



The Economic Impact of Common Wheat on the Canadian Economy: 2022

Report for:

Cereals Canada
Winnipeg, Canada

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Introduction

Cereals Canada commissioned LMC International to undertake research to quantify the benefit of common wheat to the Canadian economy, in terms of:

1. **Economic impact**
2. **Number of people dependent on the sector**
3. **Wages**

This study provides the results of that independent analysis.

We focus specifically on the production of common wheat and common wheat products, spanning several steps in the value chain: from common wheat cultivation and delivery, via milling, starch, ethanol and feed processing, through further processing in baking, dough and mixes and finally to the delivery of value-added products to end users or ports of export.

The results capture:

1. The **direct** benefit from these stages
2. The **indirect** benefit from the associated economic and market activities and industries
3. The **induced** benefit from household spending of the income earned from the common wheat sector.

The data are presented for **Direct** benefits and **Total** benefits (the sum of the direct, indirect and induced benefits above) for each stage, for the eastern and western regions of Canada and for Canada in aggregate.

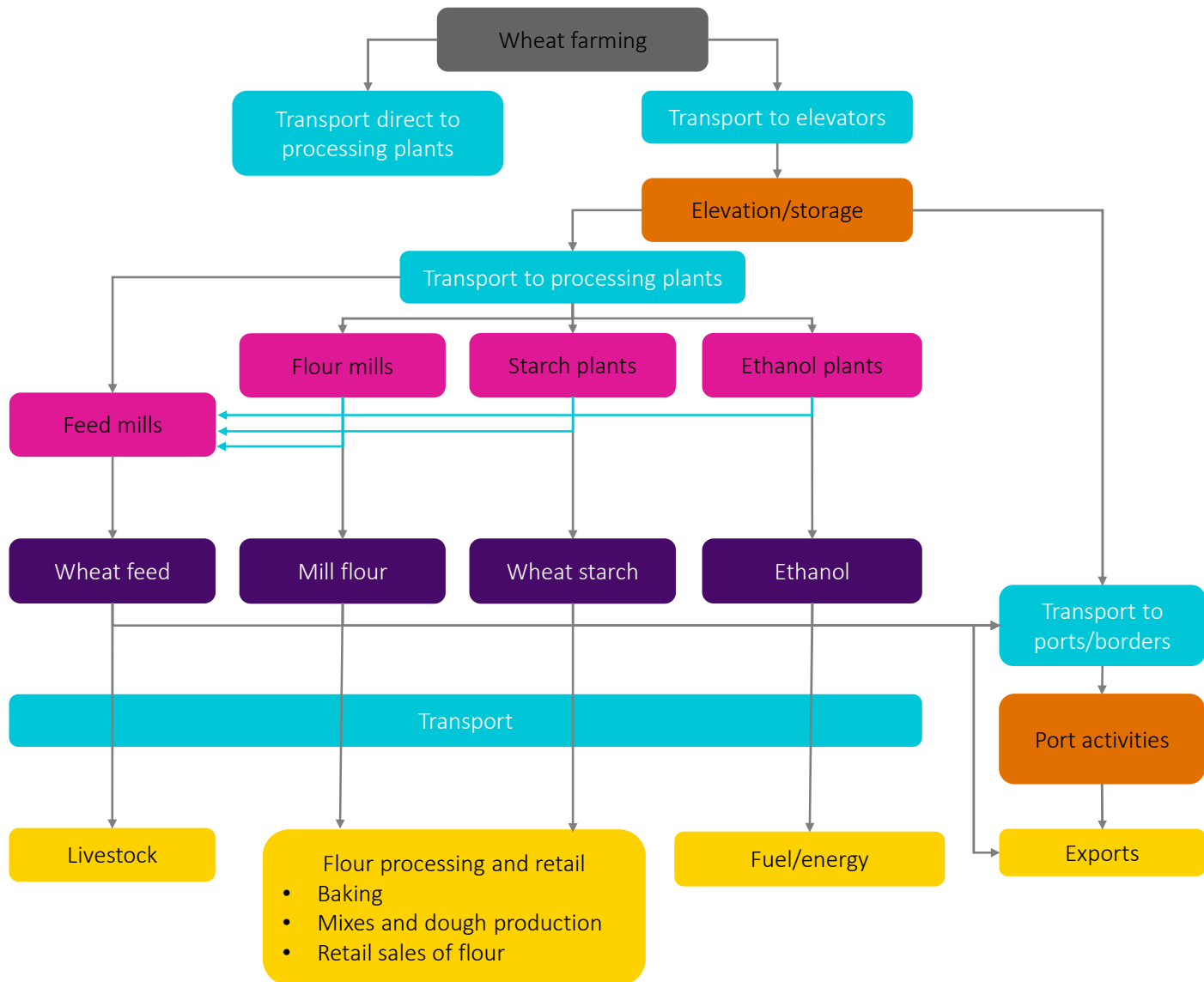
- The **eastern region** comprises Ontario, Quebec and the Maritimes.
- The **western region** comprises British Columbia, Alberta, Saskatchewan and Manitoba.

The objective is to develop an up-to-date assessment, using:

- Official data as far as possible
- The latest data for 2020/21 and previous years (which are officially revised over time)
- Interviews with industry participants
- Best practice in estimating economic benefits.

The analysis aims to provide the most accurate and independent assessment possible. To this end, we took guidance from industry participants, applied the most recent official data where relevant and used *Statistics Canada* multipliers to arrive at our totals in each category. The total results reflect the government's most recent multipliers for each sector.

*Note: Value throughout the study is presented in **Canadian dollars**, whether noted as dollars, or with the symbols \$ or C\$, unless otherwise specified. Also, hereafter, the terms "wheat" and "common wheat" are used interchangeably. Where we use the term "wheat", we refer only to common wheat.*



Summary of Results

For the average of the past three years, **2018/19-2020/21**:

- The total **economic impact** on the Canadian economy from the common wheat sector averaged C\$42.8 billion per year.
- Over 230,000 **full time equivalent jobs** are supported by the common wheat sector, comprising 215,000 paid jobs and an additional 15,000 family members (beyond the growers themselves) who support and are supported by common wheat farming operations.
- The total **wage impact** of the sector averaged C\$16.8 billion.

The economic benefits from common wheat increase when prices and output are higher. Common wheat's economic impact today is therefore at historically high levels.

The report is structured as follows:

- In this section of the report (**Part A**), our focus is on the national-level results.
- Three-year averages of regional-level results are presented in **Part B** of the report.
- An **Appendix** which details the result and methodology for each stage of the value chain in more detail.

Part A. National Results – Overview

This study evaluates the impact along the value chain for common wheat via three different metrics:

- **Economic impact:** quantifies the value added to the Canadian economy by wheat
- **Employment impact:** estimates the number of full-time equivalent (FTE) jobs contributed by the wheat value chain in Canada
- **Wage impact:** evaluates the total wages for individuals employed in the value chain

We evaluate the Canadian common wheat value chain at several distinct steps, tracing the impact through the value-added sectors of milling, starch/ethanol, further processing of flour in bakeries and dough/mixes and for direct flour retailing, and processing for livestock feed.

- For **common wheat for food**, our analysis ends at the point where common wheat is exported, or where milled flour is 1. processed in bakeries, in dough and mixes and for direct flour retail within Canada (our “flour processing and retail” sector) or 2. flour is loaded on a ship for overseas export or 3. crosses from Canada into the United States for overland export.
- **Common wheat for feed** is treated in the same way, either processed into feed in Canada or exported via ports or overland to the US.

The economic indicators for each step of the value chain are presented at two levels: **Direct effects** only, and **Total effects** (which is the sum of Direct, Indirect and Induced effects).

- **Direct effects:** the economic, employment and wage impacts that can be directly attributed to the common wheat value chain. These results are calculated by LMC based on models driven by publicly and privately available data, industry knowledge, and interviews with industry stakeholders.
- **Indirect effects:** the economic, employment and wage impacts created by those industries that supply the wheat value chain, or by individuals who work at the periphery of the sector.
- **Induced effects:** the economic, employment and wage impacts that stem from household spending of the income earned from the wheat sector.

Note: The indirect and induced effects of the common wheat sector are estimated based on input-output tables developed by Statistics Canada (StatCan). The use of these multipliers is discussed in greater detail later in the study.

The Canada-level results represent an aggregate sum of the results from the eastern and western regional level analysis.

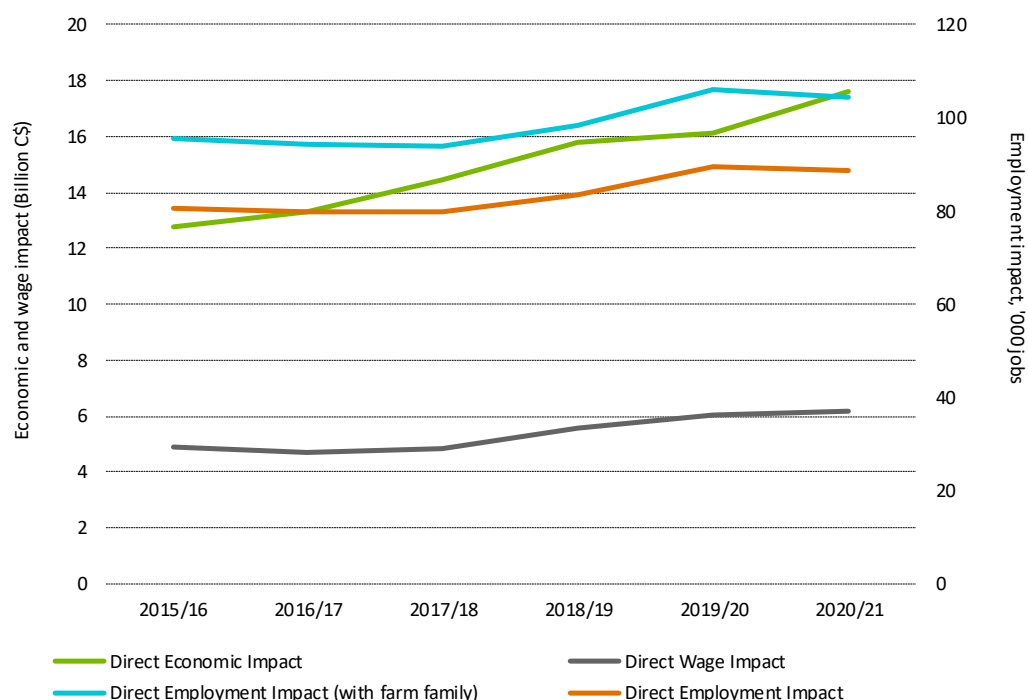
Table 1: Common wheat economic impact assessment by value chain component

Step number	Value chain component	Description	Economic impact	Employment	Wages	Multiplier used
1a	Wheat farming	Production of wheat by farmers using land and inputs such as seed, fertilizers and crop protection	yes	yes	yes	yes
1b	Farm family members	Unpaid family members who may indirectly support farm operation. Paid family members would be captured under Step 1a	captured in wheat farming	yes	captured in wheat farming	no
2	Elevation	Primary elevation of wheat	yes	yes	yes	yes
3	Crop delivery	Delivery of crop to elevators, processing plants or point of export via truck, rail and barge	yes	yes	yes	yes
4	Flour milling	Milling wheat into flour for human consumption	yes	yes	yes	yes
5	Feed milling	Milling wheat for use as animal feed	yes	yes	yes	yes
6	Other primary processing	Using wheat as a feedstock in starch milling and ethanol production	yes	yes	yes	yes
7	Product delivery	Delivery of flour, wheat feed and by-products from 4/5/6 above to end users or point of export	yes	yes	yes	yes
8	Flour processing and retail	Using flour as an input for baking and other food applications, plus retail flour sales	yes	yes	yes	yes
9	Impact at ports	Loading ocean-going vessels for overseas export	yes	yes	yes	yes

The direct effect of common wheat on the Canadian economy

The **direct** impact of common wheat on the Canadian economy is illustrated in Diagram 1. This presents the aggregate results for the entire value chain according to our three separate measures: *economic impact*, *employment* and *wage impact*. The data for each measure, broken down by each stage in the value chain, are presented in Tables 2-4.

- Between 2018/19 and 2020/21, **the direct economic impact of common wheat on the Canadian economy averaged C\$16.6 billion** (Table 2). This value peaked in the latest year covered, 2020/21, with higher output and higher prices.
- The **direct employment impact** across the common wheat value chain varies less than the economic impact as it is less influenced by prices. Between 2018/19 and 2020/21, the common wheat sector was **directly accountable** for an average of over 87,000 paying jobs (Table 3). When additional common wheat farm family members, who contribute to the overall success of the farming enterprise, are included, **the number of people directly supported by the common wheat industry over the same period approaches 103,000**.
- Between 2018/19 and 2020/21, **the direct wage impact of common wheat on the Canadian economy averaged over C\$5.9 billion** (Table 4).

Diagram 1: Direct effects of common wheat on the Canadian economy

Table 2: Direct economic impact of common wheat on the Canadian economy (C\$ billion)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19 - 20/21
Farming	5.07	5.37	6.16	6.60	6.39	7.68	6.89
Elevation	0.42	0.42	0.42	0.47	0.49	0.49	0.49
Crop delivery	1.13	1.17	1.25	1.49	1.58	1.68	1.58
Flour milling	1.18	0.98	0.72	1.15	1.29	1.19	1.21
Feed milling	0.25	0.31	0.30	0.31	0.35	0.32	0.33
Other primary processing	0.33	0.36	0.26	0.28	0.32	0.24	0.28
Product delivery	0.10	0.11	0.12	0.13	0.14	0.14	0.14
Flour processing and retail	4.05	4.34	4.93	5.09	5.27	5.58	5.31
Impact at ports	0.26	0.23	0.25	0.30	0.29	0.32	0.30
Direct Economic Impact	12.79	13.28	14.42	15.82	16.12	17.63	16.52

Table 3: Direct employment impact of common wheat on the Canadian economy ('000 jobs)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19 - 20/21
Wheat farming	29.92	28.58	28.04	30.16	32.46	31.58	31.40
Elevation	3.28	2.99	3.23	3.21	3.13	2.96	3.10
Crop delivery	3.39	3.46	3.32	3.81	4.18	3.97	3.99
Flour milling	1.77	1.60	1.61	1.70	1.69	1.70	1.70
Feed milling	2.13	2.13	2.13	2.13	2.13	2.13	2.13
Other primary processing	0.25	0.26	0.24	0.25	0.26	0.23	0.25
Product delivery	0.50	0.53	0.54	0.56	0.60	0.57	0.57
Flour processing and retail	38.21	39.31	39.73	40.39	44.01	44.13	42.85
Impact at ports	1.08	0.95	1.06	1.27	1.24	1.39	1.30
Direct Employment Impact	80.53	79.81	79.91	83.48	89.70	88.66	87.28
<i>Additional farm family members</i>	<i>15.06</i>	<i>14.44</i>	<i>14.09</i>	<i>15.07</i>	<i>16.19</i>	<i>15.89</i>	<i>15.72</i>
Direct Employment (with farm family)	95.59	94.25	94.00	98.56	105.90	104.56	103.00

Table 4: Direct wage impact of common wheat on the Canadian economy (billion C\$)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19 - 20/21
Wheat farming	2.29	2.14	2.27	2.78	2.81	3.09	2.89
Elevation	0.24	0.17	0.19	0.22	0.25	0.18	0.22
Crop delivery	0.28	0.28	0.28	0.33	0.36	0.35	0.35
Flour milling	0.12	0.10	0.09	0.11	0.13	0.11	0.12
Feed milling	0.11	0.11	0.11	0.11	0.12	0.12	0.12
Other primary processing	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Product delivery	0.03	0.03	0.03	0.03	0.04	0.03	0.03
Flour processing and retail	1.73	1.78	1.77	1.86	2.22	2.19	2.09
Impact at ports	0.07	0.07	0.08	0.10	0.10	0.12	0.11
Direct Wage Impact	4.89	4.69	4.84	5.55	6.06	6.21	5.94

The total impact of common wheat on the Canadian economy (direct + indirect + induced effects)

The total effect of common wheat on the Canadian economy is not limited to the people working directly in the industry. The full impact also accounts for the indirect and induced effects that occur. The results of the total impact (direct + indirect + induced effects) are illustrated in Diagram 2 and in Tables 5-7.

- In 2020/21, the total ***economic impact***, which includes direct, indirect and induced effects, peaked at \$44.9 billion. The average economic impact of common wheat on the Canadian economy over the past three years of full data, 2018/19 to 2020/21, was ***\$42.8 billion***.
- The total ***employment effect*** of common wheat between 2018/19 and 2020/21 averaged over ***230,000***. This includes common wheat farm family members.
- Over the same period, the ***wage effect*** of common wheat on the Canadian economy averaged ***\$16.8 billion***.

Table 5: Total economic impact of common wheat on the Canadian economy (C\$ billion)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19 - 20/21
Wheat farming	10.14	10.39	11.41	13.51	13.09	15.72	14.11
Elevation	0.73	0.71	0.72	0.84	0.87	0.87	0.86
Crop delivery	2.24	2.33	2.52	3.02	3.16	3.34	3.17
Flour milling	6.33	5.55	4.15	6.88	7.75	7.12	7.25
Feed milling	1.19	1.45	1.42	1.52	1.74	1.60	1.62
Other primary processing	1.88	2.06	1.30	1.27	1.54	1.12	1.31
Product delivery	0.26	0.29	0.32	0.35	0.38	0.37	0.37
Flour processing and retail	9.97	10.50	11.85	12.98	13.40	14.20	13.53
Impact at ports	0.44	0.39	0.44	0.54	0.51	0.57	0.54
Total Economic Impact	33.19	33.69	34.13	40.90	42.44	44.91	42.75

Diagram 2: Total effect of common wheat on the Canadian economy

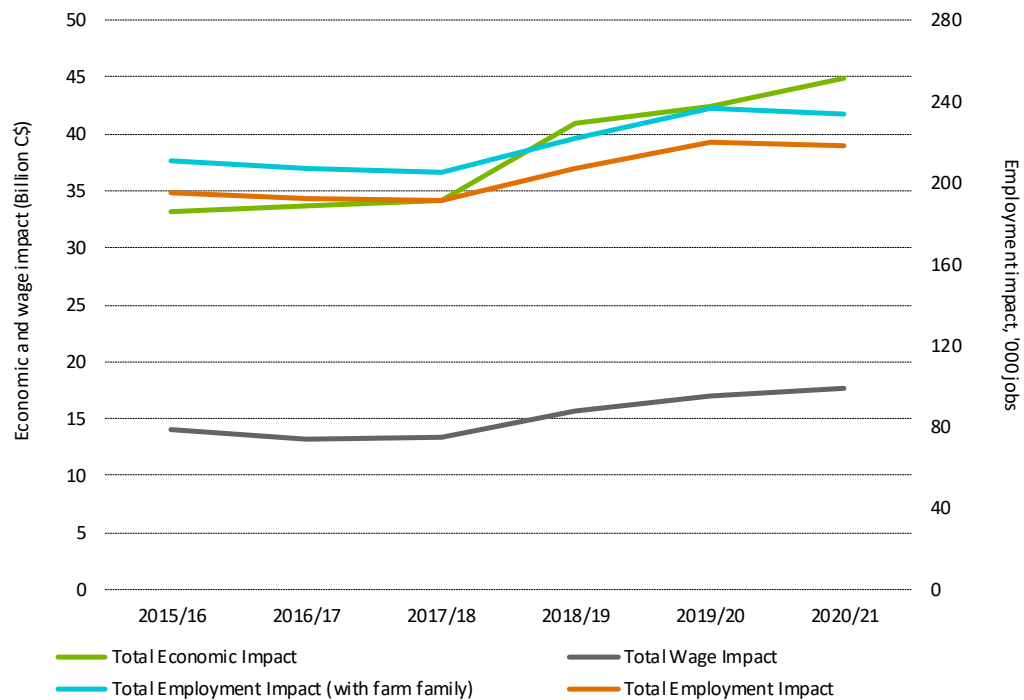


Table 6: Total employment impact of common wheat on the Canadian economy ('000 jobs)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19 - 20/21
Wheat farming	65.89	63.92	61.58	70.63	76.02	73.95	73.53
Elevation	4.96	4.57	4.88	4.89	4.78	4.51	4.73
Crop delivery	8.46	8.67	8.23	9.12	9.98	9.50	9.53
Flour milling	17.11	15.80	17.67	19.16	18.96	19.12	19.08
Feed milling	12.22	11.85	11.96	12.10	12.10	12.10	12.10
Other primary processing	1.55	1.68	1.52	1.68	1.77	1.54	1.66
Product delivery	1.18	1.28	1.28	1.31	1.41	1.34	1.35
Flour processing and retail	82.44	83.36	82.19	85.95	93.42	93.71	91.03
Impact at ports	1.63	1.45	1.61	1.94	1.89	2.12	1.98
Total Employment Impact	195.44	192.60	190.92	206.78	220.33	217.89	215.00
<i>Additional farm family members</i>	<i>15.06</i>	<i>14.44</i>	<i>14.09</i>	<i>15.07</i>	<i>16.19</i>	<i>15.89</i>	<i>15.72</i>
Total Employment (with farm family)	210.51	207.03	205.01	221.86	236.52	233.78	230.72

Table 7: Total wage impact of common wheat on the Canadian economy (C\$ billion)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19 - 20/21
Wheat farming	7.74	7.14	7.39	9.10	9.22	10.11	9.48
Elevation	0.37	0.25	0.28	0.33	0.38	0.27	0.33
Crop delivery	0.56	0.56	0.56	0.64	0.71	0.69	0.68
Flour milling	0.69	0.61	0.57	0.70	0.88	0.76	0.78
Feed milling	0.52	0.47	0.51	0.50	0.54	0.55	0.53
Other primary processing	0.07	0.07	0.06	0.07	0.08	0.07	0.07
Product delivery	0.06	0.06	0.07	0.07	0.08	0.08	0.08
Flour processing and retail	3.86	3.94	3.78	4.18	4.97	4.90	4.69
Impact at ports	0.11	0.10	0.12	0.15	0.16	0.18	0.16
Total Wage Impact	13.97	13.21	13.34	15.75	17.02	17.61	16.79

Methodology: Use of multipliers to evaluate indirect and induced impacts

The direct effects of common wheat on the Canadian economy are significant. Nonetheless, they ignore the important economic effect that a core industry generates via a ripple effect on supporting industries. This is known as the **indirect** effect. For some steps in the common wheat value chain, the indirect effect can be significant.

This is especially true for capital-intensive aspects of the sector, such as milling and other processing sectors. Many jobs associated with keeping a facility operational, from white collar jobs in engineering to trade professions like electricians, plumbers and pipefitters, are done on a contractual basis with outside firms, making the true impact of the processing facility much higher.

Similarly, direct effects fail to capture the economic activity stemming from expenditures of households drawing a salary from a given sector. While these “**induced**” effects are typically smaller than indirect effects, they can still constitute a sizeable economic force, particularly in a local area.

These economic and employment spin-offs are known as the **multiplier effect** in established economic literature. Multipliers measure the impact on the broader economy from an exogenous shock to a specific sector of the economy.

In this report, we employ different multipliers for the economic, employment, and wage effects, and the size of the multiplier effect also varies geographically and across different subsectors of the common wheat value chain. Fortunately, ***Canada maintains industry multipliers at a detailed sectoral level.***

How StatCan multipliers have been used in this study

Statistics Canada’s Industry Accounts Division has estimated over 250 economic multipliers.

We adopt national-level multipliers throughout when estimating the total impact of common wheat on the Canadian economy. This ensures a level playing field for the regions in the study.

Canadian multipliers are available for each of our impact measures, i.e. 1) economic impact, 2) employment impact and 3) wage impact, at the direct, the direct+indirect, and the direct+indirect+induced levels.

Multipliers change over time

One challenge associated with using multipliers for sophisticated economies, like Canada, is that multipliers can change over time to reflect not only new economic realities, but also methodological developments. Also, constructing multiplier tables is both data and labor-intensive, resulting in infrequent reporting. As of the writing of this study, the most recent multipliers available were from 2018 (Table 8).

Table 8: National-level multipliers derived from StatCan input-output tables

Value-added activity	StatCan Industry Designation	Economic Impact	Multipliers	
			Employment Impact	Wages Impact
Farming	Crop Production	2.05	2.34	3.28
Elevation	Warehousing and Storage	1.77	1.53	1.51
Rail Transport	Rail Transportation	1.64	2.39	1.84
Truck Transport	Truck Transportation	2.89	2.35	2.41
Barge Transport	Water Transportation	3.31	3.16	2.57
Flour milling	Grain and Oilseed Milling	6.00	11.25	6.63
Feed milling	Animal Food Manufacturing	4.96	5.67	4.54
Starch milling	Grain and Oilseed Milling	6.00	11.25	6.63
Ethanol production	Basic Chemical Manufacturing	2.59	6.71	3.76
Flour processing	Bakeries and Tortilla Manufacturing	2.57	2.14	2.26
Flour retail sales	Food and Beverage Stores	1.98	1.34	1.63
Port Activities	Warehousing and Storage	1.77	1.53	1.51

Part B. Regional Results – Overview

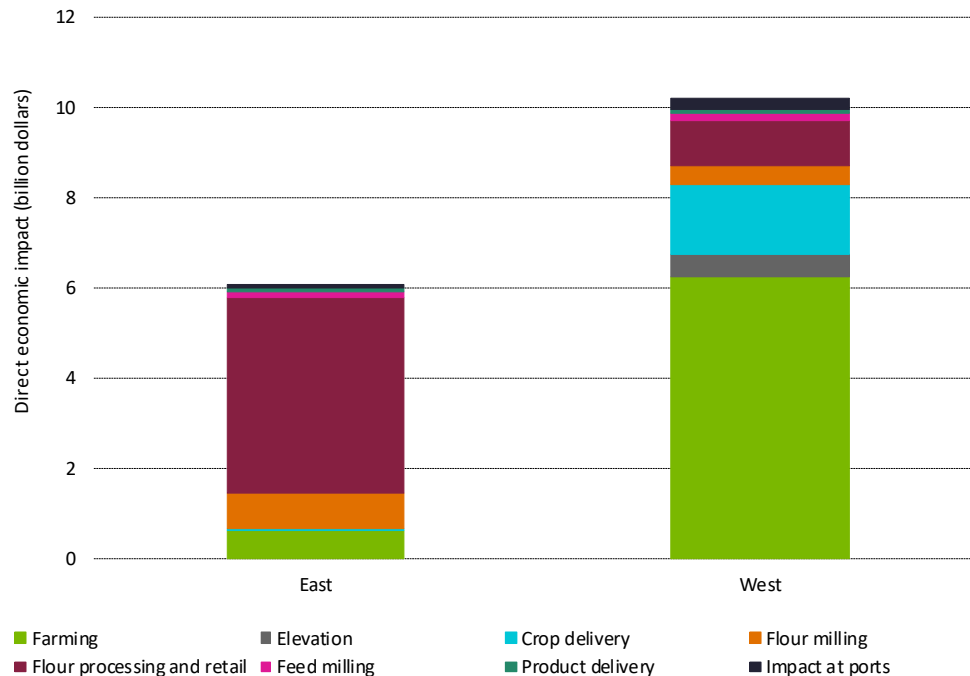
The direct effect of common wheat on Canadian regional economies

The Western region has the largest **direct economic impact** of Canadian-grown common wheat. It is the wheat production center, with the greatest crop output taking place in Saskatchewan and Alberta. However, more of the country's flour milling and flour processing capacity is located closer to the market in the eastern region.

Table 9: Direct economic impact by region (C\$ million), average 2018/19–2020/21

	East	West	Canada
Farming	636.4	6,251.5	6,887.9
Elevation	0.0	486.3	486.3
Crop delivery	38.8	1,545.6	1,584.4
Flour milling	793.8	415.0	1,208.8
Feed milling	144.2	181.5	325.8
Other primary processing	67.2	213.7	280.9
Product delivery	64.8	73.0	137.7
Flour processing and retail	4,314.3	995.4	5,309.7
Impact at ports	63.6	239.3	302.8
Direct Economic Impact	6,123.2	10,401.3	16,524.5

Diagram 3: Direct economic impact by region, average 2018/19–2020/21

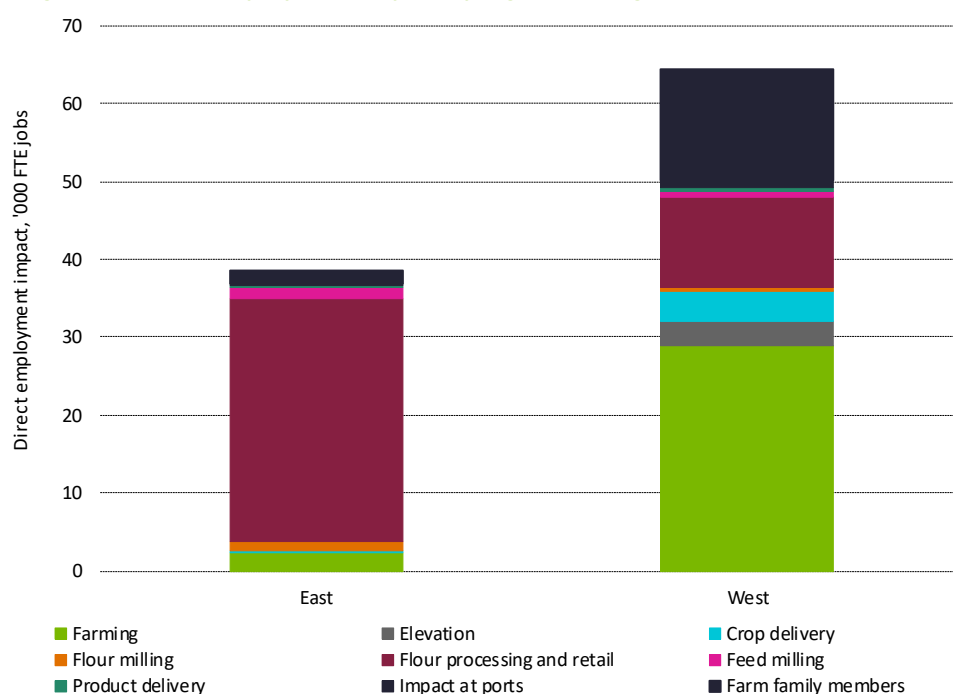


The west also has the highest **employment impact** from common wheat. In the Western region, almost 65,000 people are directly employed in the wheat sector when wheat farm family members are included.

Table 10: Direct employment impact by region (full time equivalent jobs), average 2018/19–2020/21

	East	West	Canada
Farming	2,463	28,934	31,397
Elevation	0	3,100	3,100
Crop delivery	194	3,794	3,988
Flour milling	1,114	582	1,696
Feed milling	1,388	747	2,134
Other primary processing	31	217	248
Product delivery	291	283	574
Flour processing and retail	31,201	11,646	42,847
Impact at ports	308	992	1,300
Direct Employment Impact	36,989	50,295	87,284
Farm family members	1,481	14,237	15,719
Total Employment (with farm family)	38,471	64,532	103,003

Diagram 4: Direct employment impact by region, average 2018/19–2020/21

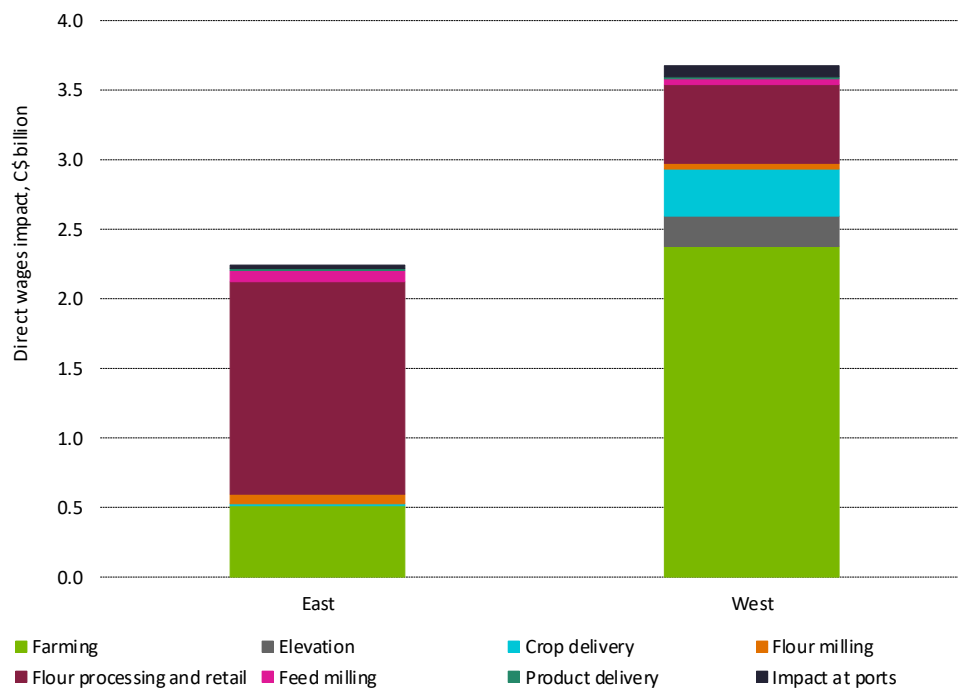


Finally, of the \$5.9 billion in **direct wages** derived from common wheat, \$3.7 billion are paid in the Western provinces.

Table 11: Direct wage impact by region (C\$ million), average 2018/19–2020/21

	East	West	Canada
Farming	516.1	2,375.6	2,891.7
Elevation	0.0	216.1	216.1
Crop delivery	10.8	335.5	346.3
Flour milling	77.0	40.2	117.2
Feed milling	75.7	40.7	116.5
Other primary processing	2.2	15.9	18.1
Product delivery	16.3	18.1	34.4
Flour processing and retail	1,522.0	567.4	2,089.4
Impact at ports	25.4	82.1	107.5
Direct Wage Impact	2,245.4	3,691.8	5,937.2

Diagram 5: Direct wage impact by region, average 2018/19–2020/21



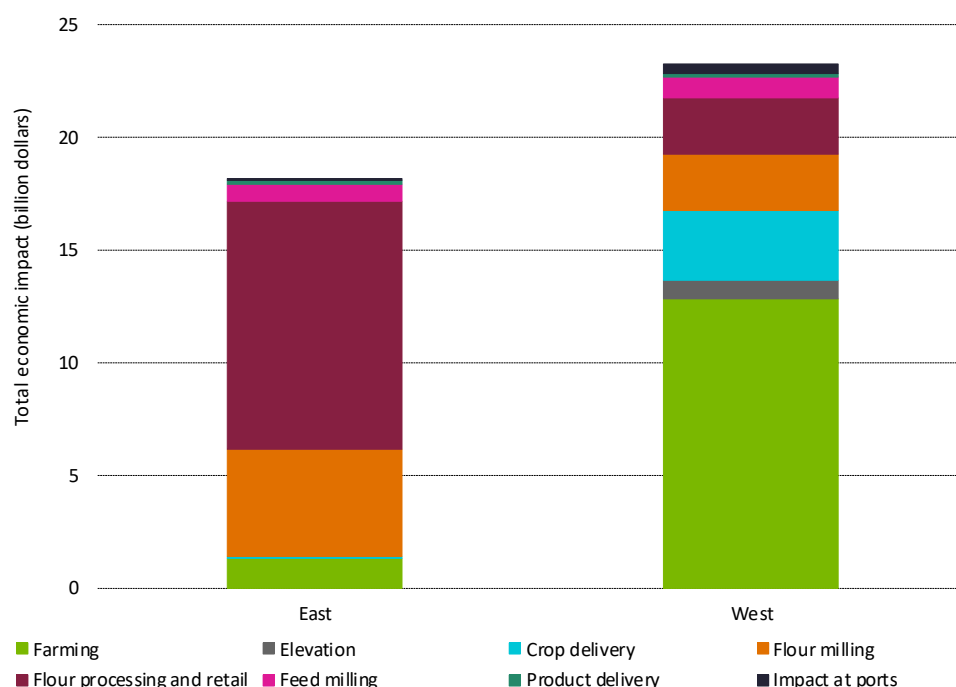
The total effect of common wheat on Canadian regional economies

Table 12: Total economic impact by region (C\$ million), average 2018/19–2020/21

	East	West	Canada
Farming	1,303.4	12,803.1	14,106.5
Elevation	0.0	862.7	862.7
Crop delivery	111.8	3,061.5	3,173.4
Flour milling	4,760.5	2,488.9	7,249.4
Feed milling	716.0	901.1	1,617.1
Other primary processing	755.8	552.9	1,308.7
Product delivery	185.9	183.3	369.2
Flour processing and retail	11,002.9	2,522.6	13,525.5
Impact at ports	112.8	424.4	537.2
Total Economic Impact	18,949.2	23,800.6	42,749.7

Applying the indirect and induced multiplier effects does little to change the relative effects of common wheat on Canada's provinces. Of the \$42.7 billion total economic impact of common wheat on the Canadian economy, almost \$24 billion stems from the Western provinces, although flour milling and flour processing are substantial contributors in the east.

Diagram 6: Total economic impact by region, average 2018/19–2020/21

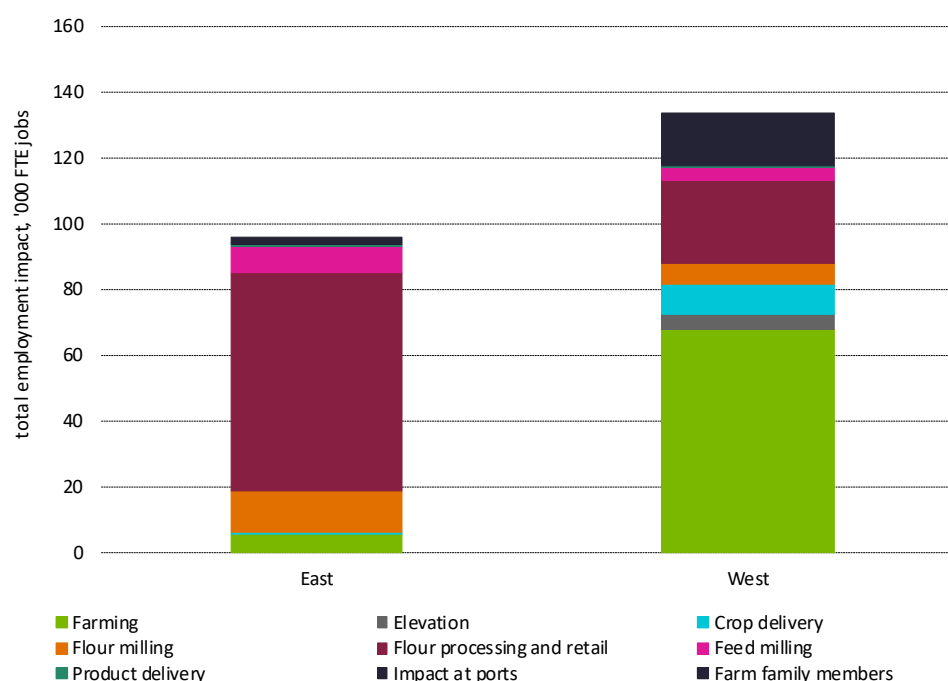


Of the 230,000 Canadian people supported by the common wheat sector (a figure including farm family members), roughly 135,000 are in the Western Canada region.

Table 13: Total employment impact by region (full time equivalent jobs), average 2018/19–2020/21

	East	West	Canada
Farming	5,768	67,764	73,532
Elevation	0	4,727	4,727
Crop delivery	456	9,079	9,535
Flour milling	12,530	6,551	19,081
Feed milling	7,869	4,234	12,103
Other primary processing	208	1,454	1,662
Product delivery	684	668	1,352
Flour processing and retail	66,328	24,700	91,028
Impact at ports	470	1,513	1,983
Total Employment Impact	94,313	120,689	215,002
Farm family members	1,481	14,237	15,719
Total Employment (with farm family)	95,794	134,926	230,721

Diagram 7: Total employment impact by region, average 2018/19–2020/21

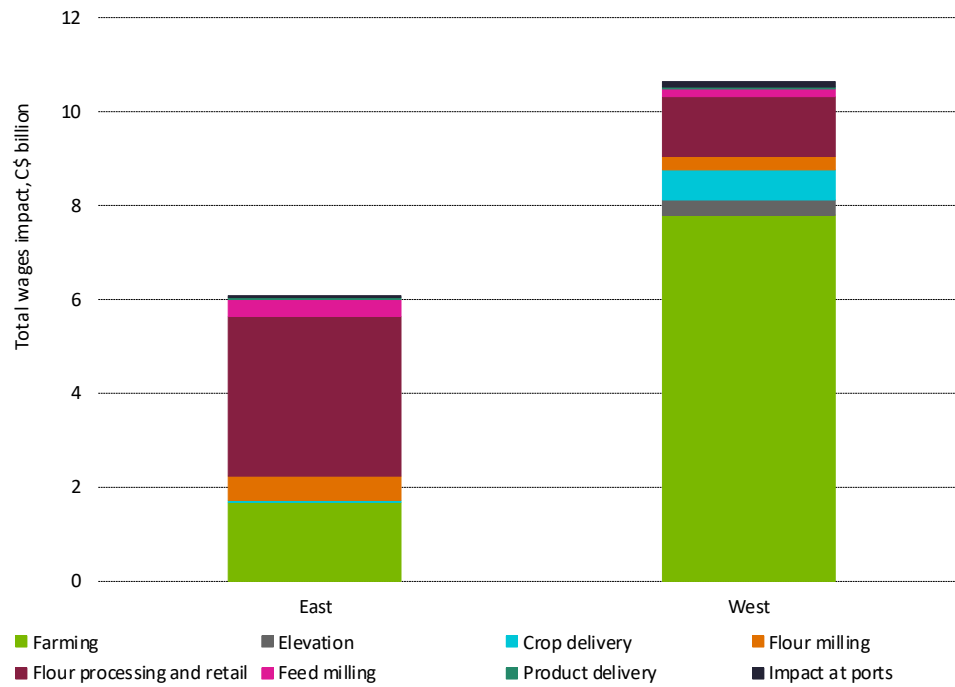


Lastly, of the \$16.8 billion in total wages attributable to common wheat, on average between 2018/19 and 2020/21, \$10.7 billion stems from the wheat sector of Western Canada, dominated by farming in the prairie provinces.

Table 14: Total wage impact by region (C\$ million), average 2018/19–2020/21

	East	West	Canada
Farming	1,691.6	7,787.3	9,478.9
Elevation	0.0	325.5	325.5
Crop delivery	26.0	654.9	680.9
Flour milling	510.4	266.8	777.2
Feed milling	343.7	184.9	528.7
Other primary processing	14.4	60.0	74.4
Product delivery	39.2	40.6	79.8
Flour processing and retail	3,414.6	1,270.6	4,685.2
Impact at ports	38.3	123.6	161.9
Total Wage Impact	6,078.2	10,714.3	16,792.5

Diagram 8: Total wage impact by region (C\$ billion), average 2018/19–2020/21



Appendix: Detailed Results by Step in the Common wheat Value Chain and Methodology

Below we present our provincial-level results in further detail and discuss the methodology employed in accounting for direct economic, employment and wage impacts across the distinct steps in the common wheat value chain.

Common wheat farming

Common wheat farming is the foundation of the wheat value chain in Canada and, along with flour milling and processing, accounts for the largest shares of the economic impact and employment in Canada.

Impact

- The direct economic impact of common wheat farming averages \$6.9 billion over the last three years, with the total economic impact estimated at \$14.1 billion. This impact is concentrated in the prairie provinces of our Western region.
- Common wheat farming directly employs 31,000 paid individuals. This figure does not include common wheat farm family members (see next section). When the indirect and induced multipliers are applied, the total employment impact of wheat farming is estimated almost 74,000.
- \$2.9 billion in wages are directly attributable to wheat farming. For growers, this includes profits from the wheat share of their farm, while for hired labor it comprises wages paid out by growers. Including indirect and induced effects, the total wage impact of wheat farming is \$9.5 billion.

Table 15: Impact of Canadian common wheat farming and production, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	636.4	6,251.5	6,887.9
Total economic impact (C\$ million)	1,303.4	12,803.1	14,106.5
Direct employment (FTE jobs)	2,463	28,934	31,397
Total employment (FTE jobs)	5,768	67,764	73,532
Direct wages (C\$ million)	516.1	2,375.6	2,891.7
Total wages (C\$ million)	1,691.6	7,787.3	9,478.9

Methodology

We determine the economic impact of wheat farming by considering the **common wheat revenues** earned by farmers; i.e. volumes produced multiplied by prices received.

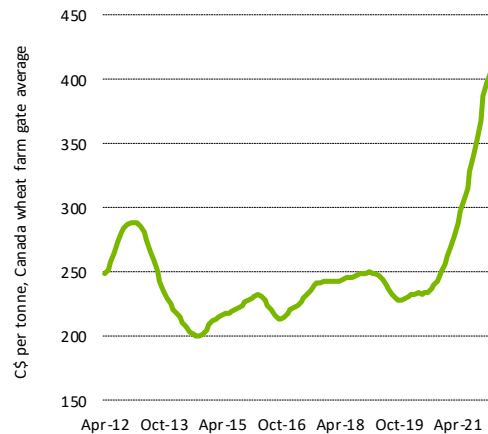
Unlike the other sectors in our analysis, this calculation does not estimate the value added by the sector: to do this, we would have to subtract common wheat farming costs from wheat farming revenues. However, if we did that, we would fail to capture the economic impact of the wide array of inputs used in wheat farming, such as seed, fertilizers and crop protection. To include these would necessitate a multitude of value-added calculations for each input into wheat farming.

The best way to view the common wheat **farming impact** in this report, therefore, is to view this as **a summation of all the value added by all the sectors up to and including the wheat farming stage.**

The value of wheat farming is determined by two main factors:

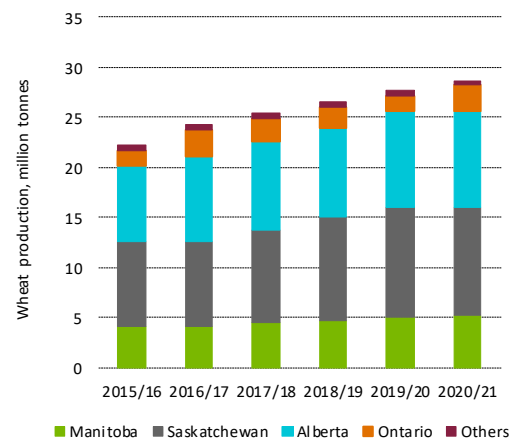
- **Common wheat prices:** The trajectory of Canadian common wheat prices demonstrates the current pricing peak. We use farmgate common wheat price series from Statistics Canada, which are weighted for feed and food grades according to production volumes of each across the different regions.
- **Common wheat output:** Canadian common wheat production shows a steady and persistent rise since 2015.

Diagram 9: Canadian farmgate common wheat prices



Source: StatCan.

Diagram 10: Canadian common wheat output



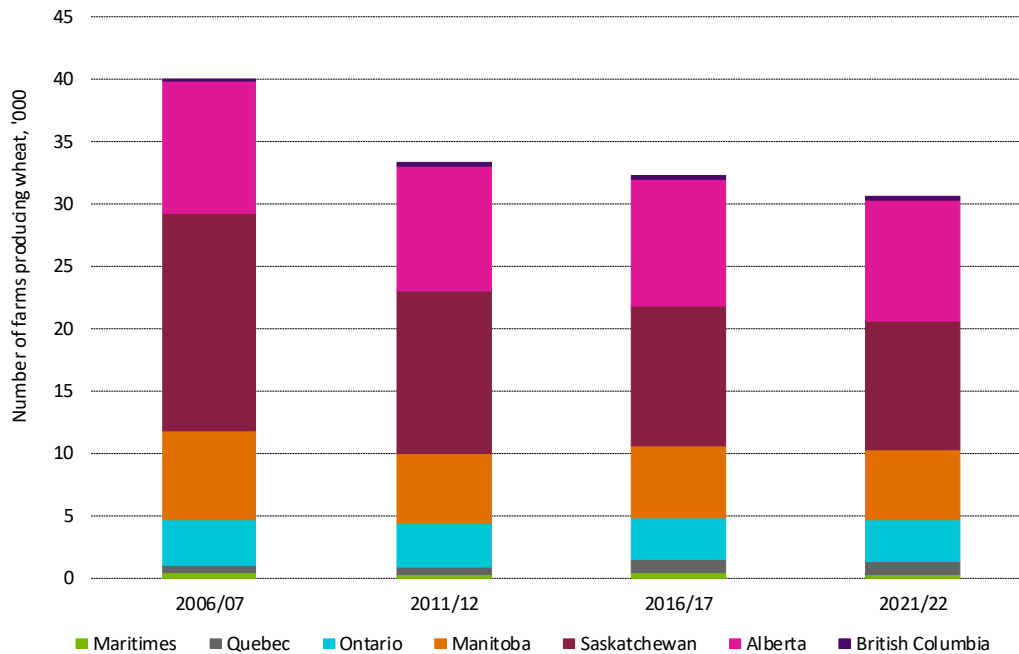
Source: StatCan.

For this study, we took paid wheat farm employment to be a combination of growers and paid labor. While many growers may hire an immediate family member (such as a son or daughter), we assumed that hired labor was primarily found outside the immediate family. The employment effect on unpaid immediate family members is captured in the next section.

Estimating **grower employment** in wheat farming was done on the basis of the wheat area as a proportion of the total field crop area in Canada. This percentage was then applied to the total number of field crop farms in Canada, assuming that there is one full time farmer per farm. This data series is constructed every five years, with the last data from 2021/22.

Wheat's share of farm earnings was used to represent a grower's **common wheat wage**. Wheat earnings were based on the average farm earnings for grain and oilseed farmers, from a data series available from StatCan. To account for the common wheat share of those earnings, we divided average wheat acreage per farm by the average farm size.

Diagram 11: Number of farms growing common wheat in Canada



Source: StatCan.

Estimates for ***hired labor*** were based on crop budgets developed by agricultural ministry extension specialists from across the Prairie Provinces. While there was some variability in these budgets in terms of labor requirements, the data was fairly tightly clustered at around 1.6 man-hours per acre of wheat. By multiplying the number of wheat acres by 1.6 and dividing by 2,000 (50 weeks x 40 hours/week), we arrived at the number of hired hands working on wheat farms on a full-time basis annually.

Wages for hired labor were also taken from StatCan, with total wages paid being the product of the number of hired workers and the prevailing wage.

Table 16: Number of hired workers dedicated to common wheat

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Maritimes	25	32	41	43	44	48	54	59
Quebec	122	136	165	189	186	189	181	234
Ontario	932	756	660	1,005	832	844	879	1,023
Manitoba	2,824	2,464	2,536	2,393	2,212	2,338	2,516	2,511
Saskatchewan	7,756	7,180	6,364	5,696	5,776	6,398	7,053	6,570
Alberta	5,296	5,044	4,872	4,738	4,792	5,088	5,350	5,149
British Columbia	74	74	80	81	35	60	68	54
Canada	17,029	15,686	14,718	14,145	13,877	14,965	16,102	15,601

Common wheat farm family members

Estimating the employment impact of an agricultural commodity presents the added challenge of how to account for farm family members other than the growers themselves. In some families, spouses and children may provide just a supporting role in farm operations, be it through keeping the books, buying supplies, or providing labor on an occasional basis. For other families, however, spouses and grown children may work on a nearly full-time basis, supported by farm revenues and, in the case of grown children, possibly working as a means ultimately to acquire the farm from their parents.

Impact and methodology

To account for this impact, we have included a sub-category in our employment estimates for common **wheat farm family members**. As labor that is unpaid in the traditional sense, this category is differentiated from the rest of our employment estimates across the wheat value chain, which represent workers who draw a cash wage from working in the wheat sector. Consequently, the total employment effect in this study is presented with and without this number. Note that the figure provides an estimate of the additional farm family members supported by wheat production: *it is not intended as an estimate of the family members employed by wheat activities on the farm.*

A number of data sets detail the average size of Canadian families over time, maintained by StatCan. One series suggests an average Canadian farm family size of 3.1 resident persons. Using this series would, therefore, imply that for every grower, there are just over two additional farm family members. These family members are supported by *all* crops grown on the farm, and therefore we assume just over one farm family member is supported by each full time (FTE) wheat farmer. Because these family members are assumed to be uncompensated through wages, ***no indirect or induced multiplier has been applied to this group and totals are the same whether looking at direct or total impacts.***

Lastly, we note that the economic impact associated with these workers has been captured under the previous heading “common wheat farming.”

Table 17: Impact of common wheat farm family members, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	n.a.	n.a.	n.a.
Total economic impact (C\$ million)	n.a.	n.a.	n.a.
Direct employment (FTE jobs)	1,481	14,237	15,719
Total employment (FTE jobs)	1,481	14,237	15,719
Direct wages (C\$ million)	n.a.	n.a.	n.a.
Total wages (C\$ million)	n.a.	n.a.	n.a.

Primary elevation

According to Canadian Grain Commission data, most of the common wheat in western Canada (and hence in Canada as a whole) is delivered to primary elevators, the balance being delivered directly to processors (more commonly in eastern Canada). This makes this an

important sector in economic value added and job creation. At the elevators, common wheat (and other grains) are stored until needed 1) by domestic flour, starch, ethanol or feed mills, 2) for overland export to the US or Mexico, or 3) for delivery to Canadian ports for overseas export.

Impact

- The direct economic impact of common wheat elevation in Canada averaged over \$486 million between 2018/19 and 2020/21. The total economic impact, meanwhile, is estimated at close to \$863 million.
- An estimated 3,100 people are directly employed in primary common wheat elevation. When indirect and induced effects are included, the total effect is estimated at over 4,700 jobs.
- Lastly, wages directly attributable to primary common wheat elevation are calculated at around \$215 million over the observed time frame, with the total wage effect estimated at over \$325million.

Table 18: Impact of primary common wheat elevation, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	0.0	486.3	486.3
Total economic impact (C\$ million)	0.0	862.7	862.7
Direct employment (FTE jobs)	0	3,100	3,100
Total employment (FTE jobs)	0	4,727	4,727
Direct wages (C\$ million)	0.0	216.1	216.1
Total wages (C\$ million)	0.0	325.5	325.5

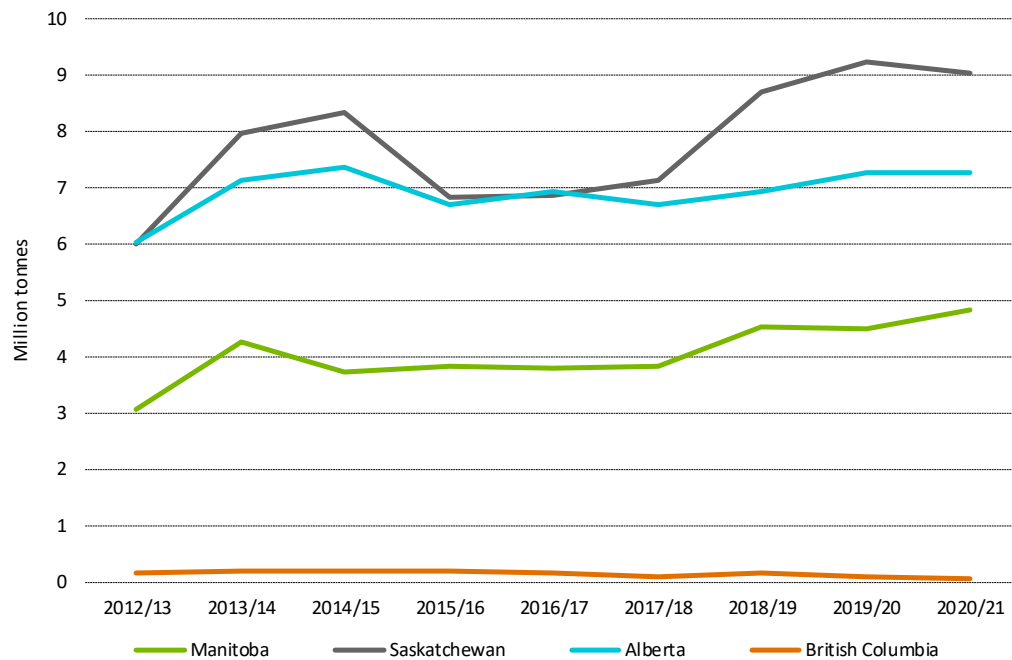
Methodology

The economic impact of wheat elevation was determined by the product of volumes of wheat being elevated and fees incurred for primary elevation. For the Prairie Provinces, elevated wheat volumes were determined by data available through the *Canadian Grain Commission*, with the numbers modified slightly to reconcile with information on internal common wheat trade flows within the country. CGC data estimates negligible volumes of elevation outside of the Prairies.

- We estimate approximately 21 million tonnes of common wheat now passes through primary elevation facilities in Canada, rising over the past few years. Note that much of this is subsequently exported rather than being processed domestically.
- Primary elevation fees were also obtained from the *Canadian Grain Commission* based on annual surveys they conduct on the costs of moving grain to point of export. Total fees, for receiving, removal of dockage and storage, typically range from \$20-\$25 per tonne over the period.

To understand the employment impact of primary wheat elevation, we began with a “*Working in Canada*” report developed by the Canadian government. This identifies 6,250 individuals employed in the elevation of all agricultural commodities in Canada. The common wheat share of this total was calculated by multiplying the total jobs figure by the ratio of common wheat in commercial positions over all grains in commercial positions. Salaries for these positions were based on a *StatCan* series for jobs in grain processing and handling.

Diagram 12: Estimated producer deliveries of Canadian common wheat to elevators



Source: Canadian Grain Commission.

Common wheat and wheat product delivery

Common wheat transport comprises:

- **Crop delivery:** transporting the common wheat crop to elevators, to our three primary processing categories (flour millers, starch and ethanol processors) and to feed processors, plus transporting the crop to overseas export ports and overland to the US.
- **Flour product delivery:** transporting flour to domestic retail, to baking and dough/mixes processors, and exporting flour.
- **Wheat feed and by-product delivery:** transporting wheat feed (after the feed mill) to domestic users and potentially to overseas export ports and overland to the US, plus transporting flour milling and other primary processing by-products (such as wheat midds, bran and DDGs) to feed processors.

Within Canada we assume that:

- The common wheat crop and its products are transported between provinces (i.e. inter provincial transfers) predominantly by rail.
- The wheat crop delivered directly to processing facilities is transported by truck.
- We assume a small volume of the crop is delivered by barge/laker vessels.

Impact – crop delivery

The majority of the common wheat crop is delivered to western elevators for rail shipment to 1) Canadian ports, 2) the US border, or 3) processing facilities within Canada, while a portion is also delivered by farmers directly to facilities within Canada.

The economic impact of common wheat deliveries is presented separately for rail, truck and lakers. For domestic transport, because wheat transport networks are nationwide rather than being fixed at a single point, **transportation effects are presented on the basis of where the common wheat originates**, rather than being allocated across the path in which the common wheat travels or where it might be delivered. Thus, if western wheat is transported by laker to an eastern miller, the west captures the crop delivery benefits in our model.

Table 19: Impact of common wheat crop transportation, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	38.8	1,545.6	1,584.4
by rail	0.2	1,151.8	1,152.0
by truck	38.6	317.0	355.6
by laker	0.0	76.8	76.8
Total economic impact (C\$ million)	111.8	3,061.5	3,173.4
by rail	0.3	1,892.4	1,892.7
by truck	111.5	915.1	1,026.6
by laker	0.0	254.0	254.0
Direct employment (FTE jobs)	194	3,794	3,988
by rail	0	2,701	2,702
by truck	193	1,030	1,223
by laker	0	63	63
Total employment (FTE jobs)	456	9,079	9,535
by rail	1	6,459	6,460
by truck	455	2,423	2,878
by laker	0	198	198
Direct wages (C\$ million)	10.8	335.5	346.3
by rail	0.0	269.7	269.8
by truck	10.8	57.4	68.2
by laker	0.0	8.4	8.4
Total wages (C\$ million)	26.0	654.9	680.9
by rail	0.1	495.0	495.0
by truck	25.9	138.4	164.3
by laker	0.0	21.5	21.5

- **Rail:** Transported wheat is an important product for the rail sector. The total rail economic impact, including indirect and induced impacts, is estimated at \$1.9 billion, with over 6,400 jobs created.
- **Truck:** The total economic impact of common wheat transportation by truck, which includes trucking to elevators in addition to trucking directly to processing facilities, averaged over \$1.0 billion annually between 2018/19–2020/21. Almost 2,900 FTE jobs are created by trucking wheat in Canada.
- **Laker:** The total laker economic impact, including indirect and induced impacts, is estimated at \$250 million, with almost 200 jobs created.

Impact – product delivery

For wheat product transportation, we cover transport of flour (after the mill), wheat feed (after the feed mill) and milling and other primary processing by-products for feed, by rail and truck for domestic use and for export. As with transport of the wheat crop, for domestic transport the **transportation effects are allocated to where the common wheat originates rather than the destination**.

Common wheat livestock feed (post feed milling) is assumed to have negligible exports. We also assume negligible quantities of flour and processed wheat feed are transported by laker, and therefore exclude lakers from this category: *note that this makes no difference to the total, as if we did allocate some flour to laker transport, for example, we would have to simultaneously reduce the figure for rail or trucks.*

Table 20: Impact of common wheat and common wheat feed product transportation, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	64.8	73.0	137.7
<i>flour by rail</i>	0.9	22.0	22.9
<i>flour by truck</i>	25.7	6.0	31.7
<i>wheat feed by truck</i>	29.9	37.6	67.5
<i>by-products for feed</i>	8.3	7.3	15.7
Total economic impact (C\$ million)	185.9	183.3	369.2
<i>flour by rail</i>	1.4	36.2	37.6
<i>flour by truck</i>	74.2	17.4	91.6
<i>wheat feed by truck</i>	86.2	108.5	194.7
<i>by-products for feed</i>	24.1	21.1	45.2
Direct employment (FTE jobs)	291	283	574
<i>flour by rail</i>	2	53	55
<i>flour by truck</i>	116	27	143
<i>wheat feed by truck</i>	135	170	305
<i>by-products for feed</i>	38	33	71
Total employment (FTE jobs)	684	668	1,352
<i>flour by rail</i>	5	127	132
<i>flour by truck</i>	273	64	337
<i>wheat feed by truck</i>	317	399	716
<i>by-products for feed</i>	89	78	166
Direct wages (C\$ million)	16.3	18.1	34.4
<i>flour by rail</i>	0.2	5.3	5.5
<i>flour by truck</i>	6.5	1.5	8.0
<i>wheat feed by truck</i>	7.5	9.5	17.0
<i>by-products for feed</i>	2.1	1.8	3.9
Total wages (C\$ million)	39.2	40.6	79.8
<i>flour by rail</i>	0.4	9.7	10.1
<i>flour by truck</i>	15.6	3.7	19.2
<i>wheat feed by truck</i>	18.1	22.8	40.9
<i>by-products for feed</i>	5.1	4.4	9.5

- The economic impact of transportation of wheat products in Canada is limited by the size of the domestic market compared with international exports. Nonetheless, the direct economic impact in Canada averages \$138 million in 2018/19–2020/21, while the total impact, including indirect and induced impacts, is estimated at almost \$370 million.
- Around 570 individuals are employed directly in the transportation of common wheat products, with a total employment impact of over 1,300 jobs.

- Wages directly attributable to transportation of wheat products amount to \$34 million, with the total wage impact approaching \$80 million.

Transport methodology

With near-infinite combinations of farm origins and end-use destinations, determining the economic impact of transportation of wheat and its products is the most complicated aspect of our economic impact model.

For rail and trucking transport:

- The first step is to determine the inter-provincial trade flows of each product. To do this, we estimated provincial-level primary processing for common wheat and feed, and for flour processing and retail, and an average distance feed is transported to livestock units (which we assume is always within province).
- The next step is to compile a distance matrix between the centers of wheat production, wheat processing and points of export (port facilities).

Note: Overseas exports are assigned to a province only if the wheat left from a port located in that province. Hence, overseas exports are zero for Alberta and Saskatchewan where no port facilities exist.

Trucking

Trucking wheat and its products was dealt with as follows:

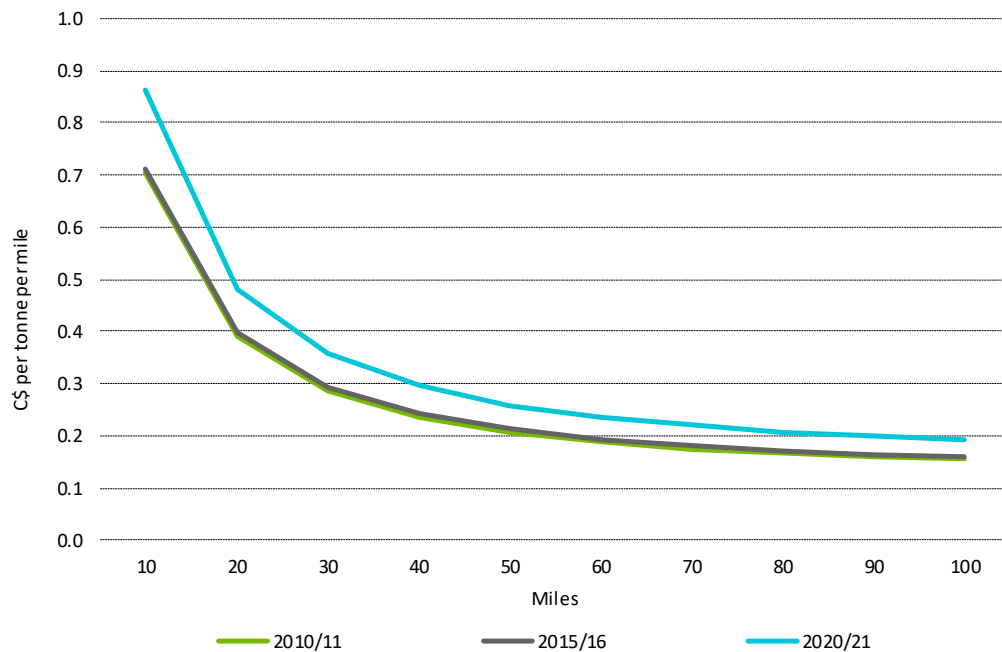
- **Common wheat volumes trucked from farm to elevator** were based on the volumes of common wheat passing through elevators (see previous section). These data were obtained from the Canadian Grain Commission.
- Common wheat that does not pass through a primary elevator was accounted for in **volumes trucked directly to milling and commercial feed facilities**.
- All common wheat livestock feed volumes, feed by-products and flour products were assumed to be trucked *within* a province over an average distance derived from industry interviews.

For the Prairie Provinces, the average distance trucked from farm to elevator was determined by dividing the number of square miles of common wheat planted by the volume of common wheat harvested. For regions where wheat production is smaller and more isolated, the average distance to elevators was determined in conversations with individuals with local expertise.

Distances for wheat trucked directly from farm to processing facilities and from primary flour milling to flour processing were determined using the average distance between the geographic centers of production in a province and processing facilities situated within that province.

Volumes were multiplied by distances to arrive at a figure in tonne-miles. This, in turn, was multiplied by a tonne-mile trucking rate sourced from StatCan to derive a final trucking expenditures number.

Diagram 13: Estimated Canadian trucking rates



The direct **employment** impact of common wheat and wheat product trucking was calculated from the tonne-miles of common wheat delivered by truck. This was converted to a full-time employment impact by assuming that a typical truck (with one driver):

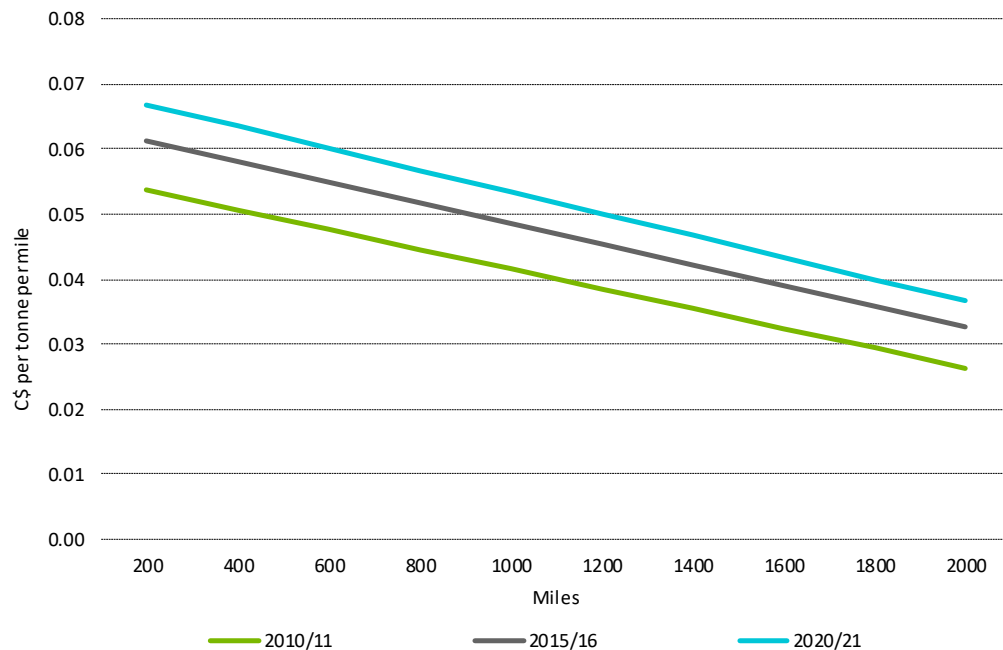
- Transports 18 tonnes of cargo
- Averages 40 miles per hour
- A full-time trucker drives 2,000 hours per year
- Trucking wages were obtained from StatCan data

Rail

Our calculations on rail expenditures also begin with estimates of provincial wheat trade flows with the US and net inter-provincial rail trade.

The inter-provincial trade estimates provide us with an estimate for tonne-miles of wheat products transported. The tonne-mile figure is then multiplied by a range of rail freight rates (which tend to be higher for shorter distances and lower for longer distances, as the diagram illustrates) to arrive at an estimate of rail freight expenditures.

Diagram 14: Trended range in Canadian rail rates



For **employment**, according to the *Railway Association of Canada*, roughly 33,000 individuals are employed in freight rail in Canada, a number that has fallen slightly over the last decade. Using the *Association* estimate of tonne-miles of cargo transported in Canada annually, to estimate the number of individuals directly employed in the rail transportation of common wheat, we *multiplied total freight rail employment by the ratio of common wheat tonne-miles to total freight tonne-miles*.

Rail **wages** were also obtained from the *Railway Association of Canada* and multiplied by jobs to determine the direct wage impact.

Flour milling: adding value to common wheat

Impact

- Good gross margins in flour milling generate strong economic impact from this sector. The direct economic impact of flour milling on the Canadian economy is \$1.2 billion. The total economic impact, including indirect and induced impacts, is much higher because of the high multiplier applied in processing sectors, at \$7.2 billion.
- 1,700 individuals are directly employed in flour milling. However, as a capital-intensive sector that relies heavily on contracted workers, the total employment impact of flour milling is also much higher, supporting over 19,000 jobs.
- \$117 million in wages are paid out to individuals directly employed in flour milling. Like the employment impact, however, the total wage impact is much higher, almost \$780 million.

Table 21: Impact of flour milling of common wheat, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	793.8	415.0	1,208.8
Total economic impact (C\$ million)	4,760.5	2,488.9	7,249.4
Direct employment (FTE jobs)	1,114	582	1,696
Total employment (FTE jobs)	12,530	6,551	19,081
Direct wages (C\$ million)	77.0	40.2	117.2
Total wages (C\$ million)	510.4	266.8	777.2

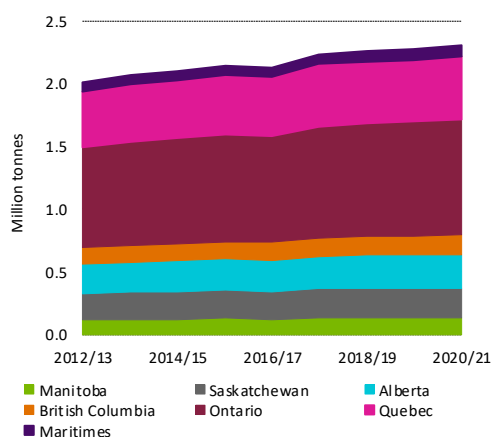
Methodology

The economic impact of the important flour milling sector is determined based on the value it adds from processing common wheat into flour. This is done on a regional level by estimating the volume processed at the processing facilities across Canada.

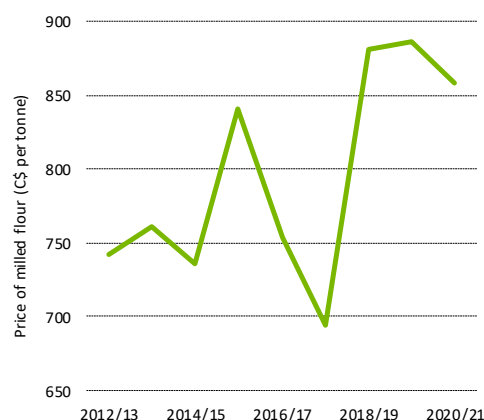
Once milling volumes are estimated, we have to choose representative common wheat and wheat flour prices in order to derive the processing value added. We used export unit values (EUVs) for both prices in order to provide a common basis for the gross margin. The **total economic impact** of milling was then taken to be the product of volumes of common wheat milled and the EUVs of value added.

The **employment** impact of flour milling was determined via discussions with some of the major mills in Canada as well as through press releases citing the number of individuals employed in a given facility.

The average **wages** for employees of processing facilities was obtained from StatCan data.

Diagram 15: Canadian flour milling, total output volume


Source: StatCan.

Diagram 16: Price of milled flour from common wheat, Canada


Other primary processing: adding value to common wheat in starch and ethanol

Impact

- The direct economic impact of starch and ethanol processing of wheat on the Canadian economy is \$280 million. The total economic impact, including indirect and induced impacts, is much higher because of the high multiplier applied in processing sectors, at \$1.3 billion.
- We estimate that nearly 250 individuals are directly employed in these two wheat processing sectors. However, as capital-intensive sectors that relies heavily on contracted workers, the total employment impact of these processing facilities is also much higher, supporting over 1,600 jobs.
- \$18 million in wages are paid out to individuals directly employed, with the total wage impact of these wheat processors far higher, in excess of \$74 million.

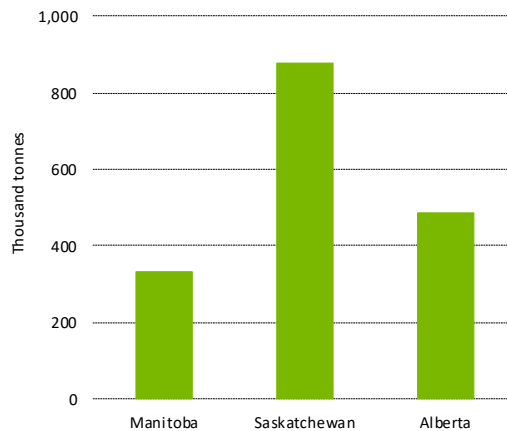
Table 22: Impact of other primary processing of common wheat, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	67.2	213.7	280.9
Total economic impact (C\$ million)	755.8	552.9	1,308.7
Direct employment (FTE jobs)	31	217	248
Total employment (FTE jobs)	208	1,454	1,662
Direct wages (C\$ million)	2.2	15.9	18.1
Total wages (C\$ million)	14.4	60.0	74.4

Methodology

The economic impact of these other processing sectors is determined based on the value they add from processing common wheat into starch and ethanol. This is done on a regional level by estimating the volume processed at each facility in Canada (we allow for only one significant starch facility in Canada, in the East, and for this reason we do not present these estimates separately).

Diagram 17: Canadian ethanol capacity, total output volume



Source: StatCan.

Once starch and ethanol volumes are estimated, we have to choose representative wheat and starch/ethanol prices in order to derive the processing value added. We used export unit values (EUVs) as our default for prices, modifying these in some cases in consultation with our in-house starch and ethanol teams. The **total economic impact** was then taken to be the product of volumes of common wheat milled and the EUVs of value added by both sectors combined.

The **employment** impact of other processing was determined via discussions with employees of facilities in Canada. The average **wages** for employees of processing facilities was obtained from StatCan data.

Flour processing and retail: adding value to flour in baking, mixes & dough, and direct flour retailing

Processing flour into many of the staple foods enjoyed in Canada and other societies is a highly significant economic sector. The uses of wheat flour in food are so numerous that it would be impossible to include everything individually, but we have chosen three key sectors which highlight the valuable role that processing flour into food products plays in the Canadian economy:

- **Baking** into numerous products, including bread, pastries, breakfast bars and snacks.
- **Dough and mixes**, such as for cakes and pizza bases.
- **Direct retailing of flour**, i.e. no further processing of the flour, instead packaging it for sale on supermarket and other shop shelves to household consumers for home baking.

Processing locations were based on the regional split of sales revenues. Retail sales locations were based on population densities. Volumes of output are estimated using StatCan data on total national revenues in each sector, which are reconciled against volumes of flour used based on the implied product prices. Note that **since we split total estimated domestic flour consumption across the three categories, the combined revenue can be taken as indicative of all the post-milling industries using wheat for food products.**

This is the most difficult sector of the value chain to quantify accurately. The further processing of wheat flour into is difficult to quantify because:

- Ingredient use and product formulations of processed goods are sensitive information from the perspective of food manufacturers.
- Branding and marketing can add significant value to consumer products, even products as simple as bread. This is the difference between consumer products at this stage of the chain and the commodity products at earlier stages. Branding and marketing make it very difficult to quantify the value that wheat can claim to add in the further processing and retailing chain. The difficulty lies in stripping out the part of the value-added that is attributable to wheat rather than any branding and marketing.

Impact

- The **baking sector** dominates the overall estimates of value, contributing close to 90% of the totals shown in the table. The economic impact of this sector is very high because of the significant value added by turning a basic product (flour) into important consumer goods.
- We estimate that the direct economic impact on the Canadian economy from the three flour processing and retailing categories combined averaged close to \$5.4 billion annually between 2018/19 and 2020/21. The total economic impact, meanwhile, is estimated at over \$13.5 billion annually.
- Approximately 43,000 people are directly employed by flour processing in Canada. With the multiplier effect, the total employment impact is estimated at over 91,000 jobs.
- Almost \$2.1 billion in wages are directly attributable to flour processing and retail while the total wage impact is close to \$4.7 billion.

Table 23: Impact of flour processing and retail, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	4,314.3	995.4	5,309.7
Total economic impact (C\$ million)	11,002.9	2,522.6	13,525.5
Direct employment (FTE jobs)	31,201	11,646	42,847
Total employment (FTE jobs)	66,328	24,700	91,028
Direct wages (C\$ million)	1,522.0	567.4	2,089.4
Total wages (C\$ million)	3,414.6	1,270.6	4,685.2

Methodology

The value added to the Canadian economy by flour processing is calculated by taking StatCan's sales revenue estimates, net of a small amount of production presumed to use imported flour. We subtract from these estimated input costs (flour volumes multiplied by factory gate price), with wheat flour estimated to account for 80% of the returns to each sector. This total was then allocated across Canada based on the regional split of sales revenues. For retail sales, we derived revenue from estimated volumes sold multiplied by the difference between flour EUV and a retail price from StatCan.

Diagram 18: Estimated flour use of common wheat, by province

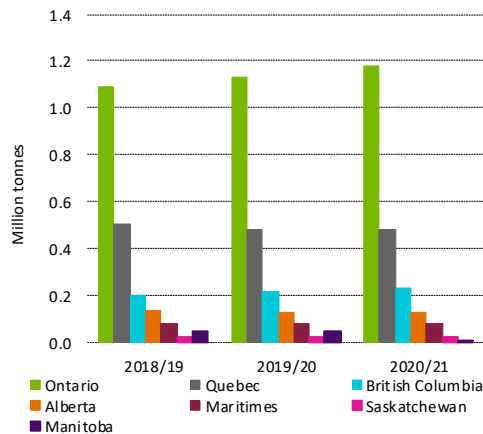
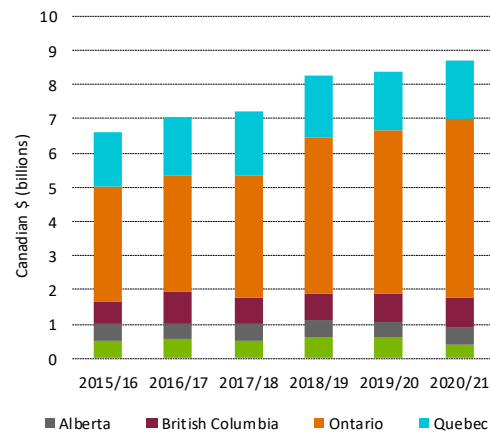


Diagram 19: Canadian baking sales revenue



Source: StatCan.

The total number of people employed in our flour processing and retailing sectors was based on industry interview estimates. We assume that 80% of these jobs can be attributed to wheat flour. Regional level employment was then taken to be a function of flour processing capacity, again based on industry interviews.

One problem with including this analysis in the main value-added calculations is that the quantification methodology employed here is necessarily less robust than in the rest of the analysis in this study, because we cannot obtain firm data from the flour sector, which regards such information as proprietary, and because several ingredients other than wheat are used in the baking and mixes processes. Taking these caveats into consideration, the analysis presented here should be taken as indicative.

Feed milling: adding value to common wheat in feed mills

A significant part of the annual common wheat crop does not meet food grade requirements and is diverted to the livestock feed sector. In addition, almost one million tonnes of by-products from flour, starch and ethanol milling are diverted into the feed sector, including DDGs, bran and wheat middlings. In this section, we estimate the value added and employment created in the Canadian feed processing sector that is attributable to Canadian common wheat from both feed wheat itself and milling by-products.

ANAC data give the number of commercial feed mills in Canada at 471 mills, producing an aggregated 18.9 million metric tonnes of prepared feed in 2020. Furthermore, ANAC estimates feed use by province based on provincial livestock populations. Major feed mill clusters are found as destination millers for poultry, dairy and hogs around the urban conglomerations of Toronto, Montreal and Edmonton respectively.

In addition, there are large concentrations of on-farm feed production, accounting for perhaps nine million tonnes of feed annually from as many as 25,000 on-farm mills. Although the number of on-farm feed mills that process common wheat is unknown, we allow for a small volume of common wheat processed on-farm and then adjust this in terms of jobs

created per tonne of feed processed to account for the lower intensity of output compared with commercial feed mills. On average, a feedlot mill will require less than one full-time worker to run the mill — typically, they would simply temper the common wheat and roll it into flakes or run it through a hammer mill in order to increase the digestibility and nutritional value of the raw grain.

The largest concentration is "*Feedlot Alley*" in southern Alberta, where much of the large-scale beef cattle production is located. The dairy industry also has some on-farm feed production. These operations are included in our estimates of value added, employment and wages as the on-farm feed and feed lot operations would otherwise have to purchase feed from feed millers. However, in terms of jobs, we assume that on-farm feed mills generate fewer jobs than commercial feed mills per tonne of feed processed.

Impact

- The direct economic impact of feed milling using common wheat on the Canadian economy is estimated at \$325 million. The total economic impact, including indirect and induced impacts is \$1.6 billion.
- We estimate that common wheat's share of direct feed milling employment is around 2,100 individuals, including on-farm job creation. As a capital-intensive sector that relies heavily on contracted workers, the total employment impact of feed milling attributable to common wheat is estimated to be much higher, supporting over 12,000 jobs.
- Approaching \$120 million in wages are paid out to individuals directly employed in feed milling as a result of using common wheat. The total wage impact of feed processing is much higher, almost \$530 million.

Table 24: Impact of animal feed milling, average 2018/19–2020/21

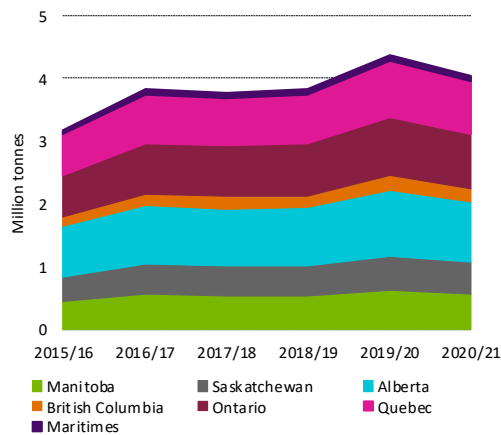
	East	West	Canada
Direct economic impact (C\$ million)	144.2	181.5	325.8
Total economic impact (C\$ million)	716.0	901.1	1,617.1
Direct employment (FTE jobs)	1,388	747	2,134
Total employment (FTE jobs)	7,869	4,234	12,103
Direct wages (C\$ million)	75.7	40.7	116.5
Total wages (C\$ million)	343.7	184.9	528.7

Methodology

The economic impact of the feed milling sector is determined based on the value it adds from processing feed grade common wheat and wheat milling by-products into processed feed. This is done on a regional level by a similar method to the one used by ANAC: we estimate regional wheat feed milling according to the distribution of livestock species weighted by each species' consumption of feed wheat. As it is extremely difficult to ascertain how much of each crop is processed in each feed mill individually, we calculate the common wheat share simply as a proportion of the total feed processed by each region.

This processed common wheat feed volume is then multiplied by the gross margin per tonne of raw material, which was itself estimated (at \$80 per tonne of common wheat) in conjunction with industry participants in interviews.

Diagram 20: Canadian feed milling of wheat and milling by-products



Similarly for jobs created, we estimate the total jobs at all feed mills combined, and then apportion jobs to common wheat by wheat's quantity as a proportion of total feed crops in that region. The average jobs per mill was estimated via discussions with employees of feed mills in Canada.

The average **wages** for employees of feed processing facilities was obtained from StatCan data. The data in the diagram show a rise in feed common wheat usage in our featured period of 2018/19-2020/21.

Impact at ports

Common wheat and, in very small volumes, wheat flour leave Canada via its international ports. These overseas shipments leave Canada via ports in British Columbia and via Ontario and Quebec ports, plus some tiny volumes from Churchill, Manitoba.

Impact

In our model, we calculated the economic impact at Canadian ports for common wheat and wheat flour:

- The total effects of wheat sector exports on Canadian ports are an economic impact of over \$535 million, an employment impact of almost 2,000 jobs, and a wage impact of \$162 million.

Table 25: Impact of common wheat at Canadian ports, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	63.6	239.3	302.8
ports - wheat	63.5	239.1	302.6
ports - flour	0.1	0.1	0.2
Total economic impact (C\$ million)	112.8	424.4	537.2
ports - wheat	112.6	424.2	536.8
ports - flour	0.2	0.2	0.4
Direct employment (FTE jobs)	308	992	1,300
ports - wheat	308	992	1,299
ports - flour	0	1	1
Total employment (FTE jobs)	470	1,513	1,983
ports - wheat	469	1,512	1,981
ports - flour	1	1	1
Direct wages (C\$ million)	25.4	82.1	107.5
ports - wheat	25.4	82.0	107.4
ports - flour	0.0	0.0	0.1
Total wages (C\$ million)	38.3	123.6	161.9
ports - wheat	38.2	123.6	161.8
ports - flour	0.0	0.1	0.1

Methodology

The **economic impact** of common wheat at Canadian ports is calculated as the product of volumes multiplied by port fees.

- Canadian wheat volumes by port and direct prairie exports (overland) were obtained from data provided by the Canadian Grain Commission.
- Export volumes by port for wheat flour were obtained from Canadian trade data.

Port fees were also obtained from the Canadian Grain Commission and are illustrated below.

The **employment impact** at the ports was based on common wheat's share of total port movements, combined with an understanding of the total number of individuals, gleaned from interviews, employed at Canadian ports.

Wages, meanwhile, were based on a study detailing the economic impact of Vancouver ports and indexed against other wage changes over time: www.portmetrovancover.com

Diagram 21: Grain charges at Canadian ports

