,375 in Quebec and 726 in the Atlantic Region.

The 452 Canadian processing plants generated sales of \$13.7 billion in 2009.

The purpose of this study is to estimate the direct, indirect and induced economic impact of dairy production and processing in Canada in terms of GDP, jobs and government revenue. The results will be broken down for five regions: British Columbia, Prairies, Ontario, Quebec and Atlantic.

Chapter 1 provides background on Canada's dairy industry, describing its main indicators and how they change in Canada and in each province. Chapter 2 presents hypotheses and results for the economic impact of dairy production and processing in Canada and in the five study regions. Chapter 3 contains an analysis of this economic impact, and places it in perspective.

Caveat

The estimates provided in this report are stated in non-rounded figures; this does not reflect absolute accuracy in the units used. Rather, approximations are presented that are based on the most realistic assumptions possible.

1. Portrait of Canada's dairy industry

1.1 Production

Location of dairy production in Canada

The majority of Canada's dairy farms are located in two provinces: Quebec (49%) and Ontario (32%). Dairy production nevertheless takes place in every Canadian province.

TABLE 1. NUMBER OF DAIRY FARMS PER PROVINCE IN CANADA AND PERCENTAGE OF THE NUMBER OF FARMS IN RELATION TO THE TOTAL FOR CANADA, 2010

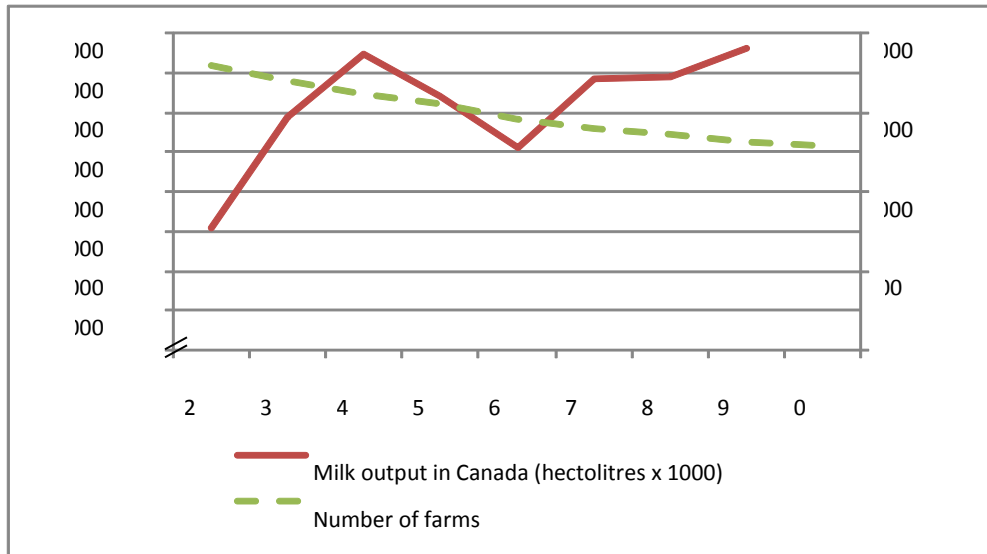
Province	Number of dairy farms	% of the Canadian total
British Columbia	529	4.1
Alberta	598	4.6
Saskatchewan	190	1.5
Manitoba	356	2.7
Ontario	4,191	32.3
Quebec	6,375	49.2
New Brunswick	234	1.8
Nova Scotia	248	1.9
Prince Edward Island	209	1.6
Newfoundland	35	0.3
Total	12,965	100

Source: Canadian Dairy Commission, 2010a.

The Canadian dairy sector: constantly increasing efficiency

The stable revenue generated by dairy production has enabled the development of modern, efficient operations with constantly increasing productivity. Like a number of agricultural sectors, Canada's dairy production has experienced concentration and increased productivity in recent years. The number of dairy farms is decreasing in every province, but milk production has remained stable and has even increased slightly since 2002 to reach 76.6 million hectolitres in 2009. From 2000 to 2010, the number of farms fell by 33%: from 19,411 to 12,965.

FIGURE 1. NUMBER OF DAIRY OPERATIONS AND MILK OUTPUT IN CANADA, 2002-2010



Note: Milk output in Canada is shown against the right axis, and the number of farms against the left axis.

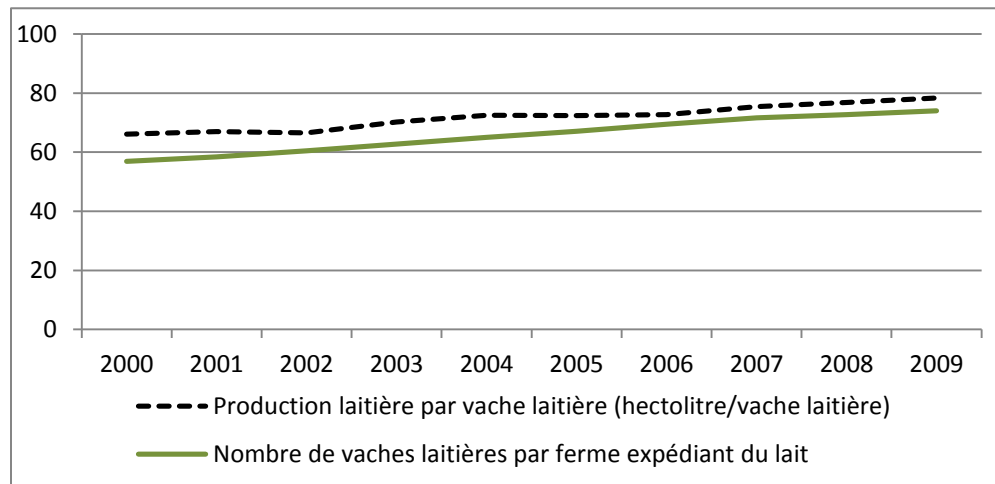
Sources: Number of farms: Canadian Dairy Commission, 2010a.

Milk output: Canadian Dairy Commission, 2010b.

Compilation: ÉcoRessources Consultants, January 2011.

From 2000 to 2009, the number of dairy cows per farm increased by 30% from a Canadian average of 57 to 74. Over the same period, milk output per cow increased by 18% from 66 hectolitres to 78, confirming an increase in productivity and herd size.

FIGURE 2. NUMBER OF DAIRY COWS PER FARM AND OUTPUT PER COW IN CANADA, 2000-2009



Note: Milk output (hectolitres per cow)

Number of cows per farm shipping milk

Sources: Average milk output: Canadian Dairy Commission, 2010b.

Number of dairy cows: Canadian Dairy Commission, 2010c.

Compilation: ÉcoRessources Consultants, janvier 2011.

Milk: a key element in Canadians' diet

Milk is one of the biggest single components in Canadians' food budget, accounting for some 15% of manufacturers' deliveries of food and beverages (Statistics Canada, 2009). Milk and dairy products take pride of place in the diet of Canadians: in them, they find not only nutrition – lipids, proteins, glucides and so on – but also a source of experiences, pleasures and the discovery of different worlds of flavour.

1.2 Processing

A rural and urban activity

Dairy product processing is an important component of Canada's economy. In terms of manufacturers' sales, it constitutes the second biggest industry in the food sector, after meat. In 2009, the value of products shipped by dairy processors was about \$13.6 billion: some 15% of total deliveries by Canada's food and beverage industry (CDC, 2011).

A total of over 450 dairy processing plants, including some 300 subject to federal inspection, are located in every Canadian province (see Table 2). Over 71% of these operations are located in Quebec or Ontario. Plant location depends in particular on the market served. Beverage milk plants are mostly located near the points of consumption, which means around urban centres. Plants making products with a longer shelf life, like cheese and butter, tend more to be located in rural regions, near their sources of supply.

TABLE 2. NUMBER OF DAIRY PROCESSING PLANTS IN CANADA, 2009

Province	Number of plants
British Columbia	49
Alberta	29
Saskatchewan	2
Manitoba	14
Ontario	118
Quebec	201
New Brunswick	10
Nova Scotia	18
Prince Edward Island	8
Newfoundland	3
Total	452

Source: Canadian Dairy Information Centre, 2011a.

A consolidated sector

Like the production sector, dairy processing has undergone a process of concentration in recent years: today, 14% of the processing plants, owned by the three largest processors in Canada (Saputo, Agropur and Parmalat), process about 75% of the milk produced in Canada. This concentration has resulted from a significant rationalization of the number of enterprises in recent years, driven by economies of scale and thus the need for improved operation of facilities, the pooling of resources and skills and a reduction in costs for larger but more efficient enterprises. The number of plants has therefore decreased by half since 1975, but the trend is slowing. Since 2005, the number of plants has decreased by only 3% (Canadian Dairy Information Centre, 2011b and Canadian Dairy Commission, 2011).

Changing consumption patterns, and enterprises that adapt

While milk remains a key dietary component for Canadians, demand is constantly shifting: purchases of yogurt, cheese and cream are increasing, and new products are constantly coming to market: probiotic yogurts, filtered milk, omega-3 products. Organic production, while it still accounts for less than 1% of total output, is increasing, as well as that of organic derivatives. Other products once very popular are becoming less so, particularly beverage milk – especially 3.25% and 2% – and ice cream.

All of these changes are driven by demographic changes, immigration, marketing, as well as competition from other products from other sectors, such as juices and smoothies. In Canada, as elsewhere in the world, we are seeing more segmentation of the market, in which the more traditional dairy consumer products, like cheddar cheese, have been joined by value-added products for specific clienteles, such as Kefir yogurt and crème fraîche. The Canadian cow's milk cheese industry, while still in its youth, now offers over 350 varieties and is recognized worldwide. In 2010, numerous Canadian cheeses were prizewinners at the World Championship Cheese Contest.

Canada's dairy sector – production and processing – appears to have taken the measure of these changes and adapted to them by innovating in the creation of products that meet the expectations of Canadian consumers. Supply management, through the negotiation of supply agreements with dairy plants, enables optimization of milk transport, directing it to the form of processing that exploits it best, improving the adaptability of the production sector to the demands of the processing sector, and of consumers.

Quality recognized worldwide

Canadian milk and dairy products meet the strictest international standards. Many Canadian dairy plants have earned HACCP or ISO certification, or both. In recent years, moreover, traceability in the dairy production process has been identified as a priority goal. It is based on three factors: identification of animals, movement of animals and identification of facilities. All newborns, male or female, are labelled using the national system of dairy cattle identification. The federal, provincial and territorial governments worked with industry to put the system in place (Canadian Dairy Information Centre, 2011b).

Both the production and processing components of the dairy industry are aware of the importance of quality control, and are involved in the development and improvement of production processes.

In this connection, producers work with the Canadian Food Inspection Agency (CFIA) in the development of national standards for biosecurity on the farm for the dairy industry. These standards help to reduce the risk and costs of the appearance, spread and propagation of disease on the farm. The "Canadian Quality Milk" (CQM) program set up by the Dairy Farmers of Canada is an on-farm food safety program based on the HACCP standards and certified by the CFIA. It requires weekly or daily monitoring of activity at the farm, particularly with respect to the use of medicines and chemicals, and all physical activities involved in production. Mechanisms to impose penalties for non-compliance with rules respecting production or the quality of the finished product are well established, and those responsible for these programs are accountable to Health Canada. These examples of action already taken are in response to the growing demands of consumers for high-quality food products that are safe to eat or drink.

We shall now look at how all these activities contribute to the Canadian economy in terms of the creation of employment and wealth, and tax revenues.

2. The economic impact of Canada's dairy industry

2.1 Method

The intersectoral model was used to estimate the economic impact of the dairy industry. It is of a type commonly used to calculate benefits generated within the economy by an increase or decrease in spending, also referred to as a "spending shock". The shock is typically represented by consumer spending or the activities of an industry like agriculture.

Direct, indirect and induced economic spin-offs generated by the dairy sector were estimated using the Dynatec 2009 model, an input-output model developed by EcoTec Consultants. It is based on, among other things, the Statistics Canada input-output model, with additional modules for estimating induced effects. Appendix 1 provides more details about this tool.

The basic concepts are defined below to facilitate understanding of the models used to estimate economic spin-offs and results.

Definitions of key concepts

Direct spin-offs

Direct spin-offs are activities in the two sectors considered in this study: production and processing. Thus, direct jobs are the accumulation, expressed in full-time equivalents (FTEs) of 2000 hours a year, of work performed by paid help and operators on the farms and in the processing plants. Direct value added – that is the contribution to Canada's GDP – is therefore the total remuneration paid to factors of production¹ in the sector.

Indirect spin-offs

Purchases by enterprises involved in dairy production and processing generate indirect economic spin-offs. For example, a dairy enterprise that purchases equipment generates an indirect impact for the equipment manufacturer. Purchases made by the equipment vendor in the conduct of its operations – on fuel, insurance and so on – also represent indirect spin-offs.

The indirect effects thus represent the proportion of economic activity (GDP, employment) generated on the part of suppliers of inputs or services for the direct activity (in our example, the dairy enterprise).
Induced spin-offs

¹ Remuneration of the factors of production includes salaries and benefits, indirect taxes (sales and production taxes), depreciation and before-tax profits.

Induced economic spin-offs are generated by personal spending on the part of active operators and paid employees in the sectors in question (dairy production and processing) and their suppliers. Since consumer spending accounts for more than 60% of the Canadian economy, it is important to estimate induced spin-offs in order to obtain a complete and comprehensive picture of all the economic spin-offs generated by the dairy sector.

Total spin-offs: a complete picture of the economic impact

Total spin-offs are the sum of direct, indirect and induced spin-offs. Every precaution is taken to avoid double counting. Our figures thus provide a full picture of the economic impact generated by the initial spending used to initiate the simulation.

2.2 Data used

Calculation of the economic impact of the dairy industry was based on detailed data on dairy production and processing in Canada and in the provinces. For the purposes of our simulations, the input-output models used are supplied with data on employment, estimated spending and total sales, broken down into expenditure and revenue. Most of the basic data were supplied by the Canadian Dairy Commission, and were then adapted and compiled by ÉcoRessources. This section details the method used to estimate the data on production and processing.

The reference year is 2009. Simulations were conducted with provincial data, which were then grouped on the basis of the five regions, on grounds of confidentiality and continuity with earlier studies of the Canadian and provincial dairy sectors. The five regions used in the study were:

- British Columbia;
- the Prairies (Manitoba, Saskatchewan, Alberta);
- Ontario;
- Quebec;
- the Atlantic region: Prince Edward Island, New Brunswick, Nova Scotia, Newfoundland and Labrador.

2.2.1 *Production sector*

Calculation of total expenditure by region was based on production cost data for each of them. The 2009 production cost data of the Canadian Dairy Commission (2010d) detail spending by hectolitre of milk produced in each province. When necessary, the provinces were grouped using a weighted average in order to obtain a production cost by study region. The production cost was multiplied by milk volumes standardized for 3.6% milk fat in 2009 in each region. These data are also provided by the Canadian Dairy Commission (2010e).

Farm cash receipts from the dairy industry (milk and cream sold by farmers) for each province in 2009 were obtained from Statistics Canada, Table 003-0008 (in Canadian Dairy Commission, 2010f). To calculate total revenue from the dairy production, various sources were used:

- Revenues from the dairy genetic material trade for 2009, prorated for dairy herd per major region, as reported by Statistics Canada (Canadian Dairy Information Centre, 2010): http://www.dairyinfo.gc.ca/index_e.php?s1=dff-fcil&s2=imp-exp&page=imp_exp;
- Revenues from the sale of good replacement bob calves, prorated for dairy herd per major region with the replacement bob calf rate (source: FPBQ) and the selling price for good replacement bob calves (source: http://www.bovin.qc.ca/en/price_info/cull_cattle_and_bob_calves/graphics.php);
- Estimates of other revenues from dairy operations for 2009 for each province, taken from statistics on revenue and expenditure of farm operations as reported by Statistics Canada (2010b). This was our source for data on revenues from custom work and machine rental, rental income and miscellaneous revenues, and program payments and insurance proceeds.

Details on the methods used to adjust expenditure and sales in the model will be found in Appendix 2.

The following tables summarize some of the information inputted into the model in order to calculate the economic impact of Canada's dairy production. Table 3 shows direct jobs generated by dairy production by major region in 2009. Table 4 details revenue from sales at the farm in 2009.

**TABLE 3. DIRECT JOBS IN DAIRY PRODUCTION IN CANADA AND IN THE REGIONS,
IN FULL-TIME EQUIVALENTS (FTEs), 2009**

Region	FTEs (2000 hrs/yr)
British Columbia	2,727
Prairies	5,772
Ontario	15,901
Quebec	23,144
Atlantic	3,210
Canada	50,753

Source: ÉcoRessources calculations, based on CDC production costs.

Note: FTEs were calculated by multiplying the average number of hours of work to produce 1hl of milk by the volume of milk produced in each region, and dividing by 2,000 (40 hours a week for 50 weeks). Working hours include family labour, paid labour and work by the owner. Since milk producers often work more than 40 hours a week, direct employment in dairy production expressed in ss is larger than the number of jobs. This should be kept in mind when making comparisons between direct employment in dairy production, and employment in other sectors of the economy.

TABLE 4. REVENUE FROM SALES AT THE FARM OF MILK, CREAM, DAIRY GENETICS, REPLACEMENT CATTLE AND OTHER REVENUE IN CANADA AND IN THE REGIONS, IN MILLIONS OF DOLLARS, 2009

Region	Cash receipts from milk and cream sold off farms*	Revenue from dairy genetics**	Revenues from sales of replacement cattle***	Other revenue****	Total revenue
British Columbia	494	7	9	19	529
Prairies	853	17	21	28	919
Ontario	1,766	33	42	84	1,924
Quebec	2,009	37	47	243	2,336
Atlantic	334	6	8	13	361
Canada	5,456	100	127	387	6,069

Notes: * Basic data provided by Statistics Canada (2010a), Table 003-0008

** Basic data provided by Statistics Canada (in Canadian Dairy Information Centre (2010)): http://www.dairyinfo.gc.ca/index_e.php?s1=dff-fcil&s2=imp-exp&page=imp_exp. Data for Canada were broken down by region on the basis of dairy herd size, using data provided by Statistics Canada, Table 003-0032. Calculations by AAC-AID, Dairy Section. Dairy genetics sales are mostly for export.

*** Data were estimated on the basis of a mid- to long-term replacement rate of 27%, on replacement cattle at 600 lb carcass weight, and an average selling price for replacement cattle in 2009 of \$86.69/100 lb carcass weight (source: http://www.bovin.qc.ca/en/price_info/cull_cattle_and_bob_calves/graphics.php). Data for Canada were broken down by region on the basis of dairy herd size, using data provided by Statistics Canada, Table 003-0032.

**** These data were provided by Statistics Canada (2010b), Catalogue No. 21-208-X. "Other revenue" includes:

Custom work and machine rental includes revenues from custom work, contract work, machinery leasing or rental, custom trucking, harvesting, crop dusting or spraying, seeding and so on.

Rental income includes revenues from quota rental, the rental of land and/or buildings and other rental income.

Miscellaneous revenue includes cash advances net of cash advances repayment, patronage dividends (such as dividends from grain pools and payments from co-operatives, co-op proceeds), quota or levy refunds, revenues from the sale of sand and gravel, Goods and Services Tax/Harmonized Sales Tax (GST/HST) input tax credit, and so on.

Program payments and insurance proceeds include income from provincial stabilization programs, federal and provincial business risk management and disaster assistance programs, government payments and other subsidies, aggregate amounts reported for subsidies, patronage dividends and reimbursements, insurance proceeds from programs (private and government) for crops and livestock due to adverse weather conditions, disease or other reasons.

2.2.2 Processing sector

The input-output model includes a dairy processing module. The total value of milk purchases by processing enterprises by region used in the model was estimated by combining values for use of beverage and processing milk by province from the Canadian Dairy Commission, with values for dairy ingredients imported into Canada in 2009, prorated by province on the basis of use of industrial milk, with data provided by Statistics Canada. The latter were estimated and broken down very approximately, but constitute only 5% of purchases of milk by plants. Table 5 presents these data.

TABLE 5. INDUSTRIAL PURCHASES IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

	Use of beverage milk in Canada*	Use of processing milk and Class 5 milk in Canada*	Estimated use of imported dairy ingredients**	Total use of Canadian milk and imported dairy ingredients
British Columbia	319	206	17	542
Prairies	465	407	40	912
Ontario	1,006	1,011	92	2,109
Quebec	554	1,531	133	2,218
Atlantic	189	145	14	348
Canada	2,533	3,300	297	6,129

Sources: *Canadian Dairy Commission (2010g)² and **Statistics Canada (2010c). Compilation and estimates: ÉcoRessources Consultants.

² The sum of specific values for the use of beverage milk in Canada and the use of processing milk and Class 5 milk in Canada supplied by the CDC is slightly higher than the data provided by Statistics Canada. The value provided by Statistics Canada is minus some expenditures, particularly transport, promotion and administration costs.

Caveats

Uncertainty related to the model used

By definition, a model is a simplified representation of reality. In this case, it is the provincial and Canadian economies that are being modelled. There is uncertainty related to the fact that the data inputted into the model are aggregates. Results of the study are thus approximations at best of the actual values, for the measurement of which no other method is yet available.

Induced effects

The validity of estimates of induced effects is frequently challenged. The purpose of taking them into consideration is to achieve an approximation of the total impact of an industry. Ignoring them, on the pretext that estimating them creates uncertainty, in itself creates uncertainty. Since everyone agrees that induced effects do exist, the only question is: "How are they to be correctly evaluated?" To ensure that induced effects were not overestimated, various precautions were taken, including:

- No more than 15 iterations;
- Various deductions were made from the income of individuals before the spending of household revenue was simulated:
 - Federal and provincial income taxes.
 - Employee contributions to employment insurance, public and private pension funds and so on.
 - The model subtracts household savings with each round of expenditure. The percentages of income saved vary from province to province from 0 to 12.2%, which means that the average propensity to consume (APC) varies from 87.8% to 100%.³
- Lastly, we took care not to assign remuneration to every hour worked by farm operators, in order not to overestimate the induced effects of production. The hours worked include unpaid hours, which do not generate any re-expenditure.

³ The APC is 100% for Prince Edward Island, Nova Scotia, British Columbia and Saskatchewan; 97.1% for Manitoba; 96.5% for Quebec; 96.2% for New Brunswick; 95.8% for Ontario; 92.2% for Newfoundland and Labrador, and 87.8% for Alberta (source: Statistics Canada).

2.3 Results for the economic impact of the dairy production sector

The Canadian dairy production sector generated total off-farm sales of over \$22 billion in 2009. These total sales (revenue from sales of milk and cream, dairy genetics, replacement cattle and the other forms of income detailed in section 2.2.1) include direct sales, indirect sales and induced sales. The largest proportion of total sales comes from Quebec, with \$7.9 billion, followed by Ontario with \$7.4 billion. Direct sales in the production sector totalled \$6 billion in Canada.

The table below shows direct, indirect and induced sales of dairy output in 2009, in the study regions.

TABLE 6. DIRECT, INDIRECT, INDUCED AND TOTAL SALES OF DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct⁴	529	919	1,924	2,336	361	6,069
Indirect	542	1,939	2,360	2,671	368	7,880
Induced	559	1,218	3,149	2,907	385	8,218
Total	1,629	4,077	7,432	7,915	1,114	22,167

In 2009, Canadian dairy production generated a total of 127,363 direct, indirect and induced jobs in Canada, expressed in FTEs. Total wealth creation (direct, indirect and induced GDP) from dairy production exceeded \$7.2 billion. Tables 8 and 9 below list direct, indirect and induced jobs and GDP generated by dairy production in Canada in 2009.

⁴ The direct sales revenues are from sales of milk and cream, dairy genetics, replacement cattle and the other forms of income detailed in section 2.2.1.

TABLE 7. DIRECT, INDIRECT AND INDUCED JOBS GENERATED BY DAIRY PRODUCTION IN CANADA AND THE REGIONS, 2009

(FTEs)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	2,727	5,772	15,901	23,144	3,210	50,754
Indirect	3,187	9,386	13,399	15,523	2,368	43,863
Induced	2,282	4,254	12,858	11,590	1,762	32,746
Total	8,196	19,412	42,158	50,257	7,339	127,363

TABLE 8. DIRECT, INDIRECT AND INDUCED GDP GENERATED BY DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	138	177	553	564	87	1,519
Indirect	210	701	970	1,054	131	3,066
Induced	190	388	1,061	911	124	2,673
Total	537	1,266	2,584	2,530	342	7,257

Dairy production maintains more direct jobs than indirect or induced jobs in Canada, Ontario, Quebec and the Atlantic region. In British Columbia and on the Prairies, indirect jobs lead direct and induced jobs. Dairy production in Canada created over 43,000 FTEs and \$3 billion in GDP for its suppliers.

A significant share of the induced effects is found in Ontario, where Canada's manufacturing sector is also concentrated.

Among the five study regions, the largest total number of jobs created by dairy production was in Quebec, with 50,257 FTEs, followed by Ontario with 42,158 and the Prairies with 19,412. Total GDP from dairy production exceeded \$2.5 billion in Ontario and Quebec.

Canadian dairy production also generates direct, indirect and induced tax revenues. Table 10 shows tax revenue from dairy production for each region studied.

TABLE 9. TAX REVENUE FROM DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	14	9	75	115	11	224
Indirect	28	40	144	142	16	370
Induced	48	97	304	314	38	802
Total	90	146	523	571	65	1,396

In 2009, dairy production generated total tax revenue of \$1.4 billion in Canada. Induced tax revenues are always higher than direct and indirect revenues, reaching \$802 million in Canada, compared with \$224 million and \$370 million, respectively. Total tax revenue exceeded \$570 million in Quebec and \$520 million in Ontario.

These direct, indirect and induced tax revenues are all paid into the consolidated funds of the federal, provincial and municipal governments.⁵ Total tax revenues from dairy production break down as follows:

TABLE 10. RECIPIENTS OF TAX REVENUES FROM DAIRY PRODUCTION IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Federal tax revenue	56	86	306	290	25	773
Provincial tax revenue	24	37	150	196	50	426
Municipal tax revenue	10	23	67	85	10	196
Total tax revenue ⁶	90	146	523	571	65	1,396

In all regions of Canada except the Atlantic, federal tax revenues are the highest, followed by provincial and municipal revenues. Federal tax revenue from Canadian dairy production totalled \$773 million in 2009, compared with \$426 million in provincial tax revenue and \$196 million in tax revenue for municipalities.

⁵ Federal tax revenues consist of individual income tax, the goods and services tax and other indirect taxes, and taxes on corporate profits. Provincial tax revenues consist of individual income tax, provincial sales tax and other indirect taxes, and taxes on corporate profits. Municipal tax revenues consist of property taxes.

⁶ Total tax revenues include federal and provincial individual income taxes, direct and indirect federal and provincial taxes, federal and provincial taxes on corporate income and municipal property taxes.

2.4 Results for economic spin-offs from the dairy processing sector

Canadian dairy processing generated total sales of nearly \$27.8 billion in 2009. The largest portion of total sales from processing was in the province of Ontario, with \$10.2 billion, followed by Quebec with \$9.4 billion. Direct sales of dairy products totalled \$13.7 billion in Canada.

The table below presents revenues from direct, indirect and induced sales of dairy products in 2009, broken down by region. In theory, dairy production is a supplier for processing and should thus be included in the indirect spin-offs from processing. To avoid double counting, however, no purchases were subtracted from the spending shock inputted into the input-output model for processing.

TABLE 11. DIRECT, INDIRECT AND INDUCED SALES FOR DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	1,236	2,078	4,686	4,904,,	813	13,717
Indirect⁷	506	1,035	2,561	2,015	302	6,419
Induced	665	1,125	3,005	2,517	374	7,685
Total	2,406	4,238	10,252	9,437	1,488,	27,821

In 2009, Canadian dairy processing generated 87,741 jobs in Canada, expressed as FTEs. Nationally, dairy processing activities generated 22,672 direct FTEs, 35,162 indirect FTEs and 29,907 induced FTEs. The table below presents data for jobs in the dairy processing sector in the study regions.

⁷ Note: In order to avoid any possibility of double counting, indirect spin-offs from processing exclude those resulting from processors' milk purchases. These are part of the direct spin-offs from dairy production. Technically, milk purchases were subtracted from total input purchases by processors.

TABLE 12. DIRECT AND INDIRECT JOBS IN DAIRY PROCESSING IN CANADA AND THE REGIONS, 2009

(FTEs)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	2,252	3,788	6,102	8,518	2,012	22,672
Indirect⁸	2,771	4,661	13,428	12,643	1,659	35,162
Induced	2,587	3,823	12,007	9,861	1,630	29,907
Total	7,609	12,272	31,536	31,022	5,301	87,741

The total numbers of jobs generated by dairy processing in 2009 were similar in Ontario and Quebec: 31,536 and 31,022 FTEs, respectively. Except in the Atlantic region, indirect jobs exceeded direct and induced jobs.

Also in 2009, the processing sector produced total GDP of \$7.9 billion nationally, including \$2.9 billion in direct spin-offs. The table below provides data on GDP for the dairy processing sector in the study regions.

TABLE 13. DIRECT, INDIRECT AND INDUCED GDP GENERATED BY DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	278	467	968	996	197	2,905
Indirect⁹	198	429	998	824	108	2,556
Induced	219	353	997	780	116	2,465
Total	694	1,248	2,963	2,600	421	7,926

Of the \$8 billion generated by Canadian dairy processing, nearly \$3 billion were generated in Ontario, and \$2.6 billion in Quebec. Next come the Prairies, with \$1.2 billion, followed by British Columbia with nearly \$700 million and the Atlantic region with over \$420 million.

Dairy processing also generated tax revenues: a total of \$1.6 billion for the whole of Canada. Most of this (\$746 million) consisted of induced tax revenues, followed by direct tax revenues (\$454 million) and indirect tax revenues (\$419 million).

⁸ Note: In order to avoid any possibility of double counting, indirect spin-offs from processing exclude those resulting from processors' milk purchases. These are part of the direct spin-offs from dairy production.

⁹ Note Note: In order to avoid any possibility of double counting, indirect spin-offs from processing in terms of GDP exclude those resulting from processors' milk purchases. These are part of the direct spin-offs from dairy production.

The table below presents these tax revenues for 2009.

TABLE 14. TAX REVENUES FROM DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	34	57	159	182	23	454
Indirect¹⁰	28	59	165	150	18	419
Induced	57	89	291	272	37	746
Total	119	205	615	604	78	1,620

These tax revenues were highest in Ontario: nearly \$615 million, followed by Quebec with \$604 million.

The recipients of total tax revenues from dairy processing were as follows:

TABLE 15. RECIPIENTS OF TOTAL TAX REVENUES FROM DAIRY PROCESSING IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Federal tax revenues	79	131	381	345	47	983
Provincial tax revenues	35	63	189	229	27	544
Municipal tax revenues	5	11	44	29	3	93
Total tax revenues	119	205	615	604	78	1,620

In all regions, federal tax revenues (\$983 million) were the highest, followed by provincial tax revenues (\$544 million) and municipal tax revenues (\$93 million).

2.5 Results for economic spin-offs from the dairy industry

The dairy industry includes the primary and secondary sectors. Simulations were conducted in such a way that the results for spin-offs from production and processing could be added together. The Canadian dairy industry thus generated a total of 215,103 direct, indirect and induced FTEs. Of these, 73,426 were direct, 79,025 were indirect and 62,653 were induced. The table below shows jobs created by the dairy industry in the five study regions.

¹⁰ Note: in order to avoid any possibility of double counting, indirect tax revenues from processing exclude spin-offs resulting from processors' milk purchases. These spin-offs are included in the direct spin-offs from dairy production.

TABLE 16. DIRECT, INDIRECT AND INDUCED JOBS GENERATED BY THE DAIRY INDUSTRY IN CANADA AND IN THE REGIONS, 2009

(FTEs)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	4,979	9,560	22,003	31,662	5,222	73,426
Indirect	5,958	14,047	26,827	28,166	4,027	79,025
Induced	4,869	8,077	24,864	21,451	3,391	62,653
Total	15,805	31,684	73,694	81,279	12,641	215,103

Except in Quebec and the Atlantic region, indirect jobs are the most numerous. The dairy industry created 31,662 direct FTEs in Quebec, compared with 28,166 indirect FTEs.

The dairy industry generated a total of \$15.2 billion in GDP in Canada, including \$4.4 billion in direct spin-offs. It generated total spin-offs of \$5.5 billion in Ontario and \$5.1 billion in Quebec. The table below shows direct, indirect and induced GDP for the dairy industry in the study regions in 2009.

TABLE 17. DIRECT, INDIRECT AND INDUCED GDP FOR THE DAIRY INDUSTRY IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	415	644	1,521	1,560	284	4,424
Indirect	407	1,130	1,968	1,878	239	5,622
Induced	408	741	2,057	1,691	240	5,137
Total	1,230	2,514	5,547	5,130	763	15,183

The dairy industry generated federal, provincial and municipal tax revenues. Total tax revenues were \$3 billion for the whole of Canada. They were highest in Quebec and Ontario, at a little over \$1.1 million. Next came the Prairies with \$351 million, British Columbia with \$209 million, and the Atlantic with \$143 million. The table below shows tax revenues from the dairy industry in 2009.

TABLE 18. TAX REVENUES FROM THE DAIRY INDUSTRY IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Direct	48	66	234	297	33	678
Indirect	56	98	309	292	34	789
Induced	105	187	595	586	76	1,548
Total	209	351	1,138	1,175	143	3,016

Detailed total tax revenues from the dairy industry were as follows:

TABLE 19. RECIPIENTS OF TOTAL TAX REVENUES FROM THE DAIRY INDUSTRY IN CANADA AND THE REGIONS, IN MILLIONS OF DOLLARS, 2009

(\$M)	British Columbia	Prairies	Ontario	Quebec	Atlantic	Canada
Federal tax revenues	135	217	687	635	82	1,756
Provincial tax revenues	59	100	339	425	48	970
Municipal tax revenues	16	34	112	115	13	290
Total tax revenues	209	351	1,138	1,175	143	3,016

In all the Canadian regions we studied, federal tax revenues from the dairy industry were highest at \$1.756 billion in 2009, compared with \$970 million in provincial tax revenues and \$280 million in municipal tax revenues.

2.6 Multiplier effects of the dairy industry in Canada and the regions

Multipliers enable us to evaluate the impact of additional sales by the dairy production and processing sectors on the generation of wealth (GDP), jobs and tax revenues. The use of multipliers is valid only at the margin: it would be inappropriate, for example, to double sales at the farm and assert that GDP, jobs and tax revenues were also doubled.

According to a linear projection, additional direct sales of \$100,000 in the production sector would enable the creation of an additional 2.1 total FTEs in the Canadian economy, and generate \$120,000 of additional GDP.

Additional direct sales of \$100,000 in the production sector would generate tax revenues for governments of \$23,000, while the same amount in the processing sector would generate tax revenues of \$12,000 for governments.

The table below provides details on multipliers for the regions and for Canada.

TABLE 20. ESTIMATED IMPACT ON THE ECONOMY IN CANADA AND THE REGIONS OF ADDITIONAL SALES OF \$100,000 IN THE DAIRY SECTOR

	Employment multiplier (total employment /direct sales)	Sales multiplier (total sales /direct sales)¹¹	Wealth creation multiplier (total GDP /direct sales)	Tax multiplier (total tax revenues /direct sales)
Canada				
Production	2.10	365,230	119,571	22,997
Processing	0.64	202,821	57,781	11,811
Sector	1.09	/	76,735	15,243
British Columbia				
Production	1.55	308,174	101,520	17,049
Processing	0.62	194,739	56,128	9,654
Sector	0.90	/	69,728	11,870
Prairies				
Production	2.11	443,424	137,664	15,915
Processing	0.59	203,893	60,059	9,853
Sector	1.06	/	83,858	11,712
Ontario				
Production	2.19	386,319	134,298	27,204
Processing	0.67	218,787	63,232	13,114
Sector	1.12	/	83,917	17,215
Quebec				
Production	2.15	338,814	108,284	24,432
Processing	0.63	192,412	53,014	12,313
Sector	1.12	/	70,847	16,223
Atlantic				
Production	2.03	308,275	94,522	18,048
Processing	0.65	183,131	51,810	9,563
Sector	1.08	/	64,958	12,175

¹¹ It is not possible in this study to estimate total sales for the dairy sector without double counting.

3. Analysis

The values presented in the previous chapter indicate that the economic impact of the dairy industry on the Canadian economy is a significant one. The purpose of this chapter is to go beyond the statistics and clarify the scope and validity of that impact on the Canadian economy.

The economic impact of the dairy industry in perspective

Canada-wide, the 50,754 FTEs generated by the primary dairy sector in 2009 (including family labour) represented 16% of total labour in the Canadian primary sector (estimated at 316,000 jobs in 2009 according to the Labour Force Survey).¹²

The 73,426 FTEs created by the dairy sector as a whole represented about 12% of agriculture and agri-food employment in Canada (estimated at 623,438 in 2005 by Statistics Canada (Agriculture et Agri-Food Canada, n.d.)), whereas the 215,103 FTEs for sector represented 1.3% of total employment in Canada in 2009 (estimated at 16,886,700 by Statistics Canada (Statistics Canada, 2010d)). The dairy industry thus reduces unemployment in Canada by more than 1%.¹³

According to Statistics Canada data, direct GDP generated by dairy production in Canada represented 7.2% of Canadian agricultural GDP, and 0.3% of total GDP.¹⁴

The impact of the dairy industry compares favourably with that of a number of leading elements of the Canadian economy. Canada's aeronautical sector generated 78,000 jobs in 2005, 42,000 jobs were generated by the Desjardins credit movement, 26,000 by Air Canada and 9,000 by General Motors. The Canadian dairy industry generated 73,426 FTEs.

Economic impact across Canada

Since every province has numerous dairy farms and processing plants, the industry generates an economic impact everywhere in Canada. Over the last 15 years, dairy production has been the first or second biggest source of farm cash receipts every year. In 2009, dairy production was among the two leading farm industries in terms of cash receipts in seven of Canada's ten provinces (Agriculture and Agri-Food Canada, 2010).

¹² Source: Statistics Canada (2010d), CANSIM, Table 282-0008 and Catalogue No. 71F0004XCB.

These two sets of statistics should be compared with care, and should be regarded as approximations only. FTEs and "jobs" have slightly different definitions.

¹³ These two sets of statistics should be compared with care, and should be regarded as approximations only. FTEs and "jobs" have slightly different definitions.

¹⁴ These two sets of statistics should be compared with care, and should be regarded as approximations only because they come from different sources and are produced by different methods. Direct GDP from dairy production was compared with values supplied by Statistics Canada (2010e) and Statistics Canada (2010f), respectively.

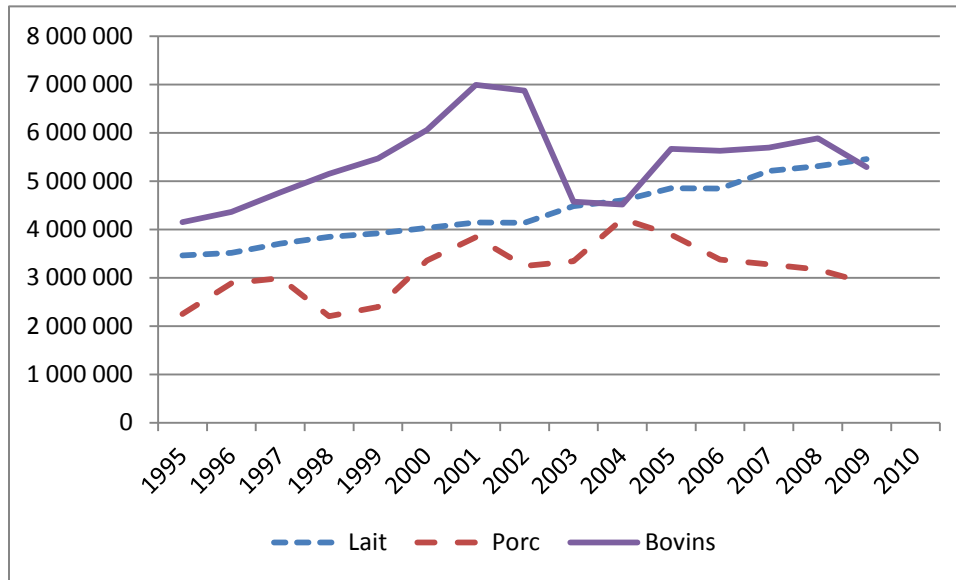
Moreover, while the existence of numerous processing plants near consumption centres and direct and induced spin-offs means that they are felt partly in urban areas, the dairy industry contributes to the economic vitality of Canada's rural regions. The location of jobs greatly affects their relative importance to the Canadian economy, and to the economy of each province. Because of the fewer industries, jobs are often harder to replace in rural areas than in urban areas. ÉcoRessources and Doyon (2009) have shed light on the relative impact of job and wealth creation in the regions. They have shown that a job in a rural area has a greater economic impact than a job in an urban area.¹⁵

Growing economic impact that promotes investment

Cash receipts generated by dairy production have been growing continuously since 1995. They are also stable over time (see Figure 3 below, Doyon (2007) and Doyon and Dupuis (2004)). Stability in cash receipts is favoured by the predetermined frequency of dairy production payments. The stable revenue from dairy production thus enables better capital and labour planning, and supports investment in production and infrastructure, thus allowing farm owners to look to the future with confidence and make business decisions in an economic environment that is predictable over the long term. These advantages are shared with the dairy sector as a whole, and even with other agricultural industries and communities in which dairy farms and processing plants are located. By comparison, cash receipts from pork and beef, which are not subject to supply management and for which prices fluctuate with market changes, experience much more variation over time, together with investment-disinvestment cycles.

¹⁵ These equivalences on what a job represents as a percentage of total employment in a region. For example, the Montreal region has 22 times as many jobs as the Lower Saint Lawrence region, and 30 times as many as Abitibi-Témiscamingue.

FIGURE 3. FARM CASH RECEIPTS FROM DAIRY PRODUCTION, PORK AND BEEF IN CANADA, IN THOUSANDS OF DOLLARS, 1995-2009



[Milk Pork Beef]

Source: Statistics Canada (2010a).

Dairy production: a structured environment

The organization of production and supply management enables milk producers to operate in a highly structured environment featuring organizations at the local, regional and national levels. These structures enable producers to develop consistent entrepreneurial initiatives for the industry as a whole in order to meet economic, environmental or public health challenges when necessary. Through their organizations and their attendance at numerous seminars, milk producers are very much involved in their community and in the public dissemination of information, continuing education for their members and improvements in the quality of their product.

This consistency, and continuous investment in research,¹⁶ also enable the industry to adapt to innovation and changes in consumer demand. The development of the organic segment over a relatively short period, and the marketing of numerous special products such as omega-3 and conjugated linoleic acid-enriched milk, are good examples of this.

¹⁶ See in particular <http://www.dairyfarmers.ca/>

Environmental quality and corporate viability

Canada's dairy producers are aware of the importance of preserving a healthy environment in order to ensure the survival of their businesses, most of which are family-owned. Since milk consists mainly of water, producers stand to gain by preserving water quality. The supply management system adjusts output to match demand; Canada's dairy policy thus works to limit – rather than subsidize – production. Since the price producers receive for their milk is regulated, they have an interest in improving the use of resources at the farm. These factors make it possible to develop better farm profitability, and enterprises and infrastructure that are viable, sustainable and perhaps transferable over time.

Canada's dairy industry is also working to develop an environmental sustainability strategy in response to climate change. It will emphasize the reduction of greenhouse gas (GHG) emissions in order to enable the industry to be even more efficient in the long term (Agriculture and Agri-Food Canada, 2011).

Conclusion

This study confirms once again the importance of the dairy industry to the Canadian economy: the roughly 13,000 dairy operations and 450 processing plants are responsible for creating or maintaining over 215,000 jobs, contribute \$15 billion to GDP and generate \$3 billion in direct, indirect and induced tax revenues.

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Appendices

Appendix 1. Details of the intersectoral model used

The Dynatec 2009 input-output model developed by EcoTec Consultants

The economic impact model developed by EcoTec Consultants is dynamic, and based on an input-output table generator complemented by econometric modules. The latter make it possible to generate more complete figures on economic impact.

The model uses Statistics Canada's most detailed version to find inputs for specific industries. This level has a total of 286 industries. The dairy production sector is in the "animal production" industry category. This is why we needed production costs specific to milk production. The processing sector is represented by the "dairy products" industry, which produces beverage milk, butter, cheese and so on.

Distinct characteristics of the Dynatec 2009 model included in this project

1. Tax revenues (federal, provincial and municipal)

Detailed calculations of federal, provincial and municipal tax revenues. These include the three main items of government revenue: individual income tax, indirect taxes (including sales taxes and property taxes) and corporate income tax.

2. Induced effects, calculated with care

For example, the model replicates net income on a pay stub as accurately as possible, including even deductions for RRSPs and the like, which makes it possible to avoid overestimating the impact.

3. More up-to-date structure

By using data on production costs by unit of expenditure specific to the dairy sector, the Dynatec model reflects current economic reality better than the Statistics Canada model does.

Appendix 2. Details of the methods used to define input data for the model

Expenditure for the production sector was estimated by multiplying the volume of milk produced in each province by the expenditure items (\$/hl). The method had to be adjusted in some instances to increase accuracy or to make the data usable in this study. Investigation of production costs required adjustments for accounting reasons. This study focuses on activities with an economic impact, rather than accounting calculations. Revenue paid for management services is thus included in calculating production costs but including them in the calculation of economic spin-offs would have been incorrect: no money changed hands, and therefore no money can be spent again, and so on. Including it would thus overvalue the induced effects of dairy production. The "revenue paid for management services" item is therefore zero for the purposes of our study. This has no effect on the revenues from the dairy production operations, but only on the breakdown of expenditure.

Similarly, the calculation of production costs includes labour costs for the operator based on the number of hours devoted to dairy production. For many provinces, applying this cost creates a significant deficit, particularly in the case of Quebec, Nova Scotia, New Brunswick and Prince Edward Island. From the intersectoral point of view, including provincial results showing a deficit would mean a direct negative impact (wealth destruction), and very significant indirect and induced effects.

In order to evaluate the economic impact of dairy production operations, we adjusted expenditure as follows: in regions with a deficit, we subtracted the absolute value of the total deficit for the province from the direct labour item in order to reduce the deficit to zero. The effect is merely a redistribution of overall revenue within the intersectoral model. The reduction in salaries actually reduces or eliminates the deficit. This adjustment was required for Quebec, Nova Scotia, New Brunswick and Prince Edward Island.

The "government subsidies and other" item in the CDC production cost study was set at zero for our study, since we took into consideration the program payments and insurance proceeds for each province, as reported by Statistics Canada. Finally, the "return on equity" expenditure item in the CDC production cost study was also set at zero, since this was an alternative profit measure.