

Economic Footprint / Impacts of Cattle Sector in Canada – A Regional Analysis

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Received: December 19, 2021; Accepted: December 31, 2021; Published: January 08, 2022

Abstract

Economic systems are getting increasingly complex over time. Decisions taken by an individual or a firm affect many other individuals or agencies than what is obvious through casual observation. The Canadian cattle sector operates under such a complex economic system. This study was undertaken to economic footprint of the Canadian cattle production in Eastern and Western Canada. In this study an approach was used by developing an input-output model of the Canadian and regional (Western and Eastern Canada) economies using 2016 as the base year. The beef cattle sector consisted of three sub-farm level activities: Cow-calf production, Backgrounding operations, and Feeders or feedlot operations. Study concludes that the Canadian cattle sector is intimately tied to many other economic activities. Gross domestic product (GDP) by farm level production of \$19.6 billion resulted in a total GDP of \$51.6 billion – about 2.6 times higher than the direct contribution. Regional multipliers suggest that they are higher in western Canada than in the east.

Keywords: *Cattle production; Multipliers; Western Canada; Eastern Canada*

1. Introduction

Economic change is a complex process. It may consist of changes that occur instantaneously / or perhaps in some cases in a sequential manner until the economic system reaches a new equilibrium. The degree of the complexity in this process is dependent upon the nature of the economy and the interdependencies between goods producing sectors that exist. Canadian cattle sector contributes the most to the total Canadian farm cash income. During the past decade (2011-2020), it contributed an average of 14.2% of total Canadian farm cash income, although its contribution has decreased from 21.7% during the 1971-1980 period.

Much of on-farm beef cattle production in Canada is concentrated in a few select provinces (FIG. 1). In Eastern Canada, the cattle sector is more important in the provinces of Ontario and to a lesser extent Quebec. In Western Canada, this activity is highly concentrated in the provinces of Alberta and Saskatchewan. In fact, for Canada as a whole, Alberta produces slightly over half of the farm cash income from sales for the sector.

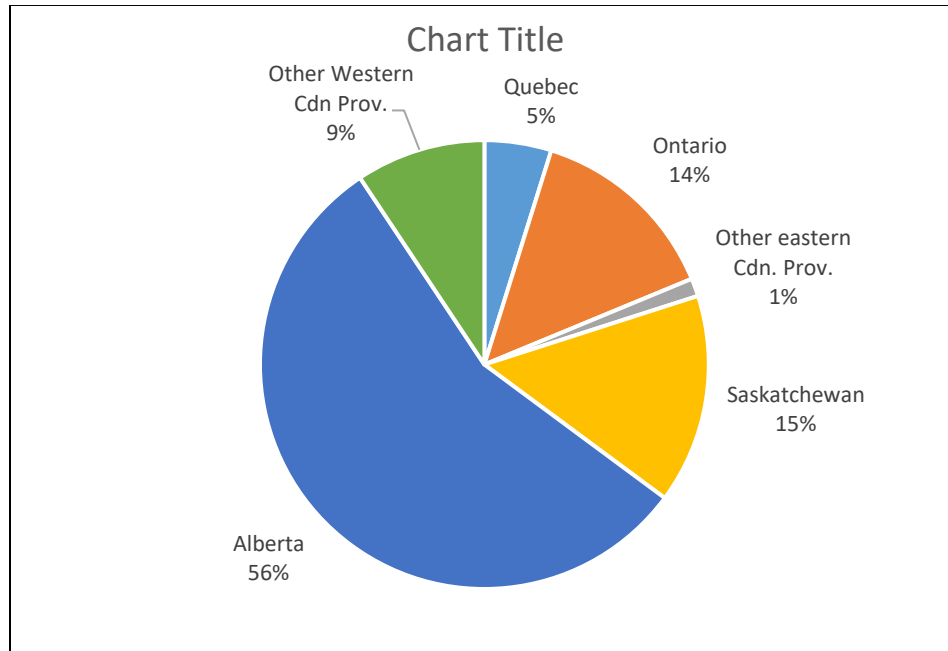


FIG. 1. Distribution of cattle and calves production by province, Canada, 2016.

To most observers, contribution of an industry (or business) is measured through the intuitively obvious economic changes it generates in an economy. These are typically the contribution it makes directly to a given economic criteria (sales, income, gross domestic product, interregional or international imports, or employment). However, such comparisons rarely reveal the true importance of the sector in question. Since in our modern economy, one sector of production depends on other sectors for inputs, direct contributions underestimate the total contributions of the sector.

Economic activities of an industry cannot be undertaken without the support of other industries in the region as well as those located outside the region (within Canada as well as international), and the cattle sector is no exception to this statement. It is the contention of this study that if contributions of an industry are measured only in terms of direct impacts, this may not provide a realistic picture of total contributions of the industry to the province/region or nation. This is because many of the economic impacts are not that obvious intuitively; only those that are directly related to the industry are obvious.

In addition to direct impacts, many other impacts are associated with the economic activities of an economic sector, such as agricultural production. Such impacts can only be estimated using an input-output model. These models have successfully been used for forestry sector [1], for water use [2], international trade [3], energy issues [4-6], and irrigation development [7].

In the context of cattle production, several studies have used an input-output based methodology [8-12]. However, none of these studies have reported the economic impacts of the cattle production on the national or regional economies. With reference

to Canada (or any of two regions), many questions need answering. What industries are affected by activities associated with cattle production in various regions of Canada? What would the regional economy look like if there were no cattle production undertaken by farmers? In other words, major issues relate to developing information on total contribution made by cattle production in Canada and in its (as well as in various regions), which is needed for private and public decision making. Given that such information does not exist, the current study was undertaken to fill this void.

The major objective of this study is to estimate the total economic impact of the Canadian cattle sector on the national and regional economies. These contributions are made by considering the various linkages of the cattle sector with other economic activities in the region where this production takes place.

2. Methods

2.1 Concept of economic impacts and multiplier

The Canadian farm level cattle sector consists of three types of production units: cow-calf production units, backgrounding production units, and finishing (or feedlot) production units. Each of these units trade with each other and with the other non-cattle farm enterprises. Such trade patterns lead to economic interdependencies among various economic good producing industries in all regions of Canada. Major types of impacts associated with actions of a given economic sector (or a firm) include:

1. *Direct impacts* which include any actions taken by the primary decision maker (a cattle producer). These may be one of two types: (i) New capital investment in expanding production capacity, a part of which could be in terms of purchases of goods and services, and another in terms of hiring additional workers for the job; and (ii) Additional level of production from the added capacity, resulting in higher input purchases, and higher workforce (additional employment).
2. *Backward linkage-based impacts*. These impacts are created in response to the increased input requirements under direct impacts that are supplied by other businesses. These inputs may also be related to the same two types of impacts as under direct impacts.
3. *Intra-sector forward linkage-based impacts*. Some of the output of various types of cattle farms trade with each other. For example, the cow-calf farms may sell their calves to backgrounding operations, who in turn may sell their cattle to finishing operations. From each of these sectors, cattle or calves are sold for exports, but in most cases these products are sold to other firms (businesses) for further processing.
4. *Income generated impacts*: All the additional workers in any of the above sets of impacts would receive compensation either as wages and salaries or as profits (if they were self-employed in the unincorporated businesses). These higher incomes would have to be spent on needed goods for everyday living. These actions of the consumers would create another round of economic impacts called “induced impacts”.

In the long run, the economy of a given jurisdiction also is affected by agglomeration impacts, which is the process in which similar industries are attracted to locate in the region. Total economic Impacts of an economic activity (such as farm level cattle production) are a sum of the above four types of impacts. These economic impacts and their interrelationship are presented in FIG. 2.

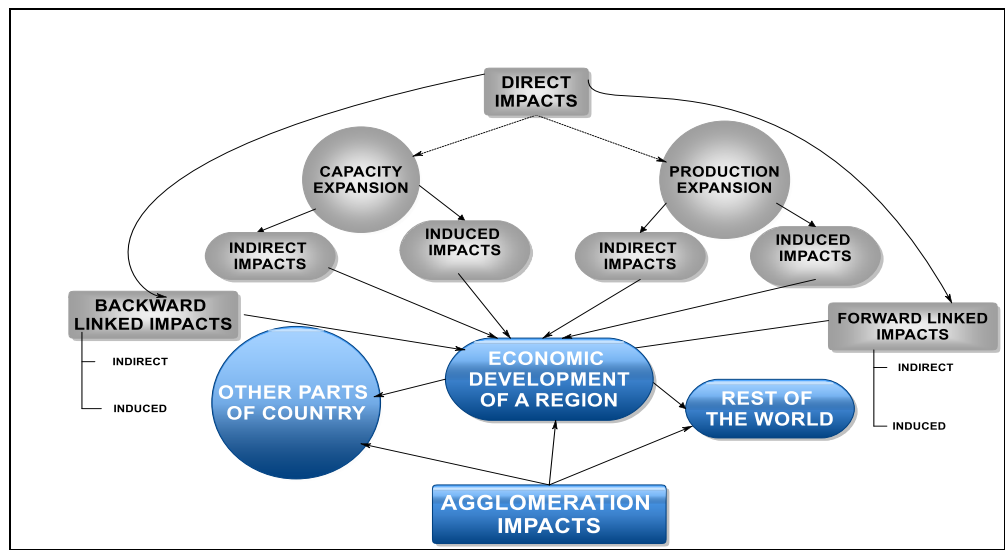


FIG. 2. Economic impacts emanating from a given economic activity.

2.2 Source of economic impacts in a regional setting

Cattle production in one region affects producers and consumers not only in the region of production, but also other regions of the country, as well as rest of the world. The rest of the world impacts depend on many factors, most important of these are trade patterns and trade agreements. The effect on other regions of a country and international economies could be positive if the region imports more goods from them. These impacts are called 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 an inter-regional input output model.

2.3 Study input-output model

The study model used for impact analysis was developed using Canadian data on economic transactions estimated by Statistics Canada. These transactions tables included internal and external trade amongst producers of goods and services as well with the final demand agencies. The model is a demand driven model where level of output for a sector depends on the demand of its products. Demand in this context is the final demand – that is the goods and services once sold cannot enter for reuse by industries or final demand agencies -- consumers, government, investment, and net export (Exports minus imports) (TABLE 1 & 2).

TABLE 1. Number of sectors and commodities in the Statistics Canada Model and Study Model.

Type of transactions	Statistics Canada Model	CRIO-16 Model
Sectors (Producing goods and services)	240	58
Commodities (Intermediate)	491	67
Primary Commodities	9	7
Final Demand sectors	273	2
Other Final Demand Sectors*	4	3

* Included change in inventories, exports, and imports.

TABLE 2. Source of Double-Counting in the Cattle and Calves Sector in Canada.

Producing Sector	Purchasing Sector	Input
Cow-calf Operations	Backgrounding Operations	Calves
	Animal Slaughtering and Meat Production Sector	Calves
Backgrounding Operations	Feeder Operations / Feedlots	Feeder Animals
Feeder Operations / Feedlots	Animal Slaughtering and Meat Production Sector	Finished Animals

The model is based on the rectangular accounting system [13], where a given sector can produce more than one commodity. The heart of the model is two transactions matrices - Matrix D (market share matrix) which displays production of various commodities by a sector (group of industries producing similar products). The second transactions matrix is Matrix B (direct input coefficients for sectors in terms of commodities). By mathematical substitution, the result is that output of a sector is determined by the demand for its product, as shown in Equation (1).

$$G = (I - DB)^{-1}(De) \quad (1)$$

Where, G is vectors of various sectors, I is an identity matrix, D and B are as defined above but adjusted for any leakages, and e is final demand for a sector adjusted for any leakages. Being a linear additive model, the value-added or employment are derived as a fixed proportion of the output.

The study input-output model for the western and eastern Canada regions was derived using a non-survey technique. This approach provides a short-cut and a substitute for the more expansive primary data collection. It is based on an estimated location quotient (LQ). A LQ is a measure of a region’s self-sufficiency in meeting its requirement for various goods and services. If a region is self-sufficient, it would first meet its own requirements and export the rest to other parts of Canada or rest of the world. It is calculated using equation (2):

$$LQ_{rc} = S_{rc}/S_{Nc} \quad (2)$$

Where, LQ_{rc} the location coefficient for c^{th} commodity in region r ; S_{rc} is the share of value of production of the c^{th} commodity in the region r ; and S_{Nc} is the share of value of production of the c^{th} commodity in Canada as a whole. If the $LQ \geq 1$, the region is a surplus region and can meet all its requirements for that commodity, making similar input-output coefficients as for Canada. If $LQ < 1$, it a deficit region for that commodity and new set of coefficients are created using equation (3).

$$A_{cr} = A_{cN} * LQ_{rc} \quad (3)$$

Where, A_{cr} is the technical coefficient for the commodity c in region r , and A_{cN} is the technical coefficient for that commodity for the nation.

The model was appended with an employment module to estimate the effect on the number of jobs under a given study scenario. The employment coefficients were a ratio of employment (no. of jobs) divided by the value of production for the sector. For estimation of induced impacts, a consumption function was estimated, yielding a value of propensity to consume. This propensity indicated the expenditures of consumer for every dollar earned as income (after taxes).

2.4 Concept of a pseudo multiplier

A multiplier is simply a ratio of the initial impacts of an economic activity and its total impacts. If it is expressed on a per dollar value of production, it is called a pseudo multiplier. Total impacts include direct, indirect and induced economic impacts. Let us take an example of cattle producers' income. Let us further assume that the pseudo income multiplier for the cattle sector is estimated at 0.75. This suggests that for every dollar of production of the cattle farms, total income in the economy (or region) would be 75 cents.

2.5 Gross vs. net economic impacts

As noted above, the cattle sector consists of three types of operations, although these activities may be integrated on a single farm, but most largescale cattle farms specialize in just one of the three phases. Thus, there is a sequential relationship among these sub-sectors. The cow-calf sector typically sells its calves (with a weight of 600 pounds) either for exports or to the backgrounding operations, whereas the backgrounding operations may sell their feeder cattle (through bringing them to higher weights, say 900 pounds) either for export or to the finishing operations. Finishing operations have mature cattle (say 1350 to 1400 pounds) sold mostly to the slaughtering and meat processing sector for further value-added.

In such an interrelated sector, one must keep in mind that the intra-sectoral purchases of cattle would lead to double-counting and increase the multiplier effect. Two types of multipliers can be distinguished for this sector – the Gross multiplier based on the situation where all purchases of cattle are included in the total impacts, and the Net multiplier based on no double counting of cattle purchases by one sub-sector from another one. Gross multipliers are expected to be larger than the net multipliers.

2.6 Study scenarios

The total economic impacts of the cattle sector on the Canadian and two regions (Eastern and Western Canada) were estimated using data for the 2018-2020 period. Two study scenarios were developed:

One, each of the sub-sectors was assumed to be an independent source of change (scenario) and total impacts were estimated using their respective expenditures. These included the three types of farm level production firms plus the processing sub-sector. In total, there were four individual scenarios.

Two, aggregate scenario, where all sub-sectors were combined but ignoring any double counting of cattle sales. In other words, it was based on following a net direct impact approach, where commodities already produced by the selling sectors were excluded. This approach showed the net total impact of the cattle sector.

Economic impacts of a given scenario were estimated using a 'with' and 'without' situation. In other words, the situation depicts the changes in the Canadian or regional economy if that production sub-sector included in the scenario did not exist.

Thus, estimated impacts show the marginal contribution of that sector to a given economy. Please note that without a given sub-sector, the economic impacts of that sector would be zero.

Each scenario was estimated as the value of production as measured by total farm cash income from the sale of cattle. Since Statistics Canada reports this income as a total for the beef cattle sector, a method to divide the income among the three scenarios was developed. The number of beef steers and heifers for slaughter in each region were estimated using these data for the three types of production sub-sectors. Slaughter cow volumes were assumed to be cull cows sold directly to slaughter (50%) from cow calf or put on feed then sold to slaughter (50%). These proportions were used to allocate income for each type of farm in the low regions.

The Canadian cattle sector is a \$9 billion industry (TABLE 3), located about one-fifth in Eastern Canada and the remaining four-fifths (80%) in Western Canada. Average yearly total farm cash income in Canada for 2018-20 period was reported at \$9.3 billion. Its distribution between the two regions suggests that Western Canada is major beef cattle producing region. Within Western Canada, the province of Alberta is where much of this activity takes place. This distribution is very different in terms of population, where almost two-thirds (68%) of Canadian population (excluding the three territories) resides in eastern Canada.

TABLE 3. Direct Impacts (Change) Associated with Study Scenarios, Average 2018-2020.

Particulars	Value of Production in Million Dollars		
	Canada	Eastern Canada	Western Canada
Cow-calf Operations	1,051	166	885
Backgrounding Operations	3,516	371	3,145
Feeding Operations including feedlots	4,693	1,310	3,383
Total Farm Cash Income	9,260	1,847	7,413

Source: Estimates using Statistics Canada [14]; Statistics Canada [15-19]; AHDB [20].

In terms of breakdown of various sub-sectors, as one would expect, the cow-calf sub-sector is the smallest among the three sub-sectors in both the regions. In eastern Canada, these operations sold 9% of the total sales of cattle sector, where as the proportion increased to 11.9% of the total for western Canada. In contrast, the finishing (feedlots) sub-sector has the largest proportion of value of production at 71% for eastern Canada and 45.6% for western Canada. A relatively larger proportion of finishing of cattle in eastern Canada is due to exports of calves and backgrounders from the west to eastern farms, mainly Ontario.

3. Results

3.1 Economic Impacts of the Canadian Farm Level Cattle Production

Direct impacts of the farm level cattle sub-sectors in Canada refer to those economic indicators that are result of their own operations. These are shown for Canada and the two regions in TABLE 4. These farms for Canada as a whole sold \$9.3 billion

worth of cattle¹, resulting in \$1.2 billion to Canada's gross domestic product (GDP), which includes the personal income of almost one billion². Directly this sector employed 43,737 workers (on a full-time equivalent basis)³. Of this total, the cow-calf operations and feedlots generated a higher level of employment⁴.

TABLE 4. Direct Impacts of the Canadian Farm Level Sub-Sector, 2018-20.

Indicator	Unit	Value			
		Cow-Calf	Back-grounding	Feeder / Feedlots	Total
Sales of Goods and Services	Million Dollars	\$1,051	\$3,516	\$4,693	\$9,260
GDP at Market Prices	Million Dollars	\$357	\$357	\$534	\$1,248
Labor Income	Million Dollars	\$288	\$288	\$490	\$1,066
Employment	Person-Years	22,415	5,419	15,903	43,737

*Total farm cash receipts for the region were obtained from Statistics Canada [14]. Total farm cash income for each of the three sub-sectors was imputed.

The level of direct output of these sectors is different and therefore, each sector imparts a different secondary (indirect and induced) impact on the economy. For all three types of farm level activities (estimated at \$9.3 billion), through direct, indirect and induced changes, the economic output of total goods and services would increase to \$29.5 billion (TABLE 5). This yielded a contribution to the GDP (market prices⁵) of \$10.1 billion which included labor income of almost \$6.5 billion.

In total, some 216,758 person-years of employment can be attributed to be created by the Canadian cattle sector are generated either directly or indirectly.

¹The value of inventory of cattle and calves on farms is not included in this estimate. This is simply the value of sales at the farm level.

²One of the reasons for the close values of GDP and labor income is that some of the budgets used for the analysis did not include depreciation and taxes.

³It should be noted that this is an estimate and is not based on actual employment numbers since these data are not reported by Statistics Canada at this level of disaggregation.

⁴Please note that these employment estimates are based on sales. If sales do not relate to employment, these estimates could be over or under-estimated for each of the three types of cattle and calves farm level production farms.

⁵ GDP at market prices includes indirect taxes and subsidies in addition to labor income and other operating surplus (which includes depreciation). If these items are excluded, the GDP is measured at factor cost.

TABLE 5. Total Economic Impacts of the Canadian Farm Level Sub-Sector, 2018-20.

Indicator	Unit	Value				Total net Impacts
		Cow-Calf	Back-grounding*	Feeder / Feedlots*	Total Gross Impacts*	
		Type II Impacts (Direct, and Indirect)				
Sales of Goods and Services	Million Dollars	\$2,869	\$11,398	\$15,184	29,451	26,349
GDP at Market Prices	Million Dollars	\$1,340	\$3,649	\$5,203	10,192	10,617
Labor Income	Million Dollars	\$926	\$2,399	\$3,534	6,859	6,459
Employment	Person-Years	44,776	67,997	103,985	216,758	194,076

*As noted above, the total of the three production types should be interpreted with caution. Because of double counting, this total is an overestimate.

The results of the total economic impacts were converted into a pseudo multiplier to show comparability. The pseudo multiplier indicates multiples of times the economic indicator increases for each unit (dollar of output / sales) of cattle farms through direct, indirect, and induced economic impacts). A higher multiplier shows a more mature and integrated economy. For the cow-calf operations, for every dollar of sales of the farms economy generate 2.73 times of sales of goods and services in Saskatchewan economy. In other words, other sectors, other than cattle sector, increase its output by \$1.73 through purchases of their input requirements and spending of labor income on goods and services. Similar interpretations can be made to other pseudo multipliers. Please note that the value of this multiplier is high during period when the direct change is low (such is the case with income and gross domestic product or GDP). Some adjustment would need to be made for the time periods when direct income and GDP are higher.

3.2 Gross vs. net multipliers

As noted above, each of the backgrounding and finishing operations purchase part of their required inputs from other farm level cattle sub-sectors. If one were to add all their input requirements to make the cattle sector, the value of direct impacts would be higher, which would lead to an inflated value of total economic impacts and the multiplier. If these values were to be used for the calculation of the multiplier, it would be called a gross multiplier. For this reason, a recommended practice in such situations is to exclude those inputs that have already been produced in the economy. The result is called net multiplier.

For the Canadian cattle sector, the gross multipliers could be as high as 10%. For example, for the level of sales of goods and services, the gross pseudo multiplier is 3.18, as against a net multiplier of only 2.845 (TABLE 6). For the other three indicators, the difference between gross and net multipliers is similar. In terms of using these multipliers for impact analysis (without estimating the impacts using an input-output model), application of gross multipliers is not recommended, only the net multipliers should be used in situations where one industry purchases its inputs from another industry whose impacts have already been accounted for.

TABLE 6. Pseudo Multipliers for the Canadian Cattle Farm Level Sub-Sector, Type I and Type II, 2018-20.

Indicator	Value			Cattle sector	Cattle Sector
	Cow-Calf	Back-grounding	Feeder / Feedlots	Gross Pseudo Multiplier	Net Pseudo Multiplier
	Type II Impacts (Direct, Indirect, and Induced)				
Sales of Goods and Services	2.731	3.342	3.236	3.180	2.845
GDP at Market Prices	3.794	14.388*	9.410	1.101	1.068
Labor Income	3.442	13.028*	7.216	0.741	0.608
Employment per Thousand dollars worth output	1.948	12.548	6.476	23.408	20.959

*Lower direct income in these sub-sectors is responsible for these large multipliers.

3.3 Economic impact of farm level cattle production in eastern Canada

The farm level cattle sector in Eastern Canada cattle, as shown in FIG. 1, is smaller than that in the western Canadian region. Total sales of cattle and calves in this region are estimated to be \$1.85 billion, compared to Canada activities which created a total GDP of \$312 million (including a labor income of \$289 million). Directly this production generated 9,445 full-time equivalent jobs on Eastern Canadian farms (Top panel of TABLE 7). In this region, higher employment is created by feeder (including finishing) operations – about 71% of all cattle and calves sales.

TABLE 7. Regional Direct Impacts of the Canadian Farm Level Cattle Production, 2020.

Indicator	Unit	Value			
		Cow-Calf	Back-grounding	Feeder	Total*
Eastern Canada					
Sales of Goods and Services	Mill. \$	\$166	\$371	\$1,310	\$1,846
GDP at Market Prices	Mill. \$	\$33	\$16	\$262	\$312
Labor Income	Mill. \$	\$25	\$14	\$250	\$289
Employment	Person-years	2,662	1,738	5,045	9,445
Western Canada					
Sales of Goods and Services	Million \$	\$885	\$3,143	\$3,383	\$7,411
GDP at Market Prices	Million \$	\$368	\$237	\$286	\$891
Labor Income	Million \$	\$244	\$170	\$240	\$654
Employment	Person-Years	19,753	3,681	10,858	34,292

*Total farm cash receipts for the region were obtained from Statistics Canada [14]. Total farm cash income for each of the three sub-sectors was imputed.

The direct impacts through sales of goods by the feeder (including finishing) operations in eastern Canada produced almost \$4.2 billion worth of sales. These resulted in a total GDP in the region of \$2.2 billion, including \$1.6 billion received by workers and other labor resources (TABLE 8 (top panel)). These values yielded a pseudo multiplier for eastern Canada of 3.19 for

goods and services, and 24.3 person-years for every thousand dollars worth of sales by the cattle farms (TABLE 9, Top panel). Some of these multipliers were high due to low income and employment from cattle production during the study period.

TABLE 8. Total Economic Impacts of the Canadian Farm Level Cattle Production, by Regions, 2020.

Indicator	Unit	Value			
		Cow-Calf	Back-grounding	Feeder	Total*
		Type II Impacts (Direct, Indirect and Induced)			
Eastern Canada					
Sales of Goods and Services	Mill. \$	\$473	\$1,277	\$4,242	\$5,992
GDP at Market Prices	Mill. \$	\$203	\$404	\$1,639	\$2,246
Labor Income	Mill. \$	\$135	\$268	\$1,156	\$1,559
Employment	Person-years	5,575	8,915	31,085	45,575
Western Canada					
Sales of Goods and Services	Million \$	\$2,397	\$10,120	\$10,941	\$23,458
GDP at Market Prices	Million \$	\$1,138	\$3,246	\$3,564	\$7,948
Labor Income	Million \$	\$791	\$2,131	\$2,378	\$5,300
Employment	Person-Years	39,201	59,082	71,901	170,184

*As noted above, the total of the three production types should be interpreted with caution. Because of double counting this total is an overestimate.

TABLE 9. Pseudo Multipliers (Type II) for the Farm Level Production of Canadian Cattle production, by Regions.

Indicator	Value			Regional Cattle Sector Gross Pseudo Multiplier	Regional Cattle Sector Net Pseudo Multiplier
	Cow-Calf	Back-grounding	Feeder / Feedlots		
	Type II Impacts (Direct, Indirect and Induced)				
Eastern Canada					
Sales of Goods and Services	2.853	3.444	3.239	3.194	2.880
GDP at Market Prices*	5.810	23.001	6.130	1.197	1.042
Labor Income*	5.324	19.523	4.624	0.831	0.784
Employment	2.094	5.129	6.162**	24.294	22.078
Western Canada					
Sales of Goods and Services	2.708	3.218	3.234	3.165	2.825
GDP at Market Prices*	3.573	13.696	12.481	1.072	1.046
Labor Income*	3.246	12.505	9.919	0.715	0.673
Employment	1.985	16.051**	6.622	22.964	20.527

* Lower direct income in these sub-sectors is responsible for these large multipliers.

** Lower direct employment may be responsible for the larger values of these multipliers.

3.4 Economic impacts of farm level cattle production in western Canada

Western Canada (particularly the province of Alberta) is the major cattle producing region of Canada. The largest component of this sector is feedlot (finishing farms), which sold \$3.4 billion worth of cattle for further use (exports or processors) - about 46% of all sales of cattle and calves. In comparison to eastern Canada, western Canada has more backgrounding and finishing operations. In comparison, smallest sub-sector in the region is the cow-calf farms, which sold only \$885 million worth of cattle and calves annually.

Total sales of cattle from this region amounted to \$7.4 billion (Bottom part of TABLE 7), almost four-fifth of Canadian cattle sales. These sales generated a total of \$891 million as GDP (which included \$654 as income payments to workers). Total employment created by this sector in the western region of Canada was 34,000 jobs (on a full-time equivalent basis).

The direct impacts, reported above, were used as additional demand for other sectors of the economy. Overall, the sector is associated with sales of goods and service of \$23 billion, generating almost eight billion dollars worth of GDP (including \$5 billion as labor income). Directly or indirectly, it is responsible for creating 170,000 full-time equivalent jobs in the region.

4. Discussion and Conclusion

Importance of an economic activity can be easily perceived by looking at observations of its performance and growth over time. However, these observations are an underestimation of its total importance in the economic system as a whole. In this study the economic footprint of the Canadian cattle industry was estimated through the economic impacts it creates within the confines of the national economy. In fact, the total economic footprint of the industry is around three times the contribution that is observed through conventional data collection.

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. Based on the results of this study, if relative contributions of a sector are estimated using direct impacts only, it will lead to serious underestimation.

The obvious inference that can be drawn from the above data is that the Canadian cattle sector makes a much higher contribution to the national and regional (as well as to provincial) economy than what is obvious from traditional measures related to direct contribution.

Cattle sector is composed of three sub-sectors - cow-calf farms, backgrounding operations, and finishing (feedlots) operations. These sub-sectors trade with each other. In fact, the calves from the cow-calf farms are purchased by backgrounding operations, and those from the backgrounding operations are bought by finishing operations. This is not to suggest that some farms could undertake all three, or at least two of these, types of cattle production activities. If one adds all the input requirements (included live animals) to make up the cattle sector, the impact results would be inflated, due to double or triple counting in their input requirements. Exclusion of live animals purchased by a sector, that have already been produced, leads to a better estimate of total impacts of the cattle sector.

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