



## The Beef Industry's Contribution to the Canadian Economy

Prepared by: Canfax Research Services

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The cattle and beef sector is an important driver of economic activity in Canada. However, that is not always apparent from looking at Farm Cash Receipts alone. Overall, **direct** impacts constitute about a one-quarter to a half of the total economic impacts. **Indirect** impacts are created through the purchase of various inputs that are required for the production in each sector (or sub-sector). Similarly, the **induced** impacts are a result of spending of the income received by owners of these resources, thereby creating more demand for various commodities and thus increase production. If relative contributions of a sector are estimated using direct impacts only, it will lead to serious underestimation. One of the inferences that can be drawn from the results of the study is that the cattle sector makes a much higher contribution to the economy than what is obvious from traditional measures related to direct contribution.

The first multiplier study was completed in 1992 and was updated in 2012 to consider the expansion of the cattle feeding industry in Western Canada in the late 1990s and the expanding role of beef exports. The purpose of the 2021 update was to incorporate the structural changes that have occurred in the industry over the last decade including packing plant closures and expansion of feedlots in the west since 2016. Slaughter numbers have returned to 2010 levels after declining and hitting a low point in 2015. Even though the beef cattle herd has been in decline over this period higher slaughter numbers have been achieved because fewer fed cattle and slaughter cows are being exported to the USA for slaughter. Also, fewer calves and yearlings are being exported to be fed in the USA. And there has been increased imports of fed cattle and cows for slaughter from the USA. In addition, employment in meat processing in Western Canada has increased since 2016, after a period of consolation in the early part of the decade.

### Canadian Results

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Every industry has both a direct impact on the economy made through sales, as well as secondary impacts which are a sum of indirect impacts and induced impacts. Indirect impacts are generated by the inputs it buys and the business it generated further down the supply chain. Induced impacts are created through spending of income within the region. There are also the jobs it creates in other sectors through the dollars spent by employees and through trade.

#### Direct Impacts

Canada's beef industry is the second largest single source of farm cash income in Canada, contributing on average \$9.1 billion per year during the 2016-2020 period. This is almost double the farm cash receipts in 1971, when this sector sold \$4.65 billion worth of cattle and calves. During the past decade (2011-2020), it contributed an average of 14.2% of total Canadian farm cash income.

The red meat processing industry (consisting of beef, veal, pork, lamb, and horsemeat) is the largest sector of the food manufacturing industry in Canada with annual revenues valued at over \$16.3 billion and total employment of over 58,000 people (FPSC, 2017).

The beef industry is the third largest employer in the Canadian agricultural sector (AGRI-LMI 2020). In 2017, the beef sector employed 44,350 workers on cow-calf, background and feedlot operations representing 13% of the employment in agriculture.

In terms of the **net direct impact** of the Canadian beef cattle industry (at the farm and processing levels combined) produced a total of \$20 billion dollar worth of goods, contributed \$4 billion to the Canadian GDP including approximately \$1.4 billion to personal income. It employed a total of 71,500 workers (on a full-time equivalent basis), with almost 60% at the farm level. However, direct contributions are not the same as total economic contribution of a sector. To estimate the total contribution, one needs a tool for estimating the spin-off effects of the sector.

#### Indirect and Induced Impacts

For Canada in the 2018-20 period, the cattle sector contributed \$51.6 billion in goods and sales, contributed \$21.8 billion to gross domestic product at market prices, including \$11.7 billion in labour income and is directly or indirectly associated with creation of 347,352 full-time equivalent jobs (includes direct, indirect and induced impacts).<sup>1</sup>

Total sales of goods and services (also called output) is similar to the gross income of a farmer. But contribution to gross domestic product is just a part of this total and thus always lower than output. It includes labor income, indirect taxes, and subsidies, plus in the case of corporations it also includes any money not distributed or spent during the year.

#### Multipliers

- The cattle sector contributed \$3.35 to the Canadian GDP for every dollar of farm cash receipts.<sup>2</sup>
- For every worker employed in the sector, another 3.9 (based on indirect and induced impacts) workers are employed elsewhere in the economy; with an **employment multiplier** of 4.86 person-years on a full-time equivalent basis.
- For every \$1 of income received by workers and farm owners, another \$6.22 are created elsewhere – resulting in an **income multiplier** of 7.22.

#### Canada by sector

All sub-sectors of the industry contribute to the economy. At the same time, it is important to note that individual sub-sectors will not add up to the total, as it will result in some values being double counted. Consequently, these sub-sector values should only be used when discussing each sub-sector and not in aggregation. The following contributions estimated are for **2018-20**:

- The *cow/calf* sector, with \$2.87 billion in sales, contributed \$1.34 billion to GDP at market prices including \$926 million in labour income and supported 44,776 full-time equivalent jobs (direct, indirect and induced impacts included see Table 6.2).
- The *backgrounding* sector, with \$11.4 billion in sales, contributed \$3.6 billion to GDP at market prices including \$2.4 billion in labour income and supported 67,997 equivalent full-time jobs (direct, indirect and induced impacts included see Table 6.2).<sup>3</sup>

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<sup>1</sup> Examples, of employment include service industries such as veterinarians, truck drivers, and agriculture supply stores in the backward linkages. As well as logistics, administration, retail and foodservice workers.

<sup>2</sup> See Table 6.10 Net aggregate ratio-form multipliers (Type 2)

<sup>3</sup> It was assumed that once a calf is produced it is going through various stages of development -- first as a backgrounder and then as a feeder (unless exported live). If we were to include all three types of farm sectors, that would have led to double counting.

- The *feedlot* sub-sector, with \$15.18 billion in sales, contributed \$5.2 billion to GDP at market prices including \$3.5 billion in labor income and 103,985 full-time jobs (direct, indirect and induced impacts included see Table 6.2).
- The *processing* sub-sector generated another level of economic activity, with an estimated \$28.25 billion in sales of goods and services, contributing \$10.74 billion to GDP at market prices including \$5.58 billion in labour income and the employment of 171,190 workers that are directly or indirectly related to cattle slaughtering and meat processing (direct, indirect and induced impacts see Table 6.6).

## Regional Results

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In **Western Canada**, farm level activities produce \$7.4 billion of goods and sales, contributed \$4.9 billion to the regional GDP, which includes \$3.2 billion worth of labour income. And an estimated 96,259 jobs in Western Canada depend on the activities of the sub-sector either directly or indirectly.

The *slaughter and meat processing sector* produced \$7 billion worth of goods and sales across Canada and in the rest of the world (Table 7.5). This generated almost two billion dollars worth of GDP in Western Canada (including slightly over a quarter of a billion dollars in terms of labor income). Employment in this sub-sector was estimated at 17,631 workers on a full-time equivalent basis.

Combined the net farm and processing levels for Western Canada, produced \$38.8 billion in goods and sales, contributed \$16.2 billion to gross domestic product at market prices, including \$8.6 billion in labour income and is directly or indirectly associated with creation of 258,130 full-time equivalent jobs (includes direct, indirect and induced impacts). The cattle sector contributed \$3.34 to the regional GDP for every dollar of farm cash receipts.

In **Eastern Canada**, farm level activities produce \$5.99 billion of goods and sales; contributed \$2.2 billion to the regional GDP, which includes \$1.55 billion worth of labor income. An estimated 45,575 jobs in Eastern Canada depend on the activities of the sub-sector either directly or indirectly (Table 8.2).

The *slaughter and meat processing sector* produced \$8.2 billion worth of goods and sales across Canada and in the rest of the world (Table 8.6). This generated almost three billion dollars worth of GDP in Eastern Canada (including \$1.66 billion dollars in terms of labor income). Employment in this sub-sector was estimated at 52,599 workers on a full-time equivalent basis.

Combined the net farm and processing levels for Eastern Canada, produced goods and services worth \$13 billion (counting all direct, indirect, and induced impacts), which translates into generation of \$5.5 billion GDP (including \$3 billion labor income). About 89,222 person-years either as paid workers or owners of unincorporated non-farm businesses (Table 8.10). The cattle sector contributed \$3.41 to the regional GDP for every dollar of farm cash receipts.

While Western Canada has significantly more beef production, the large population in Eastern Canada supports a substantial processing industry which contributed to the economic activity in the region. In addition, a large dairy industry contributed to the beef production in the area.

Note the regions do not add up to the Canadian total due to inter-regional trade and rounding.

### Alberta

In Alberta, the cattle sector generated a total of \$13.6 billion in sales, contributing \$4 billion to the provincial GDP; including \$2.7 billion in labor income. Through direct, indirect and induced effects, the sector is responsible for generating 55,125 full-time equivalent jobs (including farm level plus backward and forward linked industries) (Table 9.2).

The *slaughter and meat processing sector* produced (and sold) \$14 billion worth of goods and services, contributing \$4.9 billion dollars to the provincial GDP (including \$2.38 billion dollars in terms of labor income). Employment in this sub-sector was estimated at 44,182 workers on a full-time equivalent basis (Table 9.6).

Combined the net farm and processing levels for Alberta, produced goods and services worth \$20.47 billion (counting all direct, indirect, and induced impacts), which translates into generation of \$7.5 billion toward provincial GDP (including \$4.08 billion in labor income). About 80,724 person-years either as paid workers or owners of unincorporated non-farm businesses (Table 9.10).

### Multipliers

In terms of total activity, the effect on the provincial economy is high.

- Every dollar of output from the sector generates 85 cents to the provincial GDP (Type II pseudo multiplier – Table 9.11).
- Every dollar of GDP contributed by the sector results in a total provincial GDP of \$3.26 (Ratio-form multiplier – Table 9.11).
- Every job in the sector yields another 1.8 jobs elsewhere in the economy, resulting in an employment multiplier of 2.8 person-years (Table 9.11).

All sub-sectors of the industry contribute to the economy. At the same time, it is important to note that individual sub-sectors will not add up to the total, as it will result in some values being double counted. Consequently, these sub-sector values should only be used when discussing each sub-sector and not in aggregation (aggregated numbers are provided above). The following contributions estimated are for **2018-20**:

- The *cow/calf* sector with \$1.17 billion in sales, contributed \$544 million to GDP including \$376 million in labour income and supporting 11,264 full-time equivalent jobs (direct, indirect and induced impacts included see Table 9.2).
- The *backgrounding* sector, with \$5.9 billion in sales, contributed \$1.6 billion to GDP including \$1.09 billion in labour income and supporting 18,589 equivalent full-time jobs (direct, indirect and induced impacts included see Table 9.2).
- The *feedlot* sub-sector, with \$6.5 billion in sales, contributed \$1.87 billion to GDP including \$1.26 in labor income and 25,272 full-time jobs (direct, indirect and induced impacts included see Table 9.2).
- The *processing* sub-sector generated another level of economic activity, with an estimated \$14 billion in sales of goods and services, contributing \$4.9 billion to the provincial GDP and the employment of 44,182 workers in the province.
  - For every job in this sub-sector (approximately 4,489), five jobs are supported elsewhere in the economy.

### **Conclusion**

The major conclusion of this study is that cattle production in Canada is a significant economic activity that leads to other changes in the economic fabric of the nation. Each of these regions enjoys not only direct impact, but also those generated through secondary mechanisms – indirect and induced.

The regional impacts are uneven. In Eastern Canada, for every dollar's worth of farm level activities 1.58 times the activities in the processing sector are produced. This perhaps may reflect the additional value added by the sector. But in Alberta this value is only 1.24, perhaps affected by relatively higher fresh beef exports to other countries.

### **Outlook to 2030**

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As the Canadian economy is looking to recover from covid, with numerous sectors experiencing significant reduction in employment numbers. Agriculture in general and the beef industry specifically provides stability and an opportunity to provide employment during this time of recovery. In fact, a projected labour shortage was previously thought to be a major constraint to expansion of the beef sector. But if more people were available to fill that gap, it could support both labour income and sector expansion.

The number of workers that are expected to retire in the beef sector by 2029 combined with any growth could result in a shortage of 14,000 workers as the domestic labour supply will not be able to fill this gap (AGRI-LMI, 2020). Also, there could be shortages of labour in other sectors that provide services to the beef cattle sector such as veterinarians, trucking, and feed. This could affect expansion plans for all sectors of the beef industry. Technology developments and adoption thereof over the next 10 years could increase the productivity of labour used in the beef cattle sector. AGRI-LMI (2020) forecast that labour productivity in the beef cattle sector will increase from 0.9% to 1.2% average annual percentage change. This in part could reduce the need for labour as the current stock of labour becomes more productive.

Agriculture Canada's Medium-Term Outlook forecast Canadian beef cattle herd to be 5% larger than in 2020 by 2027. USDA (2020b) forecast that beef prices will rise to 2025-2027 then fall to 2030 as the US beef herd rebuilds. The expansion of the cattle herd in the USA is expected to put pressure on Canadian domestic beef prices resulting in a decline in wholesale prices of 9% by 2030. The Canadian beef cattle herd is expected to expand by 5% to 2027 then decline by 2% to 2030 in response to lower beef prices. These forecasts are based on "normal" weather or at least no prolonged droughts over the 2020s. Major disruptions to the animal protein sector from alternative proteins are not expected in this decade.

Domestic production in 2030 is estimated to be steady around 1.29 million tonnes. Imports of beef and veal are expected to increase by 2% (195,119 tonnes), domestic consumption will fall from 2020 levels to 894,520 tonnes in 2030; while exports to the USA (431,070 tonnes) and rest of the world (167,638 tonnes) will increase over 2020.

At the farm level cattle sub-sector, the sector would be producing, through direct sales of cattle and through indirect and induced impacts, a total of \$21 billion worth of goods and services. The Canadian economy would gain in terms of GDP in the amount of \$9 billion, while workers and owners of primary resources would also gain \$6 billion through pursuing these activities. The employment created by these activities would be close to 200,000 person-years (see Table 10.7). Given how similar this is to the 2018-20 numbers this highlights the stability of the sector as an employer that continues to contribute to the economy during the recovery period.

### **Growth Scenario**

Although current trends may suggest a relatively lack of growth in the Canadian cattle sector, an alternative scenario was developed using the assumption that the sector is going to face some growth in the future. A moderate rate of 10% growth in various regions was assumed. However, a recent study by Acera (2021) has predicted a growth of 36% in feeder animals on irrigated farms. Assuming a growth rate of 10% for the dryland farms, composite growth rate was estimated using irrigated area as a proportion of the total cultivated area. The composite (weight average) growth rate for Alberta was 11.14%, western Canada 10.2%, and eastern Canada 9.95%. To estimate the total value of economic activity in 2030, consideration of live cattle exports was considered. It was assumed that an increase in the live cattle exports would dampen the slaughter and meat processing activity in the region.

Since the structure of the economy was assumed not to change by 2030, the multipliers (both pseudo and ratio-form) would be the same as presented in earlier chapters. Results are shown in the table below for direct, indirect and induced impacts. Increase in the cow-calf production and feeders/feedlots may result in higher level of live cattle and calves exports to the U.S. This may have a slight dampening effect on the backgrounding and feeder/feedlot as well as the slaughter and meat processing sub-sector in the region.

Net Farm level and Processing Sectors Combined	Baseline	Scenario	Change
	2018-20	2030	
<b>CANADA</b>	<i>Billion CDN\$</i>		
Goods and Sales	\$51.60	\$50.58	98%
Gross Domestic Product as market prices	\$21.80	\$21.35	98%
Labour Income	\$11.70	\$11.47	98%
Employment	347,352	34,081	10%
<b>WEST</b>			
Goods and Sales	\$38.80	\$38.78	100%
Gross Domestic Product as market prices	\$16.20	\$16.26	100%
Labour Income	\$8.60	\$8.66	101%
Employment	258,130	257,876	100%
<b>Alberta</b>			
Goods and Sales	\$20.47	\$20.87	102%
Gross Domestic Product as market prices	\$7.50	\$7.82	104%
Labour Income	\$4.08	\$4.16	102%
Employment	80,724	82,307	102%
<b>EAST</b>			
Goods and Sales	\$13.00	\$11.80	91%
Gross Domestic Product as market prices	\$5.50	\$5.09	92%
Labour Income	\$3.00	\$2.80	93%
Employment	89,222	82,205	92%
<i>NOTE: Total Type 2 Impacts</i>			

### Appendix 1: Background on Multipliers

The researchers developed an input-output model for the Canadian cattle industry that quantifies the intricate and far-reaching relationships that exist in the complex economic systems of the beef cattle industry. Provided that due consideration is made for any double counting, a sum of the direct, indirect, and induced impacts would constitute the total economic impact of cattle production sector.

A multiplier is simply a ratio of total impacts to a selected direct impact for a given scenario. Mainly these multipliers are either Type I (direct and indirect impacts only) or Type II (where total impacts include direct, indirect and induced impacts). Depending on the choice of direct impact, one can calculate three types of multipliers: Final demand multipliers, Pseudo multipliers, and Ratio-form multipliers.

- A **Final demand multiplier** is a result of change in either consumer expenditures, higher exports, or expenditures by a government or an investor. The final demand multiplier shows the change in the economy for every dollar increase in final demand for that commodity. For example, an output multiplier of 1.75, suggests that one dollar increase in exports creates change in production (sales of all goods and services) in the region of \$1.75.
- If a decision maker is interested in the total change in the economy, and only has information on the direct change associated with a scenario, the multiplier that is appropriate is called a **Pseudo Multiplier**. It is estimated as a ratio of total change in the economy divided for a given economic indicator, and level of direct production of that sector. For example, if a pseudo-output multiplier for the manufacturing sector is 1.35, this suggests that if the production of this sector increases by one dollar, output of all goods and services in the regional economy would increase by \$1.35.
- The **Ratio-Form multiplier** is estimated as a ratio of total change in an economic indicator and direct change in the same indicator for a given scenario. Let us take an example of income in cattle production as reported by farm cash receipts. Let us further assume that the ratio-form income multiplier for the cattle sector is estimated at 2.25. This suggests that for every dollar of income earned by cattle producers, the rest of the economy makes an additional \$1.25 dollars, making it a total income change in the region of \$2.25 dollars.

Estimation of economic impacts of a change in final demand for a commodity or production of a sector requires caution. **Gross multipliers** that add up individual sub-sectors (e.g. cow-calf, backgrounding, feedlot, packer) overstate the impact of the total sector. The degree of overstatement in the total economic impacts arises from the double counting of inputs in the direct impact for the total economic impact analysis. For this reason, they are of limited use for policy making. To avoid this, the inputs are removed from subsequent (sequential) economic impact analyses, and if all these impacts are added together, the result is a **net total economic impact** of the whole sector for a region or nation. This is the approach used in this study.

The model considers national and regional aspects (Canada, East, West and Alberta), and four multipliers were calculated for each region and nationally:

- (1) An overarching **production/sales multiplier** that can be applied to a Farm Cash Receipts for beef cattle.
- (2) The overarching sales multiplier accounts for all economic activity at all levels in the supply chain. However, that results in double-counting occurring as one sector's sale is another sectors purchase. Therefore the **GDP multiplier** removes the double-counting to accurately measure industry's contribution to Canada's GDP.
- (3) An **employment multiplier** that moves beyond just accounting for the number of beef cattle farmers as reported by the Agriculture Census and accounts for the number of jobs throughout the supply chain that the beef industry is responsible for.
- (4) An additional multiplier was generated to look at the impact of **labor income**, as income results in spending which spreads into other sectors in the economy and is an important source of activity.

#### Data Limitations

The 2021 study suffers from several limitations, the most significant being the availability of accurate farm level cost of production and margins data. Lack of comparability between various regions and comprehensiveness of farm level regional data are a major limitation of the estimated value of multipliers.

The second limitation of the study is that regional data used for processing activities was for Canada as a whole, adjusted for self-sufficiency. Actual regional data could have produced a better estimate of the total impacts. Furthermore, the data collected by Statistics Canada is for all meat production, which does not separate beef production from other meat production. In addition, veal production is a product of both beef farms and dairy farms. Major data collection effort to sort these issues is needed to improve future economic impact analysis for this sector.

The 'Trade-related' impacts associated with a direct, backward linked, and/or forward linked sectors. Although these impacts can be estimated, they require development of individual economic impact models for each region. Given the limited resources for the project, this was considered out-of-scope.