



The Economic Impact of Durum 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 durum 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 durum wheat and durum wheat products, spanning several steps in the value chain: from durum wheat cultivation, through semolina and feed processing, 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 durum 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.

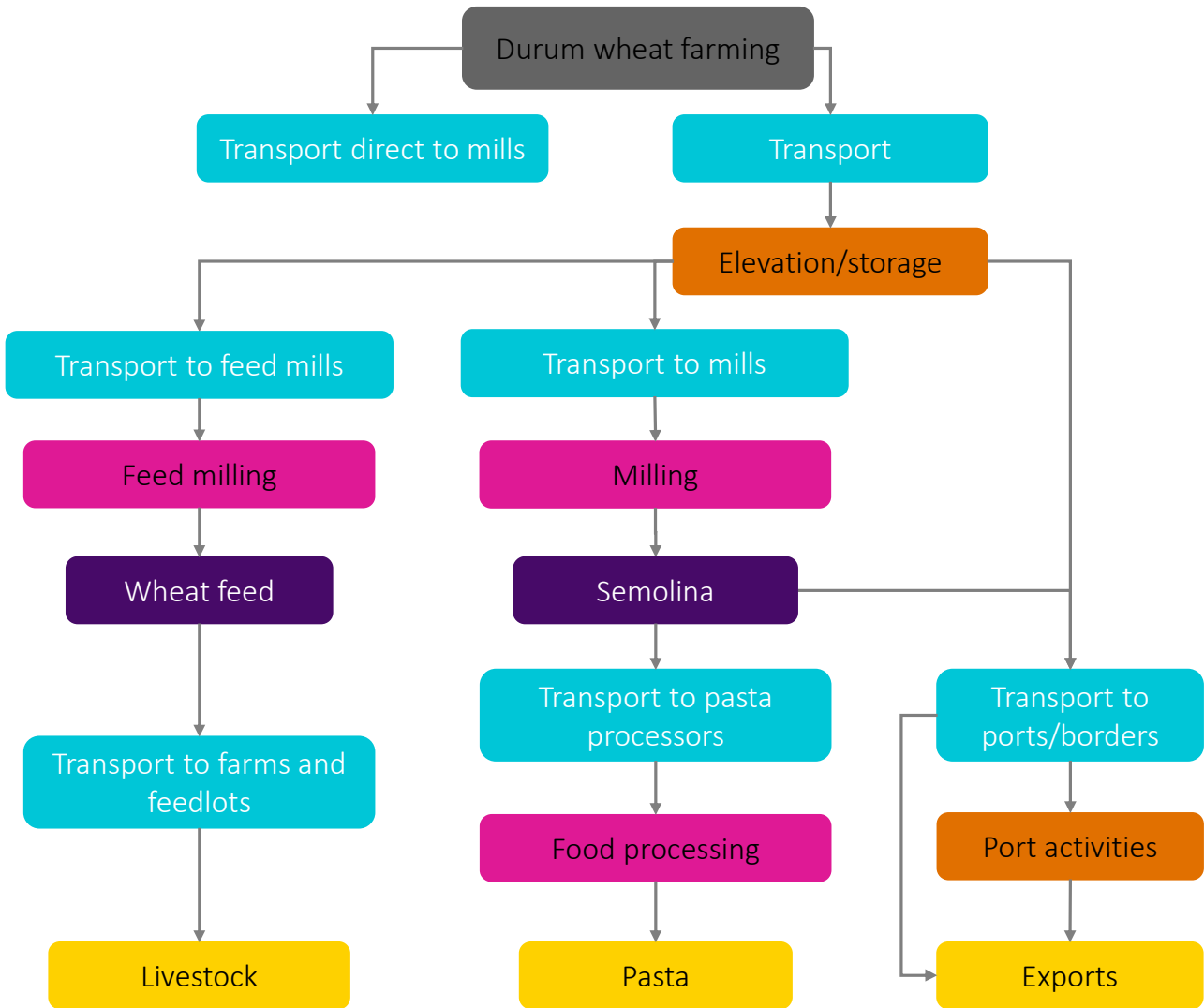
- The **eastern region** comprises Ontario, Quebec, Newfoundland and the Maritimes.
- The **western region** comprises British Columbia, Alberta, Saskatchewan and Manitoba.

The objective was 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.*



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 durum wheat sector averaged C\$7.5 billion per year.
- Over 37,000 **full time equivalent jobs** are supported by the durum wheat sector, comprising 33,000 paid jobs and an additional 4,000 family members (beyond the growers themselves) who support and are supported by durum wheat farming operations.
- The total **wage impact** of the sector averaged C\$1.9 billion.

The economic benefits from durum wheat increase when prices and output are higher. Durum 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, which follows.
- 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 durum wheat (hereafter “durum” or “durum wheat” interchangeably) via three different metrics:

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

We evaluate the Canadian durum value chain at several distinct steps, tracing the impact through the value-added products of semolina, pasta/couscous and livestock feed.

- For ***durum wheat for food***, our analysis ends at the point where semolina is 1. processed into pasta or couscous within Canada (our “food processing” sector) or 2. loaded on a ship for overseas export or 3. crosses from Canada into the United States for overland export.
- ***Durum 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 durum 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 durum 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 durum sector.

Note: The indirect and induced effects of the durum 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.

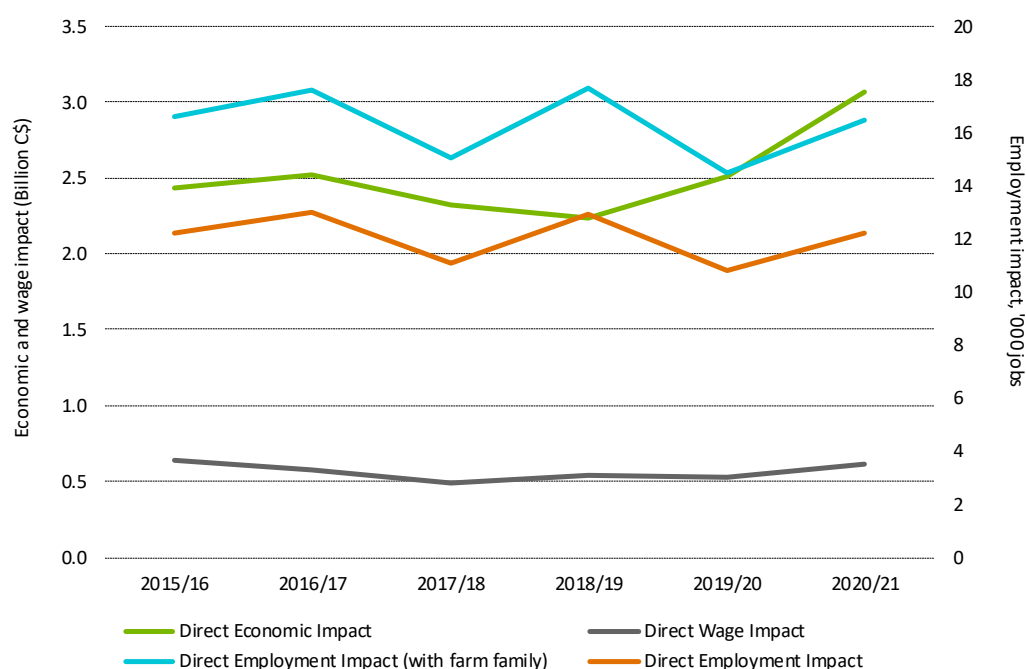
Table 1: Durum wheat economic impact assessment by value chain component

	Value chain component	Description	Economic impact	Employment	Wages	Multiplier used
1a	Durum wheat farming	Production of durum wheat by farmers using land and agricultural inputs e.g. seed, fertilizers and chemicals	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 durum farming	yes	captured in durum farming	no
2	Elevation	Primary elevation of durum wheat	yes	yes	yes	yes
3	Crop delivery	Delivery of crop to elevators, mills or point of export via truck, rail and barge	yes	yes	yes	yes
4	Food milling	Milling durum wheat for the manufacture of semolina (durum wheat flour)	yes	yes	yes	yes
5	Food processing	Processing of semolina into pasta	yes	yes	yes	yes
6	Feed milling	Milling durum wheat into animal feed	yes	yes	yes	yes
7	Product delivery	Delivery of semolina and feed to end user or point of export	yes	yes	yes	yes
8	Impact at ports	Loading ocean-going vessels for overseas export as well as laker vessels for shipments between Ontario and Quebec	yes	yes	yes	yes

The direct effect of durum wheat on the Canadian economy

The **direct** impact of durum 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 durum on the Canadian economy averaged C\$2.6 billion** (Table 2). This value peaked over the past year, 2020/21, with higher output and higher prices.
- The **direct employment impact** across the durum value chain varies less than the economic impact as it is less influenced by prices. Between 2018/19 and 2020/21, the durum sector was *directly accountable* for an average of 12,000 paying jobs (Table 3). When additional durum farm family members, who contribute to the overall success of the farming enterprise, are included, **the number of people directly supported by the durum wheat industry over the same period increases to over 16,000**.
- Between 2018/19 and 2020/21, **the direct wage impact of durum wheat on the Canadian economy averaged C\$0.6 billion** (Table 4).

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

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

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19-2020/21
Farming	1.33	1.20	1.18	1.10	1.34	1.67	1.37
Elevation	0.08	0.09	0.07	0.08	0.09	0.11	0.10
Crop delivery	0.40	0.46	0.46	0.47	0.48	0.62	0.53
Food milling	0.09	0.24	0.24	0.27	0.25	0.26	0.26
Food processing	0.43	0.25	0.25	0.19	0.22	0.27	0.23
Feed milling	0.02	0.17	0.04	0.04	0.04	0.03	0.04
Product delivery	0.01	0.03	0.01	0.01	0.01	0.01	0.01
Impact at ports	0.07	0.08	0.07	0.06	0.07	0.09	0.07
Direct Economic Impact	2.44	2.52	2.32	2.23	2.52	3.07	2.61

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

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19-2020/21
Farming	9.40	9.84	8.41	10.19	7.87	9.18	9.08
Elevation	0.62	0.66	0.64	0.59	0.69	0.59	0.62
Crop delivery	1.12	1.24	0.99	1.08	1.13	1.28	1.16
Food milling	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Food processing	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Feed milling	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Product delivery	0.05	0.18	0.06	0.06	0.06	0.05	0.06
Impact at ports	0.30	0.31	0.25	0.23	0.29	0.36	0.30
Direct Employment	12.25	13.00	11.12	12.93	10.81	12.22	11.99
<i>Additional durum farm family members</i>	<i>4.38</i>	<i>4.57</i>	<i>3.92</i>	<i>4.77</i>	<i>3.64</i>	<i>4.27</i>	<i>4.23</i>
Direct Employment (with farm family)	16.62	17.57	15.04	17.70	14.45	16.49	16.21

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

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19-2020/21
Farming	0.26	0.27	0.24	0.30	0.23	0.27	0.27
Elevation	0.05	0.04	0.04	0.04	0.05	0.04	0.04
Crop delivery	0.10	0.11	0.10	0.10	0.11	0.13	0.11
Food milling	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Food processing	0.19	0.11	0.08	0.06	0.08	0.12	0.09
Feed milling	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Product delivery	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Impact at ports	0.02	0.02	0.02	0.02	0.02	0.03	0.02
Direct Wage Impact	0.64	0.58	0.49	0.54	0.53	0.61	0.56

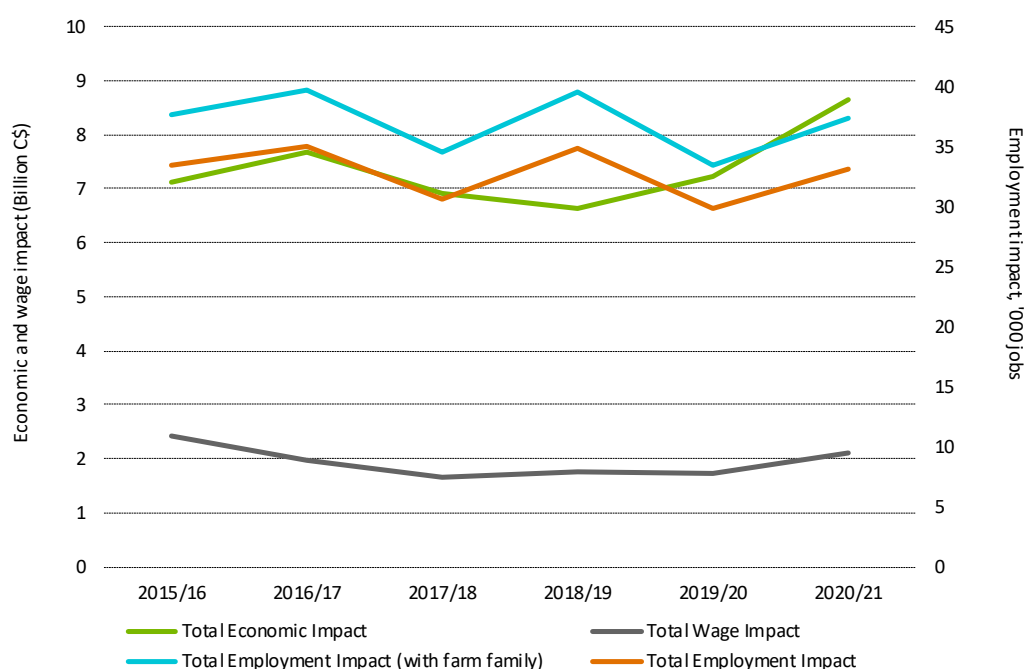
The total impact of durum wheat on the Canadian economy (direct + indirect + induced effects)

The total effect of durum 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 \$8.7 billion. The average economic impact of durum on the Canadian economy over the past three years of full data, 2018/19 to 2020/21, was close to **\$7.5 billion**.
- The total **employment effect** of durum between 2018/19 and 2020/21 averaged almost **37,000**. This includes durum farm family members.
- Over the same period, the **wage effect** of durum on the Canadian economy averaged **\$1.9 billion**.

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

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19-2020/21
Farming	2.88	2.60	2.54	2.37	2.90	3.61	2.96
Elevation	0.12	0.13	0.11	0.13	0.14	0.16	0.14
Crop delivery	0.89	1.03	1.05	1.09	1.08	1.43	1.20
Food milling	0.56	1.45	1.44	1.61	1.51	1.59	1.57
Food processing	2.43	1.44	1.42	1.08	1.24	1.54	1.29
Feed milling	0.12	0.81	0.20	0.21	0.20	0.15	0.19
Product delivery	0.02	0.09	0.03	0.03	0.03	0.03	0.03
Impact at ports	0.10	0.12	0.10	0.09	0.11	0.13	0.11
Total Economic Impact	7.12	7.67	6.90	6.62	7.21	8.66	7.50

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

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

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19-2020/21
Farming	22.01	23.05	19.69	23.87	18.44	21.49	21.27
Elevation	1.10	1.17	1.13	1.04	1.22	1.04	1.10
Crop delivery	2.90	3.21	2.58	2.67	2.78	3.16	2.87
Food milling	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Food processing	3.96	3.95	3.95	3.95	3.95	3.95	3.95
Feed milling	1.43	1.39	1.40	1.42	1.42	1.42	1.42
Product delivery	0.12	0.43	0.15	0.15	0.15	0.13	0.14
Impact at ports	0.52	0.55	0.45	0.42	0.51	0.65	0.52
Total Employment	33.36	35.06	30.65	34.82	29.78	33.14	32.58
<i>Additional durum farm family members</i>	<i>4.38</i>	<i>4.57</i>	<i>3.92</i>	<i>4.77</i>	<i>3.64</i>	<i>4.27</i>	<i>4.23</i>
Total Employment (with farm family)	37.73	39.63	34.58	39.60	33.42	37.41	36.81

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

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average 2018/19-2020/21
Farming	0.84	0.90	0.80	0.98	0.76	0.90	0.88
Elevation	0.07	0.06	0.06	0.06	0.08	0.05	0.07
Crop delivery	0.21	0.22	0.20	0.20	0.22	0.25	0.22
Food milling	0.06	0.04	0.04	0.05	0.06	0.05	0.05
Food processing	1.14	0.64	0.47	0.38	0.51	0.74	0.54
Feed milling	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Product delivery	0.01	0.02	0.01	0.01	0.01	0.01	0.01
Impact at ports	0.03	0.03	0.03	0.03	0.04	0.05	0.04
Total Wage Impact	2.41	1.98	1.67	1.77	1.73	2.11	1.87

Methodology: Use of multipliers to evaluate indirect and induced impacts

The direct effects of durum 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 durum value chain, the indirect effect can be significant.

This is especially true for capital-intensive aspects of the sector, such as semolina and pasta processing. 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 durum 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 durum 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 2016 (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	1.64	2.39	1.84
Rail Transport	Rail Transportation	2.89	2.35	2.41
Truck Transport	Truck Transportation	3.31	3.16	2.57
Barge Transport	Water Transportation	6.00	11.25	6.63
Food milling	Grain and Oilseed Milling	1.89	2.69	2.36
Food processing	Grain and Oilseed Milling	4.96	5.67	4.54
Feed milling	Grain and Oilseed Milling	1.77	1.53	1.51
Port Activities	Warehousing and Storage	1.77	1.53	1.51

Part B. Regional Results – Overview

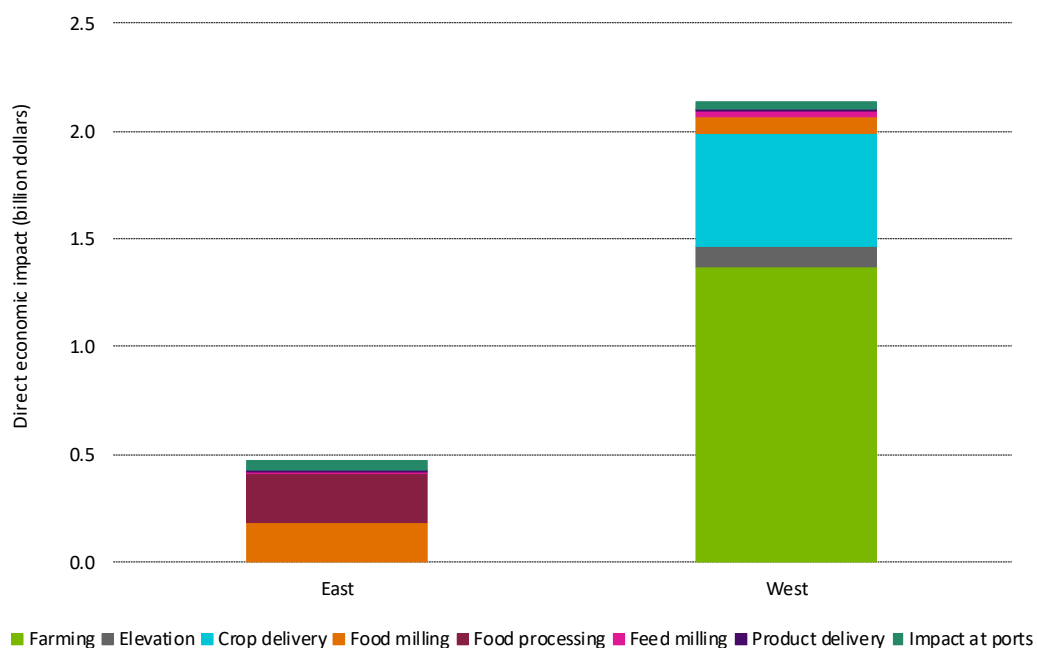
The direct effect of durum wheat on Canadian regional economies

Unsurprisingly, the Western region dominates the **direct economic impact** of Canadian-grown durum. It is both the production center of durum — with almost all crop output taking place in Saskatchewan and Alberta — and home to much of the country’s durum milling capacity, although pasta processing is located in the eastern region.

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

	East	West	Canada
Farming	0.0	1,370.0	1,370.0
Elevation	0.0	95.8	95.8
Crop delivery	0.0	527.6	527.6
Food milling	183.7	78.0	261.7
Food processing	226.6	0.0	226.6
Feed milling	12.1	25.9	38.0
Product delivery	5.2	6.5	11.7
Impact at ports	40.8	33.7	74.6
Direct Economic Impact	468.4	2,137.5	2,605.9

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

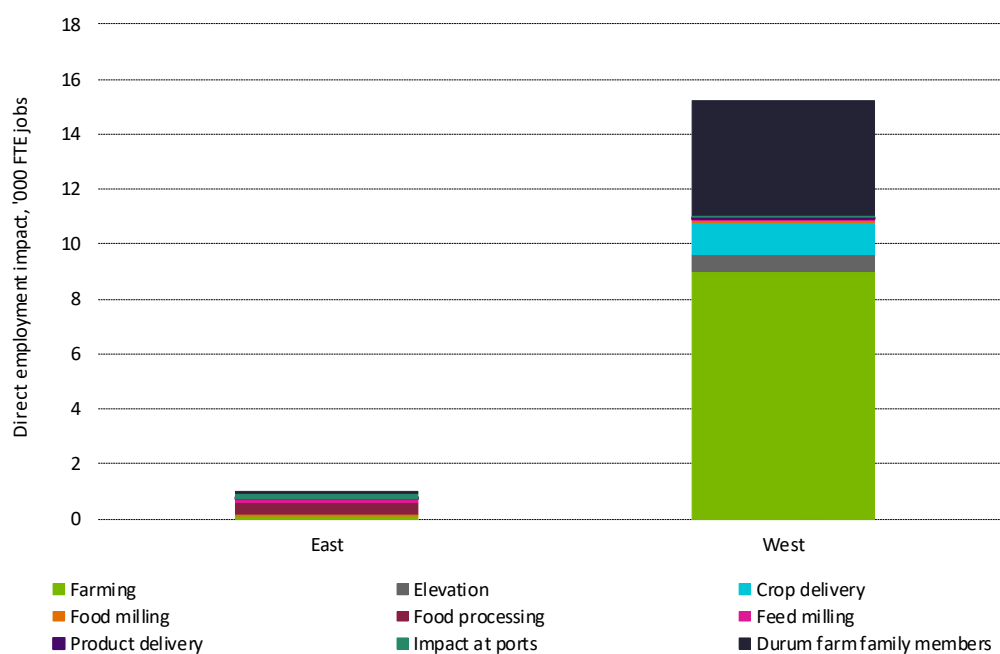


The Prairies also dominate in terms of the **employment impact** of durum wheat. In the Western region, over 15,000 people are employed and supported by the durum sector when durum farm family members are included.

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

	East	West	Canada
Farming	86	8,995	9,081
Elevation	0	622	622
Crop delivery	0	1,163	1,163
Food milling	81	35	116
Food processing	401	0	401
Feed milling	158	92	251
Product delivery	23	36	60
Impact at ports	161	134	295
Direct Employment Impact	912	11,076	11,987
Durum farm family members	55	4,173	4,228
Direct Employment (with farm family)	966	15,249	16,215

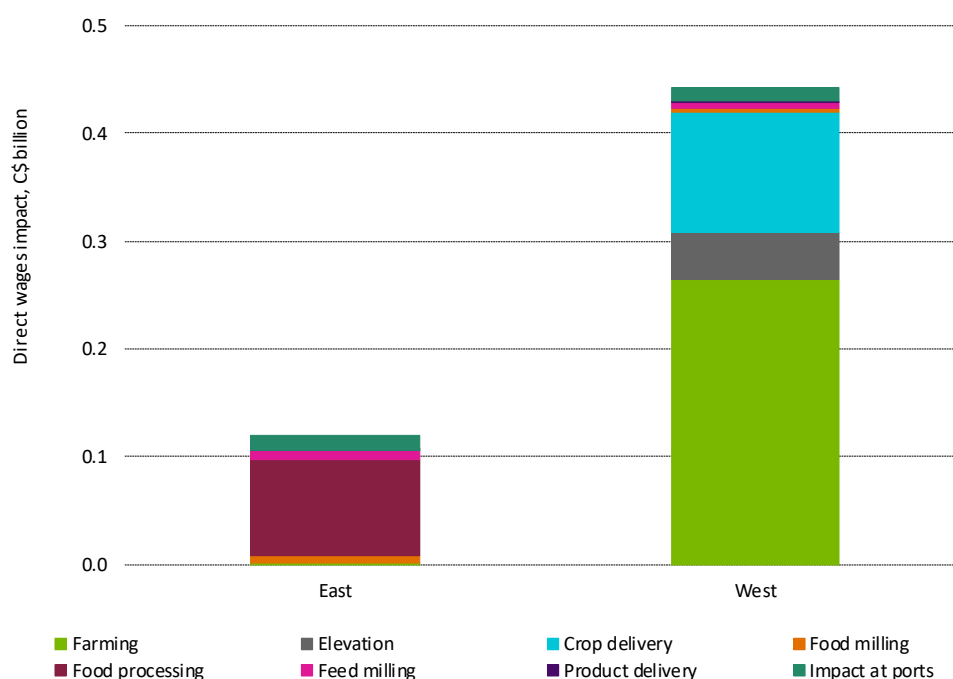
Diagram 4: Direct employment impact by region, average 2018/19–2020/21



Finally, of the \$0.56 billion in **direct wages** derived from durum, \$0.44 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	1.9	265.0	266.8
Elevation	0.0	43.6	43.6
Crop delivery	0.0	112.0	112.0
Food milling	5.6	2.4	8.0
Food processing	89.6	0.0	89.6
Feed milling	8.6	5.0	13.7
Product delivery	0.6	2.6	3.2
Impact at ports	13.4	11.2	24.6
Direct Wage Impact	119.8	441.8	561.6

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


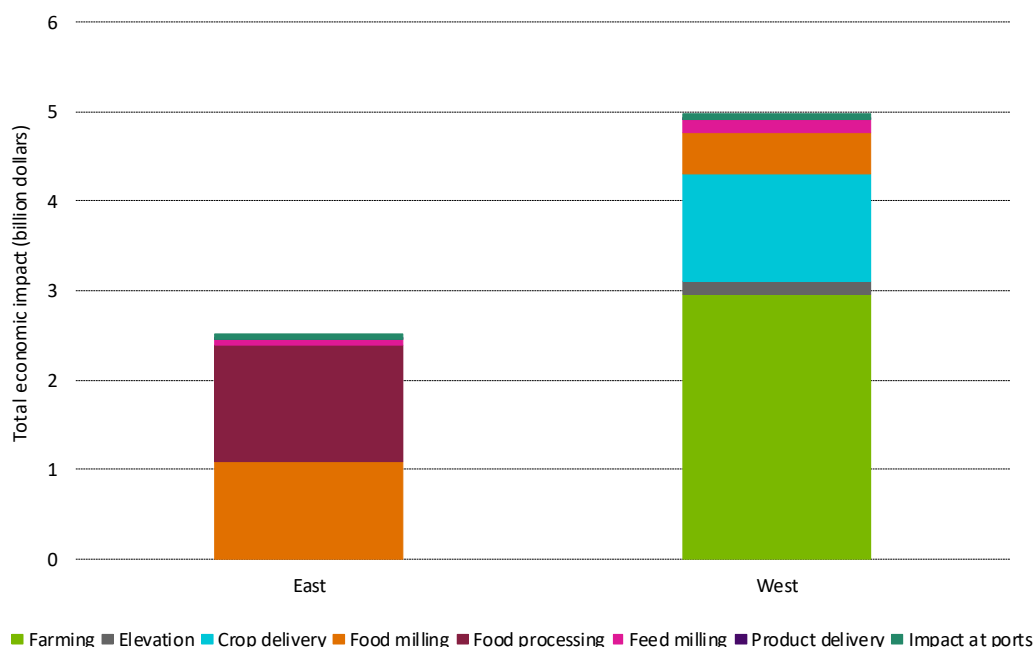
The total effect of durum wheat on Canadian regional economies

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

	East	West	Canada
Farming	0.0	2,961.0	2,961.0
Elevation	0.0	144.2	144.2
Crop delivery	0.0	1,201.3	1,201.3
Food milling	1,101.6	467.7	1,569.2
Food processing	1,287.3	0.0	1,287.3
Feed milling	59.9	128.7	188.6
Product delivery	14.9	16.8	31.7
Impact at ports	61.5	50.8	112.3
Total Economic Impact	2,525.1	4,970.5	7,495.6

Applying the indirect and induced multiplier effects does little to change the relative effects of durum on Canada's provinces. Of the nearly \$7.5 billion total economic impact of durum on the Canadian economy, over 70% stems from the Western provinces, although semolina manufacturing and pasta production are significant contributors in the east.

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

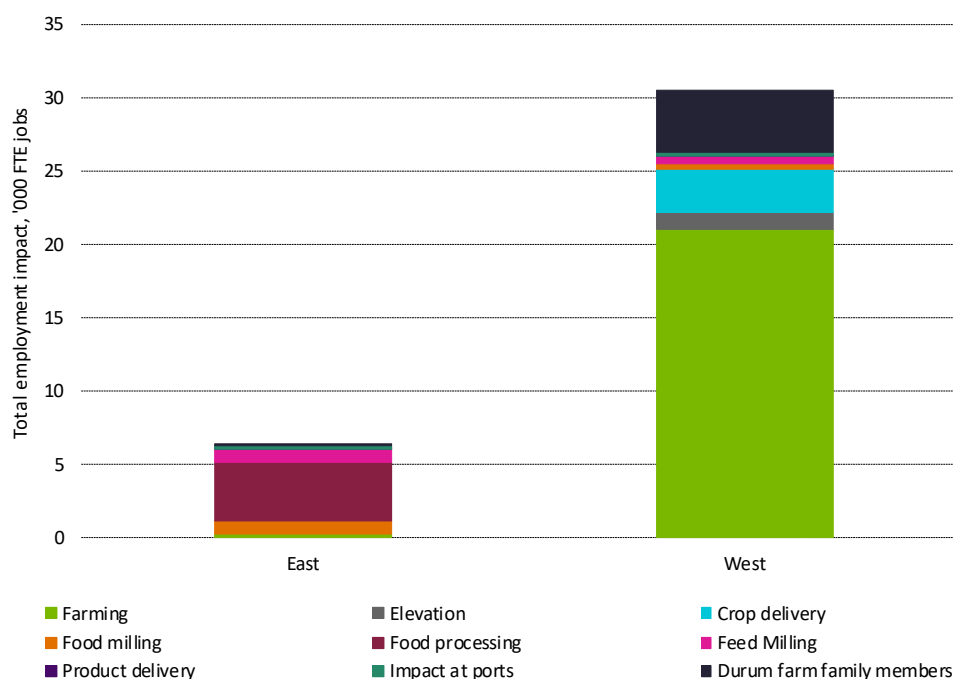


Of the 37,000 Canadian people supported by the durum sector (a figure including farm family members), roughly 30,000 are in the Western Canada region.

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

	East	West	Canada
Farming	201	21,066	21,267
Elevation	0	1,103	1,103
Crop delivery	0	2,870	2,870
Food milling	916	389	1,305
Food processing	3,961	0	3,961
Feed Milling	898	523	1,421
Product delivery	55	86	141
Impact at ports	286	237	523
Total Employment Impact	6,317	26,274	32,591
Durum farm family members	55	4,173	4,228
Total Employment (with farm family)	6,372	30,447	36,819

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

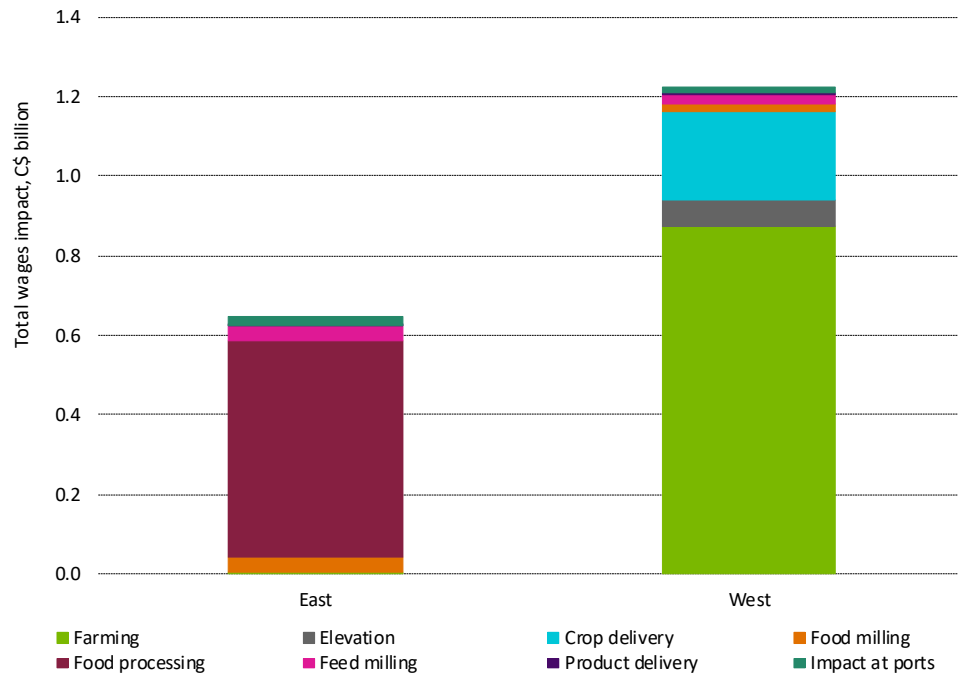


Lastly, of the \$1.9 billion in total wages attributable to durum, on average between 2018/19 and 2020/21, \$1.2 billion stems from the durum industries of Western Canada, dominated by the prairie provinces.

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

	East	West	Canada
Farming	6.1	873.3	879.5
Elevation	0.0	66.5	66.5
Crop delivery	0.0	224.2	224.2
Food milling	37.4	15.9	53.3
Food processing	541.0	0.0	541.0
Feed milling	39.2	22.8	62.1
Product delivery	1.5	5.5	7.0
Impact at ports	20.5	17.0	37.5
Total Wage Impact	645.8	1,225.3	1,871.1

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



Appendix: Detailed Results by Step in the Durum 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 durum value chain.

Durum wheat farming

Durum farming is the foundation of the durum wheat value chain in Canada and accounts for over half of the economic impact and, because much of the crop is exported before processing, the vast majority of durum employment in Canada.

Impact

- The direct economic impact of durum farming averages almost \$1.4 billion over the last three years, with the total economic impact estimated at almost \$3.0 billion. This impact is concentrated in the prairie provinces of our Western region.
- Durum farming directly employs over 9,000 paid individuals. This figure does not include durum farm family members (see next section). When the indirect and induced multipliers are applied, the total employment impact of durum farming is estimated at close to 21,000.
- \$0.3 billion in wages are directly attributable to durum farming. For growers, this includes profits from the durum 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 durum farming is \$0.9 billion.

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

	East	West	Canada
Direct economic impact (C\$ million)	0.0	1,370.0	1,370.0
Total economic impact (C\$ million)	0.0	2,961.0	2,961.0
Direct employment (FTE jobs)	86	8,995	9,081
Total employment (FTE jobs)	201	21,066	21,267
Direct wages (C\$ million)	1.9	265.0	266.8
Total wages (C\$ million)	6.1	873.3	879.5

Methodology

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

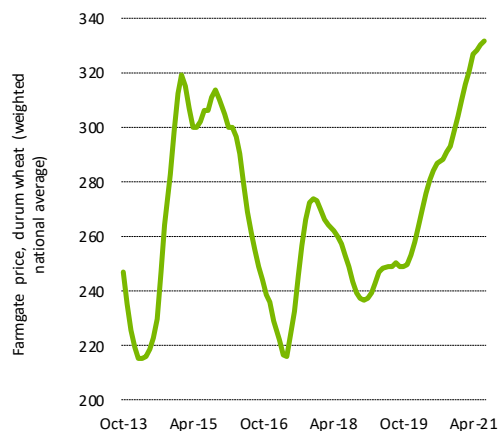
Unlike the other sectors in our analysis, this calculation does not estimate the value added by the sector: to do this, we would have to subtract durum farming costs from durum wheat farming revenues. However, if we did that, we would fail to capture the economic impact of the wide array of inputs used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

The best way to view the durum **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 durum wheat farming stage.**

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

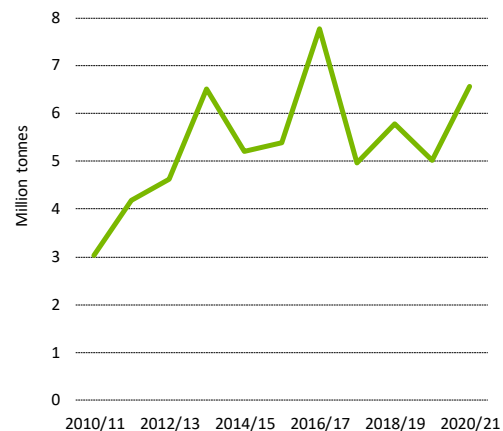
- **Durum wheat prices:** The trajectory of Canadian durum wheat prices demonstrates the peaks in 2015 and again in 2020 and 2021. We use the common wheat feed price as a proxy for durum feed wheat prices. We then weight overall durum prices for feed and food according to production volumes to calculate our average durum crop price.
- **Durum output:** Canadian durum wheat production shows the slight upturn in the last year of our featured period, 2020/21.

Diagram 9: Canadian durum wheat prices



Source: StatCan.

Diagram 10: Canadian durum wheat output



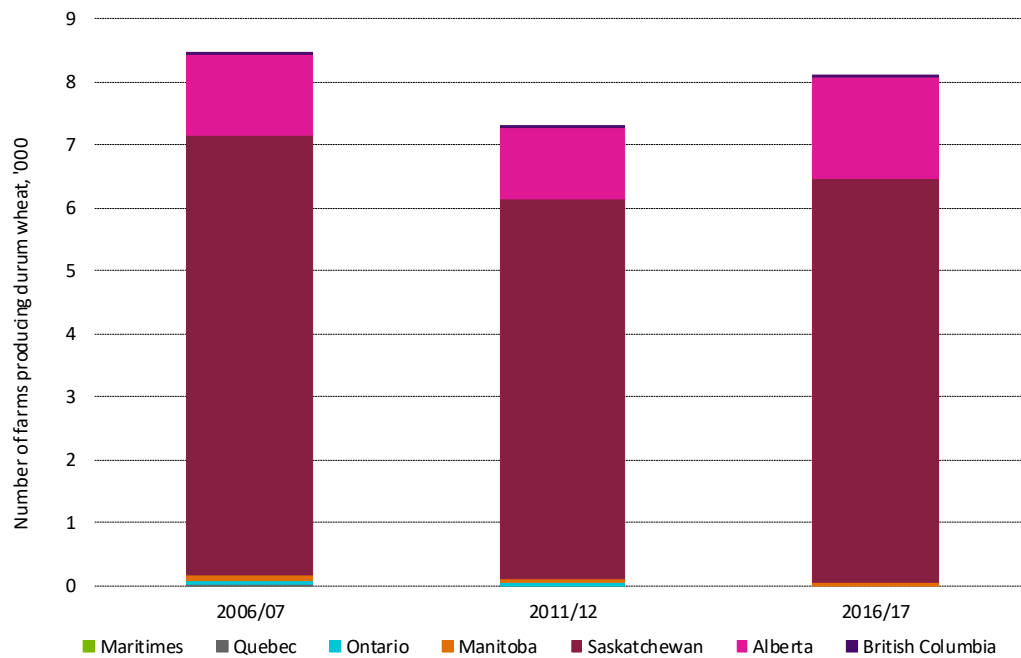
Source: StatCan.

For this study, we took paid durum 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 durum farming was done on the basis of the durum 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.

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

Diagram 11: Number of farms growing durum 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 durum. By multiplying the number of durum 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 durum 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 durum wheat

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Saskatchewan	3,492	3,360	3,920	4,000	3,292	3,992	3,280	3,716
Alberta	496	464	712	881	872	948	620	810
Other	0	0	0	0	0	1	15	25
Canada	3,988	3,824	4,632	4,881	4,164	4,940	3,915	4,551

Durum 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 ***durum 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 durum value chain, which represent workers who draw a cash wage from working in the durum sector. Consequently, the total employment effect given at the beginning of this study is presented with and without this number. Note that the figure provides an estimate of the additional farm family members supported by durum wheat production: *it is not intended as an estimate of the family members employed by durum 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) durum 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 “durum wheat farming.”

Table 17: Impact of durum 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)	55	4,173	4,228
Total employment (FTE jobs)	55	4,173	4,228
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, as much as 90% of the durum wheat moved off-farm in Canada is delivered to primary elevators, with the balance being delivered directly to processors. At the elevators, durum (and other grains) are stored until needed 1) by domestic semolina 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 durum elevation in Canada averaged over \$95 million between 2018/19 and 2020/21. The total economic impact, meanwhile, is estimated at nearly \$145 million.
- An estimated 600+ people are directly employed in primary durum elevation. When indirect and induced effects are included, the total effect is estimated at 1,100 jobs.
- Lastly, wages directly attributable to primary durum elevation are calculated around \$45 million over the observed time frame, with the total wage effect estimated at over \$65 million.

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

	East	West	Canada
Direct economic impact (C\$ million)	0.0	95.8	95.8
Total economic impact (C\$ million)	0.0	144.2	144.2
Direct employment (FTE jobs)	0	622	622
Total employment (FTE jobs)	0	1,103	1,103
Direct wages (C\$ million)	0.0	43.6	43.6
Total wages (C\$ million)	0.0	66.5	66.5

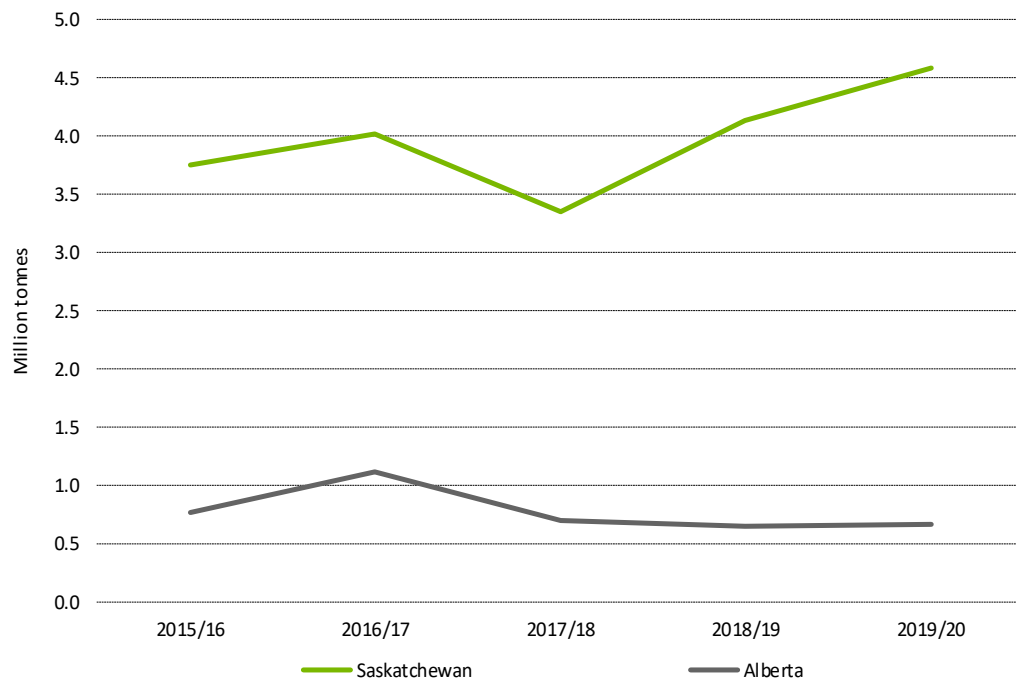
Methodology

The economic impact of durum elevation was determined by the product of volumes of durum being elevated and fees incurred for primary elevation. For the Prairie Provinces, elevated durum volumes were determined by data available through the *Canadian Grain Commission*, with the numbers modified slightly to reconcile with information on internal durum trade flows within the country. Elsewhere, the volumes of durum passing through elevators (versus being delivered directly to processing facilities) were derived based on conversations with industry stakeholders. We estimate very small volumes of elevation outside of the Prairies.

- We estimate approximately five million tonnes of durum can pass through primary elevation facilities in Canada each year. 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 durum 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 durum share of this total was calculated by multiplying the total jobs figure by the ratio of durum 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 durum wheat to elevators



Source: Canadian Grain Commission.

Durum wheat and durum product delivery

Durum transport comprises delivery of:

- **Crop delivery:** transporting the durum wheat crop to elevators, to food (semolina) and feed processors, and transporting the crop to overseas export ports and overland to the US.
- **Semolina delivery:** transporting semolina to domestic pasta plants and, in small quantities, exporting semolina.
- **Durum feed delivery:** transporting feed durum (after the feed mill) to domestic users and (potentially though in reality negligibly) to overseas export ports and overland to the US.

Within Canada we assume that:

- The durum crop and its products are transported between provinces (i.e. inter provincial transfers) predominantly by rail.
- The durum crop delivered directly to processing facilities is transported by truck.
- A small share of the crop is also delivered by barge/laker vessels to the processing facilities in Ontario and Quebec.

Impact – crop delivery

The majority of the durum crop is delivered to elevators for rail shipment to 1) Canadian ports, 2) the US border, or 3) processing facilities within Canada, while an increasing share is delivered by farmers directly to processing facilities within Canada.

The economic impact of durum deliveries is presented separately for rail, truck and barge (laker). As semolina mills and most of the pasta processing is located in Quebec and Ontario, laker transport is relatively more important for the durum crop than for some grains such as barley, although actual volumes are fairly limited.

For domestic transport, because transport networks are nationwide rather than being fixed at a single point (unlike milling, for example), **transportation effects are presented on the basis of where the durum originates**, rather than being allocated across the path in which the durum travels or where it might be delivered. In effect, this means the west captures the crop delivery benefits as negligible durum production occurs in the eastern region.

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

	East	West	Canada
Direct economic impact (C\$ million)	0.0	527.6	527.6
by rail	0.0	308.1	308.1
by truck	0.0	73.3	73.3
by laker	0.0	146.2	146.2
Total economic impact (C\$ million)	0.0	1,201.3	1,201.3
by rail	0.0	506.2	506.2
by truck	0.0	211.7	211.7
by laker	0.0	483.4	483.4
Direct employment (FTE jobs)	0.0	1,162.5	1,162.5
by rail	0.0	844.2	844.2
by truck	0.0	190.6	190.6
by laker	0.0	127.7	127.7
Total employment (FTE jobs)	0.0	2,870.2	2,870.2
by rail	0.0	2,018.6	2,018.6
by truck	0.0	448.3	448.3
by laker	0.0	403.3	403.3
Direct wages (C\$ million)	0.0	112.0	112.0
by rail	0.0	84.3	84.3
by truck	0.0	10.6	10.6
by laker	0.0	17.1	17.1
Total wages (C\$ million)	0.0	224.2	224.2
by rail	0.0	154.8	154.8
by truck	0.0	25.5	25.5
by laker	0.0	44.0	44.0

- **Rail:** The direct economic impact of rail transportation of the durum crop in Canada averages over \$300 million between 2018/19 and 2020/21, while the total impact, including indirect and induced impacts, is estimated at over \$500 million.
- **Rail:** Over 800 individuals are employed directly in the rail transportation of durum, with a total employment impact of more than 2,000 jobs.

- **Rail:** Wages directly attributable to rail transportation of the durum crop amount to \$80 million, with the total wage impact estimated at over \$150 million.
- **Truck:** The direct economic impact of durum transportation by truck, which includes trucking to elevators in addition to trucking directly to processing facilities, averaged over \$70 million annually between 2018/19-2020/21. The total impact, meanwhile, is estimated at over \$200 million.
- **Truck:** The direct employment impact of durum transportation by truck averaged nearly 200 jobs over the observed timeframe. When indirect and induced multipliers are applied, we calculate the total impact to exceed 400 jobs supported.
- **Truck:** More than \$10 million in annual wages were earned directly through durum wheat trucking over the observed three-year time frame. At the same time, the total wage impact from trucking the durum crop was calculated to be almost \$25 million.
- **Laker:** Direct economic impact between 2018/19 and 2020/21 averaged almost \$150 million annually, with the total impact estimated at over \$480 million.
- **Laker:** Jobs directly associated with laker transportation of durum wheat and associated port activities averaged almost 130 over the observed time frame, whereas the total employment impact is estimated at more than 400 jobs.
- **Laker:** Direct wages attributable to laker transportation of durum meanwhile averaged over \$17 million, with the total wage impact exceeding \$44 million.

Impact – product delivery

For durum product transportation, we cover transport of semolina (after the semolina mill) and feed durum (after the feed mill) by rail and truck for domestic use and for export. As with transport of the durum crop, for domestic transport the **transportation effects are allocated to where the durum originates rather than the destination**. Both semolina and durum livestock feed (post feed milling) are assumed to have negligible exports.

We also assume negligible quantities of semolina and processed durum feed are transported by laker, and therefore exclude lakers from this category: *note that this makes no difference to the total, as if we allocated some semolina to laker transport, we would have to simultaneously reduce the figure for rail or trucks.*

- The economic impact of transportation of durum food and feed products in Canada is relatively small because of the limited size of the domestic market compared with international exports. The direct economic impact in Canada averages \$12 million in 2018/19-2020/21, while the total impact, including indirect and induced impacts, is estimated at almost \$32 million.
- Around 60 individuals are employed directly in the transportation of durum products, with a total employment impact of 140 jobs.
- Wages directly attributable to transportation of durum products amount to \$3 million, with the total wage impact estimated at \$7 million.

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

	East	West	Canada
Direct economic impact (C\$ million)	5.2	6.5	11.7
<i>semolina by rail</i>	<i>0.2</i>	<i>1.5</i>	<i>1.7</i>
<i>semolina by truck</i>	<i>2.7</i>	<i>0.0</i>	<i>2.7</i>
<i>feed by truck</i>	<i>2.3</i>	<i>5.0</i>	<i>7.3</i>
Total economic impact (C\$ million)	14.9	16.8	31.7
<i>semolina by rail</i>	<i>0.3</i>	<i>2.5</i>	<i>2.8</i>
<i>semolina by truck</i>	<i>7.9</i>	<i>0.0</i>	<i>7.9</i>
<i>feed by truck</i>	<i>6.7</i>	<i>14.3</i>	<i>21.0</i>
Direct employment (FTE jobs)	23.5	36.3	59.7
<i>semolina by rail</i>	<i>0.4</i>	<i>13.3</i>	<i>13.7</i>
<i>semolina by truck</i>	<i>12.4</i>	<i>0.0</i>	<i>12.4</i>
<i>feed by truck</i>	<i>10.7</i>	<i>23.0</i>	<i>33.6</i>
Total employment (FTE jobs)	55.2	85.8	141.0
<i>semolina by rail</i>	<i>0.9</i>	<i>31.8</i>	<i>32.7</i>
<i>semolina by truck</i>	<i>29.2</i>	<i>0.0</i>	<i>29.2</i>
<i>feed by truck</i>	<i>25.1</i>	<i>54.0</i>	<i>79.1</i>
Direct wages (C\$ million)	0.6	2.6	3.2
<i>semolina by rail</i>	<i>0.0</i>	<i>1.3</i>	<i>1.4</i>
<i>semolina by truck</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>
<i>feed by truck</i>	<i>0.6</i>	<i>1.3</i>	<i>1.9</i>
Total wages (C\$ million)	1.5	5.5	7.0
<i>semolina by rail</i>	<i>0.1</i>	<i>2.4</i>	<i>2.5</i>
<i>semolina by truck</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>
<i>feed by truck</i>	<i>1.4</i>	<i>3.1</i>	<i>4.5</i>

Transport methodology

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

For rail, trucking and barge transport:

- The first step is to determine the inter-provincial trade flows of each product. To do this, we estimated provincial-level durum processing for semolina and feed (see the sections on Semolina Processing and Feed Milling), for pasta/couscous processing 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 durum production, durum processing and points of export (port facilities).

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

Trucking

Trucking durum products was dealt with as follows:

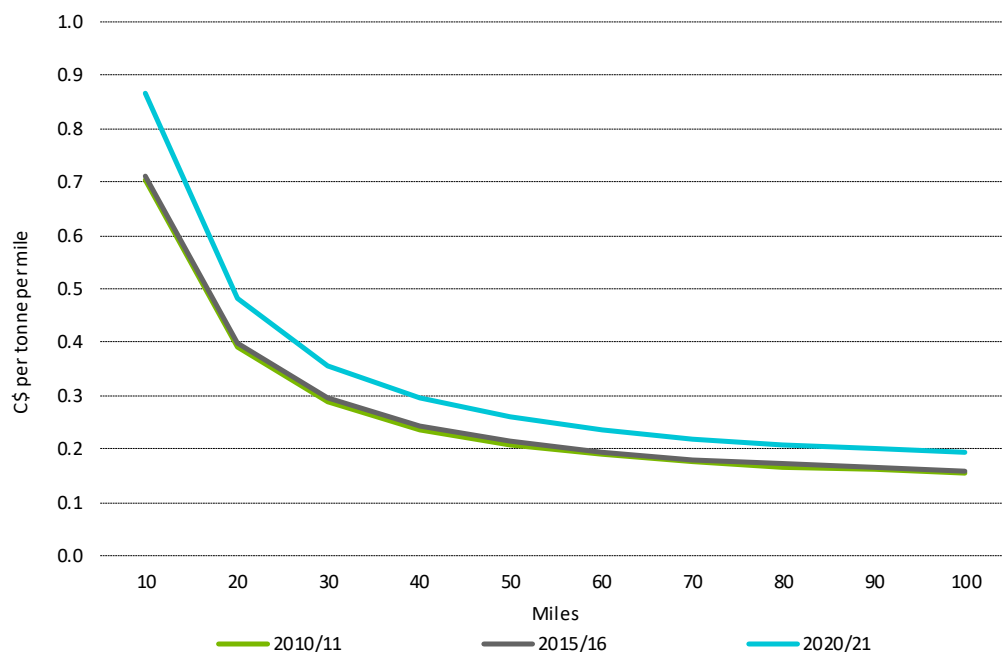
- **Durum wheat volumes trucked from farm to elevator** were based on the volumes of durum passing through elevators (see previous section). These data were obtained in part from the Canadian Grain Commission.
- Durum wheat that does not pass through a primary elevator was accounted for in **volumes trucked directly to semolina processing and feed facilities**.
- All durum livestock feed volumes 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 durum planted by the volume of durum harvested. For Quebec, Ontario and British Columbia, where durum production is smaller and more isolated, the average distance to elevators was determined in conversations with individuals with local expertise.

Distances for durum trucked directly from farm to processing facilities and from semolina mills to pasta facilities were determined using the average distance between the geographic centers of production in a province and processing facilities situated within that province. In all cases, durum and its products trucked directly to facilities was done at a distance of less than 200 miles, which would be at the high end of actual observed trucking distances.

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

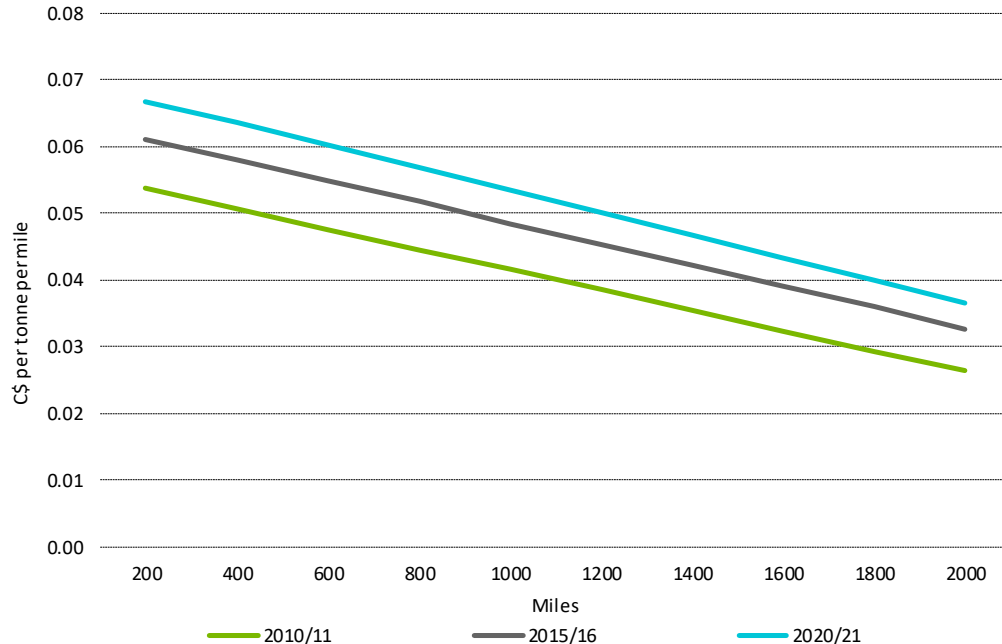
- Transports 18 tonnes of cargo
- Averages 40 miles per hour
- A full-time trucker drives 2,000 hours per year
- Trucking wages were obtained from StatCan data

Rail

Our calculations on rail expenditures also begin with estimates of provincial durum 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 durum 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 Diagram 12 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 durum wheat, we *multiplied total freight rail employment by the ratio of durum 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.

Lakers

Estimates of the expenditures incurred through durum wheat shipment by laker begin with the assumption that roughly 75% of the durum delivered to processing facilities in Ontario and Quebec is delivered by laker vessel. Most of this barge traffic originates around Thunder Bay, ON, based on rail shipments delivered from the Prairies. Laker shipping rates were obtained from the Canadian Grain Commission and average close to \$25 per tonne in recent years.

Employment and wages on both laker vessels themselves and at ports were based on conversations with experts in shipping in the Great Lakes and on a report entitled “*Ocean Shipping in the Great Lakes: an Analysis of Issues*” by Dr. John Taylor of Grand Valley State University.

Food milling: adding value to durum wheat in semolina processing

Impact

- The direct economic impact of semolina processing on the Canadian economy is just over \$260 million. The total economic impact, including indirect and induced impacts is \$1.57 billion.
- Over 110 individuals are directly employed in semolina processing. However, as a capital intensive sector that relies heavily on contracted workers, the total employment impact of semolina processing is estimated to be much higher, supporting over 1,300 jobs.
- \$8.0 million in wages are paid out to individuals directly employed in semolina processing. Like the employment impact, however, the total wage impact of semolina processing is much higher, in excess of \$50 million.

Table 21: Impact of semolina processing, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	183.7	78.0	261.7
Total economic impact (C\$ million)	1,101.6	467.7	1,569.2
Direct employment (FTE jobs)	81	35	116
Total employment (FTE jobs)	916	389	1,305
Direct wages (C\$ million)	5.6	2.4	8.0
Total wages (C\$ million)	37.4	15.9	53.3

Methodology

The economic impact of the semolina milling sector is determined based on the value it adds from processing durum wheat into semolina. This is done on a regional level by estimating the volume processed at each processing facility in Canada. We estimate this on the basis of each facility’s processing capacity, taking into account the fact that some facilities devote a significant share of their capacity to milling common wheat.

To account for this swing milling capacity, we first estimate total jobs at the combined plants, and then apportion jobs to durum by durum's quantity relative to common wheat in that location.

Once durum milling volumes are estimated, we have to choose which durum and semolina prices are most representative of the processing value added. We used import unit values (EUVs) for both prices in order to provide a common basis for the gross margin. The **total economic impact** of semolina processing was then taken to be the product of volumes of durum milled and the IUVs of value added. One difficulty here is that semolina is classified under different HS codes depending on the country, and whether it is being exported or imported. For the purpose of this study, we have used to HS code 1101.00.20 (listed as "durum wheat flour" from StatCan as indicative of semolina prices for the purposes of calculating the margin value added per tonne of durum wheat processed).

The **employment** impact of the semolina processing sector was determined via discussions with employees 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 durum wheat milling for semolina

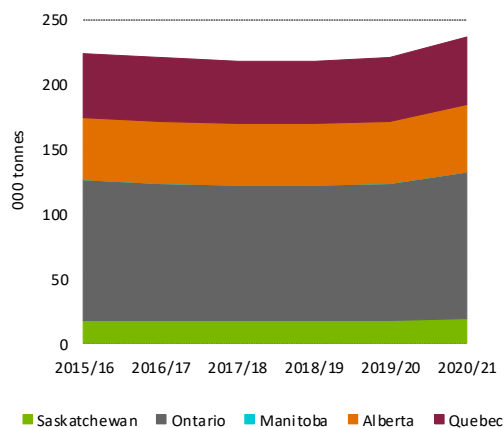
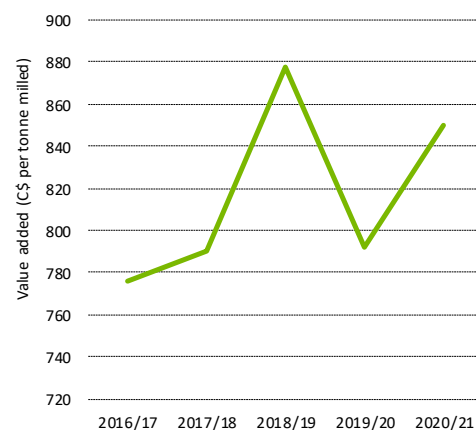


Diagram 16: Canadian semolina processing value added



Food processing: adding value to semolina in pasta and couscous manufacturing

Most semolina processing facilities in Canada further process a portion of the semolina they produce on site into pasta or, in very small volumes, into couscous. Overall, 60-70% of Canada's semolina is usually further processed into pasta/couscous Canada, with the remainder exported. For simplicity in this sector, we aggregate the pasta and couscous volumes together under the term "pasta manufacturing" throughout.

This is the most difficult sector of the value chain to quantify accurately. The further processing of semolina into pasta and couscous is difficult to quantify because:

- Ingredient use and product formulations of processed foods are sensitive information from the perspective of industrial food manufacturers.
- Branding and marketing add significant value to consumer products. 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 durum can claim to add in the further processing chain. The difficulty lies in stripping out the part of the large value-added in consumer and wholesale pasta prices that is attributable to durum rather than branding and marketing.

Impact

- We estimate that the direct economic impact on the Canadian economy from pasta/couscous manufacturing averaged close to \$225 million annually between 2018/19 and 2020/21. The total economic impact, meanwhile, is estimated at close to \$1.3 billion annually because this sector, like semolina processing, enjoys a high multiple with many associated benefits for the local economy.
- Approximately 400 people are directly employed by pasta manufacturing in Canada. With the substantial multiplier effect, the total employment impact is estimated at approaching 4,000 jobs.
- Almost \$90 million in wages are directly attributable to pasta manufacturing while the total wage impact is around \$540 million.

Table 22: Impact of pasta manufacturing, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	226.6	0.0	226.6
Total economic impact (C\$ million)	1,287.3	0.0	1,287.3
Direct employment (FTE jobs)	401	0	401
Total employment (FTE jobs)	3,961	0	3,961
Direct wages (C\$ million)	89.6	0.0	89.6
Total wages (C\$ million)	541.0	0.0	541.0

Methodology

The value added to the Canadian economy by pasta manufacturing is calculated by estimating the volumes produced multiplied by the value added per tonne of pasta manufactured. Total pasta manufactured is estimated as:

- Semolina production
- *minus* semolina exports.

This total was then allocated across Canada's pasta manufacturing facilities based on semolina processing.

Diagram 17: Canadian pasta manufacturing

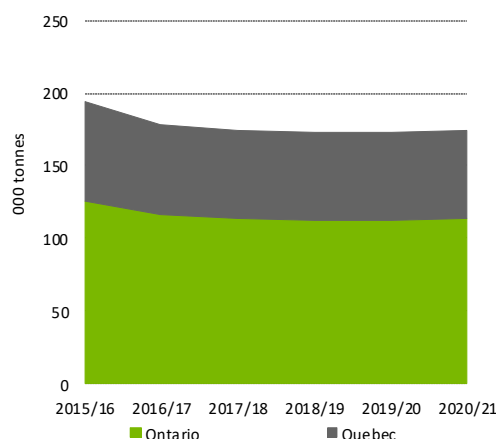
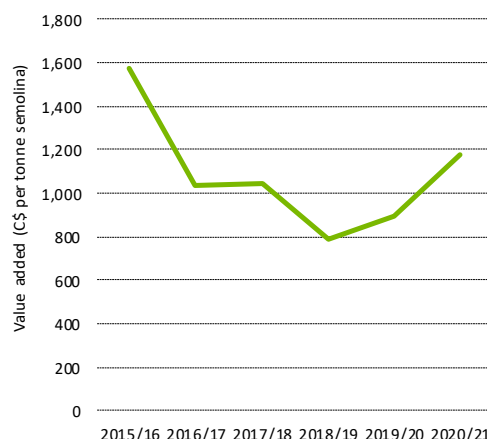


Diagram 18: Canadian pasta manufacturing value added per tonne of semolina



The value added per tonne of pasta manufacturing was based on the spread between unit import values (IUVs) for semolina and raw pasta, obtained from Canadian trade data.

The total number of people employed in the pasta manufacturing sector was based on industry interview estimates. We assume that all of these jobs are attributable to durum wheat as there are few ingredients in pasta/couscous of any note other than semolina/durum wheat. Regional level employment was then taken to be a function of regional pasta manufacturing 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 food processing sector, which regards such information as proprietary, nor from *Statistics Canada*, which does not report this level of detail in its *Canada Food Statistics* data. Taking these caveats into consideration, the analysis presented here should be taken as indicative.

To calculate the value, we used the unit value export price of pasta products for export to the US, as reported by *Statistics Canada*.

Feed milling: adding value to durum wheat in feed mills

A significant part of the annual durum wheat crop does not meet food grade requirements and is diverted to the livestock feed sector. In addition, our feed analysis incorporates by-products from processing, such as 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 durum wheat.

ANAC data gives 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. 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 durum wheat on the Canadian economy is estimated at approaching \$40 million. The total economic impact, including indirect and induced impacts is almost \$190 million.
- We estimate that durum wheat's share of direct feed milling employment is around 250 individuals, including some on-farm job creation. As a capital-intensive sector that relies heavily on contracted workers, the total employment impact of feed milling attributable to durum is estimated to be much higher, supporting over 1,400 jobs.
- Nearly \$15 million in wages are paid out to individuals directly employed in feed milling as a result of using durum wheat. Like the employment impact, however, the total wage impact of feed processing is much higher, in excess of \$60 million.

Table 23: Impact of animal feed milling, average 2018/19–2020/21

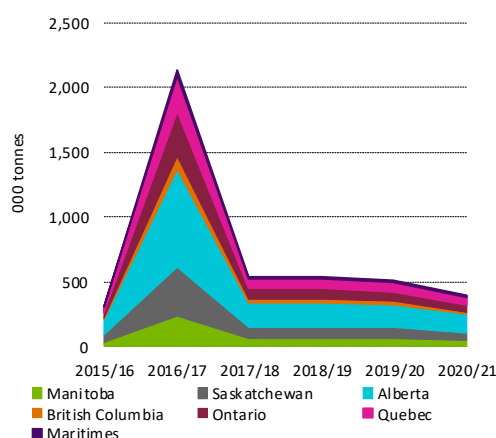
	East	West	Canada
Direct economic impact (C\$ million)	12.1	25.9	38.0
Total economic impact (C\$ million)	59.9	128.7	188.6
Direct employment (FTE jobs)	158	92	251
Total employment (FTE jobs)	898	523	1,421
Direct wages (C\$ million)	8.6	5.0	13.7
Total wages (C\$ million)	39.2	22.8	62.1

Methodology

The economic impact of the feed milling sector is determined based on the value it adds from processing feed grade durum wheat into processed feed. This is done on a regional level by estimating the volume processed at each processing facility in Canada. We estimate this on the basis of each facility's capacity, taking into account the fact that facilities devote a significant share of their capacity to processing other crops. As it is extremely difficult to ascertain how much of each crop is processed in each feed mill individually, we calculate the durum share simply as a proportion of the total feed processed by each region.

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

Diagram 19: Canadian commercial feed milling of durum wheat



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

The average **wages** for employees of feed processing facilities was obtained from StatCan data. The StatCan data show a distinct peak in feed durum usage in 2016, although this is outside of our featured period of 2018/19-2020/21.

Impact at ports

Durum wheat exports take place overland to the US and Mexico, which is captured in our trucking section, but durum also leaves Canada via its international ports. These overseas shipments leave Canada via ports in British Columbia and via Ontario and Quebec ports.

We assume the small volume of Canadian semolina exports are made solely overland to the US and Mexico, and therefore these are captured in our product delivery trucking estimates and not included in this section.

Impact

In our model, we calculated the economic impact at Canadian ports for durum wheat:

- The total effects of **durum wheat** exports on Canadian ports are an economic impact of over \$110 million, an employment impact of over 500 jobs, and a wage impact of over \$35 million.

Table 24: Impact of durum wheat at Canadian ports, average 2018/19–2020/21

	East	West	Canada
Direct economic impact (C\$ million)	40.8	33.7	74.6
Total economic impact (C\$ million)	61.5	50.8	112.3
Direct employment (FTE jobs)	161	134	295
Total employment (FTE jobs)	286	237	523
Direct wages (C\$ million)	13.4	11.2	24.6
Total wages (C\$ million)	20.5	17.0	37.5

Methodology

The **economic impact** of durum wheat at Canadian ports is calculated as the product of volumes multiplied by port fees. We do not include any allowance for the very small volumes of semolina or pasta exported from Canada as these are overwhelmingly overland to the US.

- Canadian durum wheat volumes by port and direct prairie exports (overland) were obtained from data provided by the Canadian Grain Commission.
- Export volumes by port for semolina 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 durum'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.portmetrovanancouver.com

Diagram 20: Grain charges at Canadian ports

