



Dairy Goat COP Study

Final Report

Prepared for **Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)**

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Introduction

The Goat Value Chain Roundtable, bringing together industry (and government) representatives from the entire value chain, intends to increase the productivity and competitiveness of Ontario dairy goat producers, as well as develop a better understanding of the prevailing risks affecting the industry. As such, the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) has engaged MNP LLP to conduct a provincial multi-year Cost of Production (COP) study of the dairy goat operations in the province to gain a better understanding of the cost level in the industry, its observed variance, and its competitiveness. MNP LLP has also been engaged to develop a benchmarking tool for producers' use and a technical sector risk analysis that will also support future strategic decision-making. This report presents the results of the COP study conducted for the years 2019, 2020, and 2021.

As this is an early effort to further understand costs of producing goat milk in Ontario, the efforts of the 17 participating producers and staff and management from OMAFRA are commended to help bring this information forward and lay the groundwork for advancing the industry.

COP Process Overview

This COP study is the main element for Ontario dairy goat producers to measure their level of competitiveness, both for individual producers as well as for the industry against other (global) players. It will also serve to maximize efficiencies at the farm level, and as a tool to identify expansion or start-up opportunities (combined with the developed benchmarking tool), as it is believed that the industry has long-term potential for further development to meet the increasing demand for its products.

The COP reflects the cost of producing one litre of goat milk and excludes costs related to other farm enterprises. To be more specific, it includes the following items:

- **Cash costs:** Annual costs related to raising the dairy and replacement herds
- **Government rebates and other income:** Rebates and other income received that reduce the COP
- **Capital expenses:** Costs associated with the financing and depreciation from the use of fixed assets on the farm
- **Labour:** A return for eligible owner and family labour for the dairy and replacement farm enterprises.

Sampling and Data Collection

The collection and processing of COP was performed in four steps:

Step 1: Farm Selection

Representatives from OMAFRA have presented this COP study among Ontario dairy goat producers using an information letter, and together with MNP and the milk brokers, organized virtual information sessions for producers where they were able to receive more information regarding the participation process and indicate their interest to participate in the study. In addition, all Ontario dairy goat producers listed on OMAFRA's milk inspection list were randomized by MNP and contacted by OMAFRA. Interested producers were then screened

for suitability of participating in the COP study by MNP, resulting in a final sample of 16 producers for all three COP years.

Step 2: Data Collection

Financial and production information required to calculate the COP were then collected by trained data collectors using templates designed by MNP. Data was collected through on-farm visits, by email, by telephone, or using a combination of these methods.

Step 3: Data validation and Consolidation

Upon receipt of the data MNP's central data processing team performed validation tests to ensure that the data was within acceptable limits, free of errors and gaps, and consolidated all data into a common format for measurement. Costs for raising the replacement herd are allocated to the dairy COP in this step.

Step 4: COP Calculation

MNP then calculated the COP for one standardized litre of milk and the average cost of milk per doe. As milk component levels differ from month to month and from producer to producer, the litres produced have been standardized to determine an aggregate weighted average costing and to make equitable cost comparisons between participating producers. Standardization has been calculated using a 3.8% butterfat level and 3.4% protein level, as provided by OMAFRA.

Any other methodological considerations used to calculate the COP, such as allocation processes between the different farm enterprises, labour calculations, depreciation rates and how costs were transferred from the replacement herd to the dairy herd can be found in the 2019-2021 Ontario Dairy Goat COP Methodology Handbook submitted earlier to OMAFRA and attached as Appendix A.

Summary COP Results

Description of Sample

Data was collected from a total of 17 producers. However, one producer in Eastern Ontario only participated in the 2019 and 2020 COP studies, and another producer in Eastern Ontario only participated in the 2021 COP study. Thus, the final sample for each year consisted of 16 producers, of which 14 producers were in Southwestern Ontario and 2 producers were in Eastern Ontario for all three COP years. Several producers were contacted in Northern Ontario, but they did not reply to OMAFRA’s communications. The overall make-up of where producers were located was not impacted due to the one producer dropping off after the 2020 study as the new producer in 2021 was in the same region. Table 1 compares the regional distribution of the sampled farms to that of the population of Ontario dairy goat farms according to OMAFRA’s milk inspection list.

Table 1: Distribution of location of COP sample and population

Region	COP Sample		Population	
	Number	Percentage	Number	Percentage
Eastern/Central Ontario	2	13%	26	11%
Northern Ontario	0	0%	10	4%
Southwestern Ontario	14	87%	196	85%
Total	16	100%	232	100%

The population of 232 farms was based on the number of goat farms at the beginning of this project. Since that time the industry has dropped to under 210 producers.

Table 2 outlines several summary statistics for participating producers and helps put the overall COP results in context.¹ Total production in the sample increased over the three years, both in terms of the number of does on farm and the number of standardized litres produced. However, the level of butterfat of the milk plateaued after 2020 and the level of protein of the milk stayed constant across the three COP years. This is noteworthy as producers are compensated for their milk components, with protein being the more profitable component.

¹ These statistics are a weighted average for those participants that were not classified as an outlier (see the sections Summary of COP Results and Detailed COP Components).

Table 2: Production statistics for the COP sample, 2019-2021

Statistic	2019	2020	2021
Average number of milking and dry does in herd	416	441	477
Total standardized litres produced	394,747	411,889	463,807
Standardized litres produced per doe – 365 days	985	958	976
Standardized litres produced per doe – 305 days	823	800	816
Average butterfat %	3.83	3.87	3.85
Average protein %	3.36	3.38	3.36
Person-equivalents of labour (in person per 3,000 hours)	1.89	2.07	2.12
Total feed acres farmed	94	103	101
Share of butterfat revenue of total milk revenue	35.4%	35.3%	35.2%
Share of protein revenue of total milk revenue	64.5%	64.7%	64.8%

Results per Standardized Litre

COP results per standardized litre are based on the total standardized litre a farm producers per year. As indicated above, this was done using standards of 3.8% butterfat and 3.4% protein. The number of liters produced using a producer’s actual butterfat and protein contents were converted to these standards, after which a weighted average was calculated based on the share of revenue that is on average received by the sample for the two milk components as shown in Table 2.

The COP results per standardized litre presented in Table 3 are based on the weighted average cost per standardized litre (total cost for all farms divided by total standardized litres for all farms). As such, Table 3 shows the COP results for all three years on a standardized litre basis for the four cost categories, as well as the final COP for the total of 17 farms that were part of the COP sample (including outliers). The COP was highest in 2019 at \$1.359 per standardized litre, dropping to \$1.225 in 2020 and increasing slightly to \$1.243 in 2021.

Table 3: COP results per standardized litre, weighted average, including outliers, 2019-2021

Cost Category	2019	2020	2021
Total Cash Costs	\$0.713	\$0.666	\$0.719
Total Government Rebates and Other Income	-\$0.022	-\$0.054	-\$0.056
Total Capital Costs	\$0.230	\$0.201	\$0.161
Total Producer Labour	\$0.438	\$0.412	\$0.419
Net Cost per Standardized Litre of Milk Produced	\$1.359	\$1.225	\$1.243

Data Variability and Outliers

Table 4 shows the producer with the lowest COP (minimum), the producer with the highest COP (maximum), and the standard deviation for all three COP years. Variability in results, measured by the standard deviation, is a concern given the small sample size. Variability was the highest in the 2019 data with a standard deviation of \$0.458 per standardized litre. Further details on the variability due to the small sample size are included in the Study Constraints section.

Table 4: Data variability indicators per standardized litre, including outliers, 2019-2021

COP Indicator	2019	2020	2021
Minimum	\$0.945	\$0.809	\$0.825
Maximum	\$2.370	\$1.688	\$2.393
Standard deviation	\$0.458	\$0.245	\$0.395

To normalize this variability, outliers with a total COP outside two standard deviations of the mean of the COP have been removed in a secondary set of results (Table 5). This resulted in removing two outliers from the 2019 data, none from the 2020 data, and one outlier from the 2021 data. All further results in this report exclude these outliers. Per Table 5, removing the outliers reduces the COP to \$1.272 per standardized litre in 2019, \$1.225 in 2020, and \$1.194 in 2021, as the removed outliers had higher costs.

Table 5: COP results per standardized litre, including outliers and excluding outliers, 2019-2021

Cost Category	Including outliers			Excluding outliers		
	2019	2020	2021	2019	2020	2021
N	16	16	16	14	16	15
Total Cash Costs	\$0.713	\$0.666	\$0.719	\$0.684	\$0.666	\$0.706
Total Government Rebates and Other Income	-\$0.022	-\$0.054	-\$0.056	-\$0.018	-\$0.054	-\$0.058
Total Capital Costs	\$0.230	\$0.201	\$0.161	\$0.191	\$0.201	\$0.157
Total Producer Labour	\$0.438	\$0.412	\$0.419	\$0.415	\$0.412	\$0.394
Net Cost per Standardized Litre of Milk Produced	\$1.359	\$1.225	\$1.243	\$1.272	\$1.225	\$1.198

Results show that 2019 was the last relatively “normal” year in the industry, as the impact of the COVID-19 pandemic is visible across several cost categories:

- **Cash costs** dropped in 2020 due to the economic slowdown. Producers sold more animals which reduced cash costs by \$0.02 per standardized litre over 2019. Other cash costs such as feed purchases, crop inputs, marketing, and operational expenses remained relatively flat. Cash costs then rose in 2021 as feed prices and repairs and maintenance increased beyond 2019 levels.

- **Government rebates and other income** increased in 2020 due to producers receiving insurance proceeds on farm losses and increased further in 2021 due to producers claiming COVID-19 relief income. These income items offset the costs in the COP.
- **Capital costs** dropped in 2021 as producers hunkered down and paid off existing debts and reduced the number of new capital purchases, thereby reducing interest costs.
- **Producer labour** dropped slightly from 2019 to 2021 by \$0.021 per standardized litre. This is due to an increase in producer labour efficiency based on standardized litres produced per producer labour hour. In 2019, producers were able to generate 61.3 standardized litres per producer labour hour, increasing to 62.6 standardized litres per hour in 2020 and to 65.5 standardized litres per hour in 2021. The increase in efficiency could be due to multiple factors, including improving herd efficiency by selling off less productive animals, or general improvement in best practices on the farm.

Figure 1 provides a visualization of the COP results per standardized litre by cost category. The growth in cash costs and decline in capital costs from 2019 to 2021 is apparent when looking at the results.

Figure 1: COP results per standardized litre, excluding outliers, 2019-2021

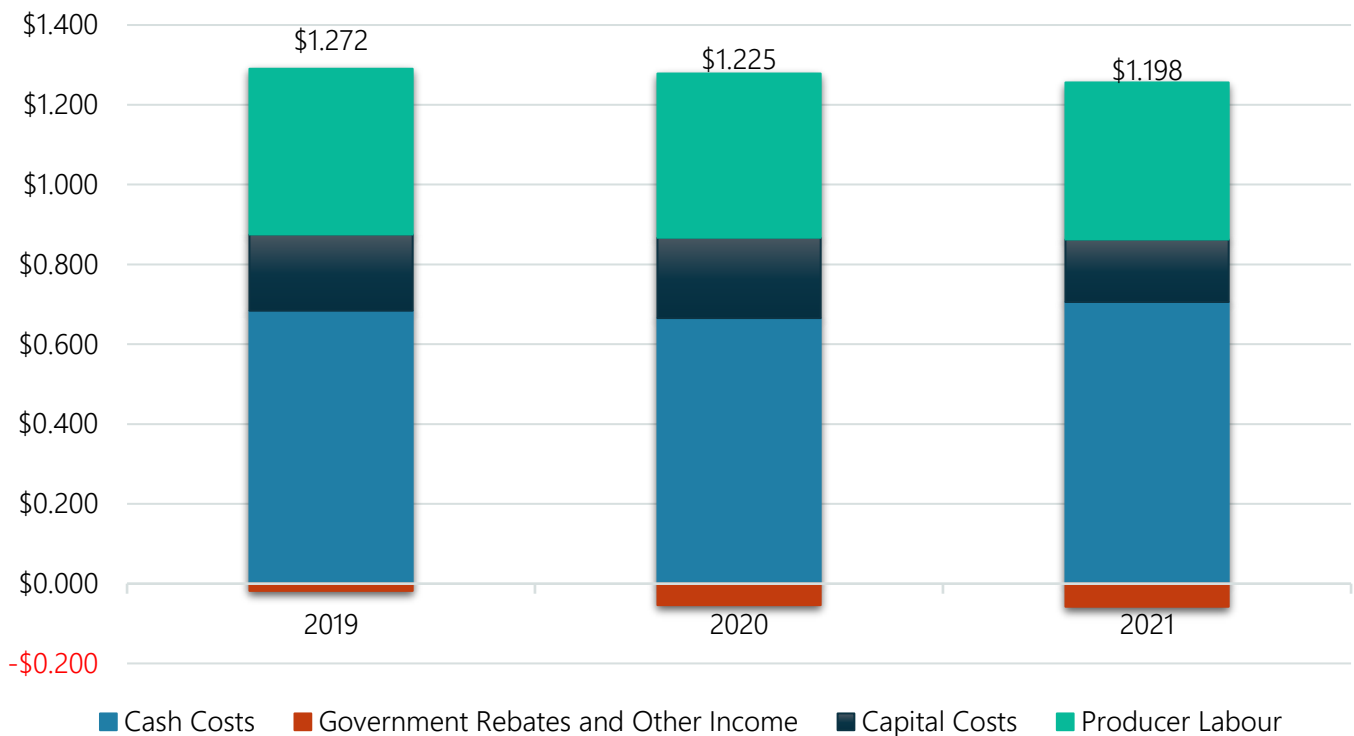


Table 6 shows the updated variability indicators for the COP data with the outliers removed. Removing the outliers reduces the standard deviation by \$0.103 per standardized litre in 2019 and \$0.094 in 2021.

Table 6: Data variability indicators per standardized litre, excluding outliers, 2019-2021

COP Indicator	2019	2020	2021
Minimum	\$0.945	\$0.809	\$0.825
Maximum	\$2.089	\$1.688	\$1.955
Standard deviation	\$0.355	\$0.245	\$0.301

It should further be noted that, due to the limited sample size, MNP is unable to draw any conclusions regarding COP results for the entire population of dairy goat producers in Ontario. The results presented in this report are only applicable to those producers that were part of the sample, as it is unknown if there are any biases in the remainder of the population that were not captured in the dataset.

Results per Dairy Doe

COP results per doe are based on the average number of milking and dry does in a herd per year. The average number of milking and dry does is calculated as the average of the number of milking and dry does at the start of the year and at the end of the year. For example, if a producer started with 100 milking and dry does and finished the year with 150 milking and dry does, their average number of does used in the COP is 125 $[(100+150)/2]$.

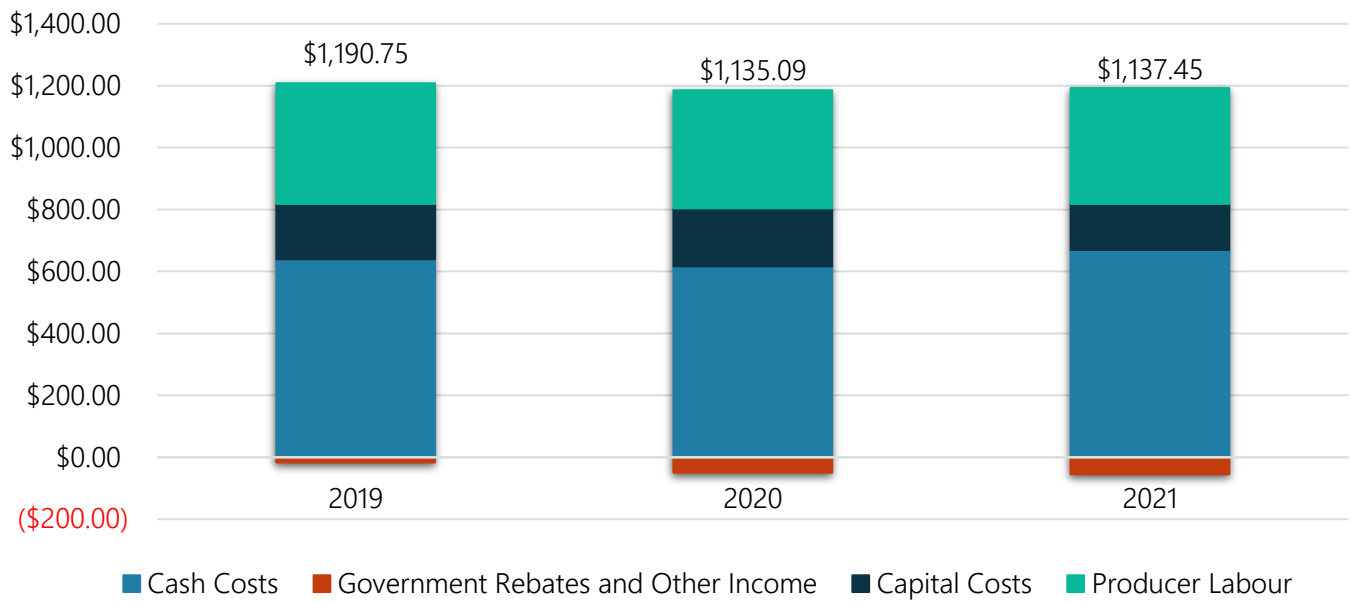
The COP results per dairy doe presented in Table 7 are based on the weighted average cost per doe (total cost for all farms divided by total does for all farms) with outliers removed. The results per doe show similar trends to the per standardized litre results since the production level per doe, measured as standardized litres produced per doe, is relatively consistent across farms, ranging between 958 in 2020 and 985 in 2019. The COP per dairy doe for all farms in the study was highest in 2019 at \$1,190.75, lowest in 2020 at \$1,135.09, and settled at \$1,137.45 in 2021.

Table 7: COP results per dairy doe, weighted average, excluding outliers, 2019-2021

Cost Category	2019	2020	2021
Total Cash Costs	\$640.24	\$616.94	\$670.06
Total Government Rebates and Other Income	-\$16.97	-\$49.95	-\$54.91
Total Capital Costs	\$178.76	\$186.64	\$148.71
Total Producer Labour	\$388.71	\$381.46	\$373.58
Net Cost per Doe	\$1,190.75	\$1,135.09	\$1,137.45

Figure 2 provides a visualization of the COP per dairy doe by cost category.

Figure 2: COP results per dairy doe, excluding outliers, 2019-2021



Detailed COP Components

This section outlines the detailed cost components that make up the main COP categories. The detailed cost component results are split into two sections:

1. Detailed costs per standardized litre excluding outliers
2. Detailed costs per doe excluding outliers

Detailed Costs Per Standardized Litre

Tables 8-11 show the detailed cost components for the three COP years that make up the main cost categories in the Summary COP Results section. The percentages represent the proportion of the individual cost against the total COP. All detailed costs in this section are reported per standardized litre and excluding outliers. These tables show that off-farm feed purchases, milk marketing expenses², repairs and maintenance, interest, depreciation, and direct producer labour make up a large share of the total COP numbers across the three years, and in many cases also increased in share from 2019 to 2021.

Cash costs in Table 8 show that feed purchases were the highest cost item, increasing from 33.9% of the total COP in 2019 to 39.9% in 2021. The COP for these 16 Ontario dairy goat producers also decreased significantly by the net sale of animals, meaning that on average producers were selling more goats than they purchased, resulting in an offset against other COP cash costs ranging from a low of -\$0.084 per litre in 2019 to a high of -\$0.147 in 2021 (-6.6% to -12.3% of total COP). Milk marketing expenses, repairs and maintenance, and net sale of animals all increased significantly over the three-year period.

Table 8: Cash costs per standardized litre, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Feed purchases	\$0.431	33.9%	\$0.436	35.6%	\$0.477	39.9%
Administrative costs	\$0.005	0.4%	\$0.008	0.6%	\$0.004	0.3%
Breeding and vet expenses	\$0.026	2.0%	\$0.023	1.9%	\$0.023	2.0%
BRM program fees	\$0.000	0.0%	\$0.000	0.0%	\$0.001	0.1%
Crop input costs	\$0.028	2.2%	\$0.024	1.9%	\$0.031	2.6%
Custom work	\$0.025	2.0%	\$0.034	2.8%	\$0.029	2.5%
Freight and trucking	\$0.003	0.2%	\$0.001	0.1%	\$0.001	0.1%

² Includes transport deductions, lab deductions, share purchases, and other deductions (e.g., administrative fees).

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Fuels and lubricants	\$0.021	1.6%	\$0.015	1.2%	\$0.022	1.8%
Hired labour	\$0.016	1.3%	\$0.011	0.9%	\$0.017	1.4%
Milk marketing expenses	\$0.058	4.5%	\$0.062	5.1%	\$0.061	5.1%
Professional fees	\$0.005	0.4%	\$0.006	0.5%	\$0.008	0.7%
Property taxes and insurance	\$0.021	1.6%	\$0.025	2.0%	\$0.024	2.0%
Rent	\$0.008	0.6%	\$0.007	0.6%	\$0.011	1.0%
Repairs and maintenance	\$0.056	4.4%	\$0.068	5.5%	\$0.077	6.5%
Supplies	\$0.030	2.3%	\$0.028	2.3%	\$0.031	2.6%
Utilities	\$0.036	2.8%	\$0.036	3.0%	\$0.033	2.8%
Net purchase (sale) of animals	-\$0.084	-6.6%	-\$0.120	-9.8%	-\$0.147	-12.3%
Total cash costs	\$0.684	53.8%	\$0.666	54.4%	\$0.706	58.9%

Government rebates and other income increased each year per Table 9. As noted above, other income increased in 2020 due to producers on the study receiving more insurance payouts for farm losses than in 2019. Government support income reduced the COP in 2021 by \$0.016 per standardized litre as Covid-19 relief payments became available and were used more in 2021.³

Table 9: Government rebates and other income per standardized litre, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Government support income	\$0.000	0.0%	\$0.000	0.0%	-\$0.016	-1.3%
BRM program income	-\$0.009	-0.7%	-\$0.003	-0.2%	-\$0.006	-0.5%
Other income	-\$0.009	-0.7%	-\$0.051	-4.2%	-\$0.036	-3.0%
Total government rebates and other income	-\$0.018	-1.4%	-\$0.054	-4.4%	-\$0.058	-4.8%

Table 10 outlines capital costs, which decreased from 15.0% of the total COP in 2019 to 13.1% in 2021. This is due to producers taking on less debt during the pandemic, as well as interest rates dropping in 2020 and 2021. Building, machinery, and equipment depreciation all stayed relatively constant over the three-year period.

³ Other income includes (the dairy and replacement portions of) custom work income, rental income, interest income, and patronage dividends.

Excluding outliers, 2020 becomes the year with the highest capital costs, accounting for \$0.201 per standardized litre, or 16.4% of the total COP.

Table 10: Capital costs per standardized litre, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Interest	\$0.086	6.8%	\$0.088	7.2%	\$0.060	5.0%
Building depreciation	\$0.055	4.3%	\$0.059	4.8%	\$0.052	4.3%
Machinery and equipment depreciation	\$0.049	3.9%	\$0.055	4.5%	\$0.045	3.7%
Total capital costs	\$0.191	15.0%	\$0.201	16.4%	\$0.157	13.1%

Hours worked for each type of labour activity on the farm were recorded, with direct producer labour valued at \$24.98/hour in 2019, and \$25.32/hour in 2020 and 2021.⁴ Producer management labour was valued at \$44.58 in 2019, at \$45.25 in 2020, and at \$45.93 in 2021.⁵ With outliers excluded, producer labour per standardized litre overall declined by about 5% from \$0.415 in 2019 to \$0.394 in 2021 (Table 11).

Table 11: Producer labour costs per standardized litre, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Direct labour	\$0.398	31.3%	\$0.395	32.3%	\$0.378	31.6%
Management and administration	\$0.018	1.4%	\$0.016	1.3%	\$0.016	1.3%
Total producer labour	\$0.415	32.6%	\$0.412	33.6%	\$0.394	32.9%

Detailed Costs Per Doe

Tables 12-15 show the detailed cost components for each COP year on a per doe basis, excluding outliers. The cash costs in Table 12 show that feed purchases were the highest cost item, increasing from 33.9% of the total COP in 2019 to 39.8% of the total COP in 2021, very similar to the share of costs on a per standardized litre basis. Cash costs were reduced by a net sale of animals that ranged from a low of -\$78.72 per doe in 2019 to a high of -\$139.58 in 2021 (-6.6% to -12.3% of total COP).

⁴ Median of the GL-MAN-3 category, <https://www.tbs-sct.canada.ca/agreements-conventions/view-visualiser-eng.aspx?id=24#rates-gl>

⁵ Average of steps 4 and 5 of the AG-3 category, <https://www.tbs-sct.canada.ca/agreements-conventions/view-visualiser-eng.aspx?id=3#rates-ag>

Table 12: Cash costs per doe, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Feed purchases	\$403.68	33.9%	\$404.43	35.6%	\$453.25	39.8%
Administrative costs	\$4.60	0.4%	\$6.97	0.6%	\$3.74	0.3%
Breeding and vet expenses	\$24.39	2.0%	\$21.31	1.9%	\$22.19	2.0%
BRM program fees	\$0.25	0.0%	\$0.42	0.0%	\$1.13	0.1%
Crop input costs	\$26.14	2.2%	\$22.03	1.9%	\$29.41	2.6%
Custom work	\$23.39	2.0%	\$31.22	2.8%	\$27.90	2.5%
Freight and trucking	\$2.67	0.2%	\$1.39	0.1%	\$1.04	0.1%
Fuels and lubricants	\$19.24	1.6%	\$13.95	1.2%	\$20.53	1.8%
Hired labour	\$14.99	1.3%	\$10.59	0.9%	\$16.09	1.4%
Milk marketing expenses	\$54.06	4.5%	\$57.51	5.1%	\$57.45	5.1%
Professional fees	\$4.88	0.4%	\$5.94	0.5%	\$8.01	0.7%
Property taxes and insurance	\$19.62	1.6%	\$23.03	2.0%	\$23.23	2.0%
Rent	\$7.23	0.6%	\$6.77	0.6%	\$10.82	1.0%
Repairs and maintenance	\$52.02	4.4%	\$62.93	5.5%	\$73.51	6.5%
Supplies	\$27.93	2.3%	\$26.04	2.3%	\$29.76	2.6%
Utilities	\$33.85	2.8%	\$33.50	3.0%	\$31.60	2.8%
Net purchase (sale) of animals	-\$78.72	-6.6%	-\$111.07	-9.8%	-\$139.58	-12.3%
Total cash costs	\$640.24	53.8%	\$616.94	54.4%	\$670.06	58.9%

Government rebates and other income increased each year per Table 13. Other income received from insurance payouts decreased the cost per doe by \$38.82 in 2020, and government support decreased the COP by \$14.79 from COVID-19 relief payments in 2021.

Table 13: Government rebates and other income per doe, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Government support income	\$0.00	0.0%	\$0.00	0.0%	-\$14.79	-1.3%
BRM program income	-\$8.50	-0.7%	-\$2.66	-0.2%	-\$5.89	-0.5%
Other income	-\$8.47	-0.7%	-\$47.29	-4.2%	-\$34.23	-3.0%
Total government rebates and other income	-\$16.97	-1.4%	-\$49.95	-4.4%	-\$54.91	-4.8%

Table 14 outlines capital costs, which decreased from 15.0% of the total COP in 2019 to 13.1% in 2021. This is similarly in line with the per standardized litre costs due to producers taking on less debt and declining interest rates in 2020 and 2021.

Table 14: Capital costs per doe, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Interest	\$80.90	6.8%	\$81.34	7.2%	\$57.33	5.0%
Building depreciation	\$51.61	4.3%	\$54.67	4.8%	\$49.11	4.3%
Machinery and equipment depreciation	\$46.24	3.9%	\$50.63	4.5%	\$42.27	3.7%
Total capital costs	\$178.76	15.0%	\$186.64	16.4%	\$148.71	13.1%

The share of producer labour costs per doe outlined in Table 15 also follows a similar trend to the per standardized litre costs, with producer labour comprising 32.6% of the total COP in 2019, growing to 33.6% in 2020, but reducing back to 32.8% in 2021.

Table 15: Producer labour costs per doe, excluding outliers, 2019-2021

Cost Item	2019		2020		2021	
	\$	%	\$	%	\$	%
Direct labour	\$372.11	31.3%	\$366.57	32.3%	\$358.71	31.5%
Management and administration	\$16.60	1.4%	\$14.89	1.3%	\$14.87	1.3%
Total producer labour	\$388.71	32.6%	\$381.46	33.6%	\$373.58	32.8%

Study Constraints

Several issues were encountered throughout the COP study that could have an impact of the study results or the interpretation of study results, including the producer participation rate and the resulting margin of error, as well as the lack of return on equity.

Producer Participation Rate

Producers on OMAFRA's milk inspection list were randomized, and a list of 30 producers was provided to OMAFRA in August 2021. The list was expanded to 60 producers in September 2021 due to a poor response rate and lack of interest. Producers cited the early stage of the project at that time and prior negative experiences as reasons they did not wish to participate in this study. The randomized list was increased again to 75 producers in November 2021. From these 75 producers, OMAFRA was able to identify 31 producers who were interested. Further screening and detailing the requirements of the project resulted in the final list of 17 producers who carried through with the study, for a study participation rate of 22.7% (17 / 75) and a sample size of 7.3% (17 / 232) of the total population.

There are two concerns with this sample result. The first is that because only a small number of those producers selected responded, the sample is not necessarily a random selection of the industry. This can introduce bias into the results (e.g., maybe more low-cost producers did not participate, maybe a certain production style was under- or overrepresented in the results). Secondly, a poor participation rate increases the margin of error of the results.

Margin of Error

The margin of error represents the level to which the study reflects the actual COP for the overall population. The margin of error in this study is 19% at the 90% confidence level; the study reflects that the weighted average COP is 90% accurate with a 19% margin of error. This is a significant margin of error caused by the low sample size and shows that the study results may not be representative of the actual COP for the overall population. For example, it is possible that the participating producers share some common traits that differ from other producers who declined participation, and these traits are not represented in the data. Users of these COP results should exercise caution when using this COP data for making assumptions about the Ontario dairy goat industry due to the high margin of error.

Return on Equity

Cost of Production studies generally also include a return on equity to "reward" the producer for his investment in the specific industry. The return on equity is usually calculated as net equity – i.e., assets minus liabilities – multiplied by an appropriate rate of return. However, in line with previous studies for this industry and to be able to create a true baseline COP for this industry (as producers differ largely on how they pay themselves a

return), it was decided not to include a return on equity in this study. The COP for all three years would have been higher if a return on equity had been included.

Comparison to previous study

A previous study was conducted in 2016 for this industry and even though some of the methodologies used in the 2016 study were also adopted for the 2019-2021 study (e.g., labour data, valuation of fixed assets) and the general approaches to the two studies were similar, it has been proven to be challenging to compare the results. The omission of a depreciation expense and a producer or management labour expense seem to be driving the variance in results between the two studies. Differences in allocating expenses and valuing inventory as well as other methodological considerations and different sample compositions could further be contributing to variances in results. For these reasons, a formal comparison between the two studies has not been done.

Appendix A: Methodology Handbook

Introduction

The purpose of this methodology handbook is to set out the principles and standard practices for the collection and consolidation of COP data by MNP data collectors, MNP data consolidators, and OMAFRA staff. The specific objectives of this methodology handbook are:

- To document all the procedures to follow when calculating the Cost of Production for Ontario dairy goats, from the selection of farms to the final calculations.
- To provide a comprehensive reference point for the COP which will enhance the transparency of the process.

The following sections present in more detail an overview of the COP, the sampling process, the required COP enterprises and components, the handling of (family) labour hours, as well as the handling of the replacement herd, fixed assets, and depreciation, for Ontario dairy goat producers.

Overview of the COP

Principles of the COP

The COP survey is the main element for Ontario dairy goat producers to measure their level of competitiveness, both for individual producers as well as for the industry against other global players. It will also serve to maximize efficiencies at the farm level and as a tool to identify expansion or start-up opportunities, as the industry has long-term potential for further development to meet the increasing demand for its products.

The COP reflects the cost of producing goat milk and excludes costs related to other enterprises. To be more specific, it includes the following items:

- The cost associated with raising a replacement herd.
- A return for eligible family labour for the dairy enterprise.⁶

The following basic principles are of guidance in conducting a COP survey for the Ontario goat industry:

- Accounting concepts are based on generally accepted accounting principles, including accrual accounting and historic cost asset valuation.

⁶ Note that MNP had initially included in the COP a return on equity for the dairy enterprise as well, however after further consideration with OMAFRA it was decided to exclude this element due to the relatively young and changing nature of the Ontario dairy goat industry. Based on previous experience, including a “fixed” return on equity might skew the numbers that producers will use to benchmark their operations against and improve the industry in such a manner.

- Costs are segregated into various enterprises to reflect the current state of affairs on dairy goat operations, and allocations between enterprises are performed on a fair and reasonable basis. The final COP only includes costs related to the production of milk.
- Data are collected by trained technicians in accordance with the principles and practices set out in this methodology handbook.
- Data collectors and consolidators are responsible for data inspection and validation.

Overview of the process

The collection and processing of COP data was performed in five steps:

1. Farm selection: representatives of OMAFRA promoted this COP study among Ontario dairy goat producers using an information letter, and together with MNP and the milk brokers, organized information sessions for producers where they were able to receive more information regarding the participation process and indicate interest to be recruited for the study. In addition, all Ontario dairy goat producers were randomized by MNP, after which they were first contacted by OMAFRA, and finally screened for suitability of participating in the COP study by MNP.
2. Data collection: data was collected using farm visits, virtual meetings, or telephone conversations (depending on producer preferences) by trained data collectors from MNP.
3. Data validation at the farm level: data collectors performed validation tests once all the information was gathered, e.g., in terms of crop and livestock inventories, milk sales, etc.
4. Consolidation and validation: upon receipt of the data MNP's central data processing team performed additional (automated) validation tests to ensure that the data are within acceptable limits.
5. Calculation of both the average provincial cost of producing one standardized litre of milk (standardized for 3.8% of butterfat and 3.4% of protein) and the average provincial cost of milk per doe.

Sampling and Data Collection

Sample Size and Selection

As stated above, Ontario dairy goat producers were randomized by MNP to avoid any (further) bias of the sample. Unfortunately, MNP was not able to determine the sample itself and its size in accordance with statistical standards due to limited interest in participation from the industry. Therefore, the study allowed for producers to sign up until 2021 data collection was mostly finished up.

Recruitment of Farms

Following the random selection process, a few rules and communication protocols were followed during the contacting process:

- Recruiters were obliged to contact farms in the order of the recruitment list provided by MNP's central data processing team. A minimum of three attempts per farm was required.
- Recruiters undertook all efforts possible to encourage participation in the survey.

- Every action (i.e., calls, visits) undertaken was recorded along with a summary of the conversation and potentially the reason for refusal.

MNP's central data processing team monitored the acceptance rate and provided reports to OMAFRA to enhance the participation rate.

When a producer agreed to take part in the COP, the farm was included in the COP for all three COP years (i.e., 2019-2021) where possible. The producer was also be asked to participate in the piloting of the benchmarking tool and the technical sector risk analysis.

OMAFRA, MNP's offices in Ontario, and other industry stakeholders continued to promote participation in the COP study among Ontario dairy goat producers.

Data Collection

To gather information from the participating farms, data collectors contacted the producers a minimum of two times per year. A contact is defined as a phone call, email, virtual meeting, or on-farm visit, where information on COP-related activities was gathered. The method used to contact the producers depended on producers' preferences.

Data collection then took place during those contacts using the data collection templates (Microsoft Excel workbooks) designed by MNP. Afterwards, MNP data collectors reviewed the data collected to ensure it was complete and conducted follow-ups if there were any outstanding questions.

Data was collected on a calendar year basis, and adjustments were made for those farms with a non-December fiscal year-end. Data for farms with fiscal year-ends ending in November, December, January, and February were not adjusted as there were no significant changes to inventories due to, for example, harvesting of crops. Data for farms with other fiscal year-ends was adjusted.

After a workbook was deemed complete, it was submitted to MNP's central data processing team.

COP Calculation

COP Enterprises

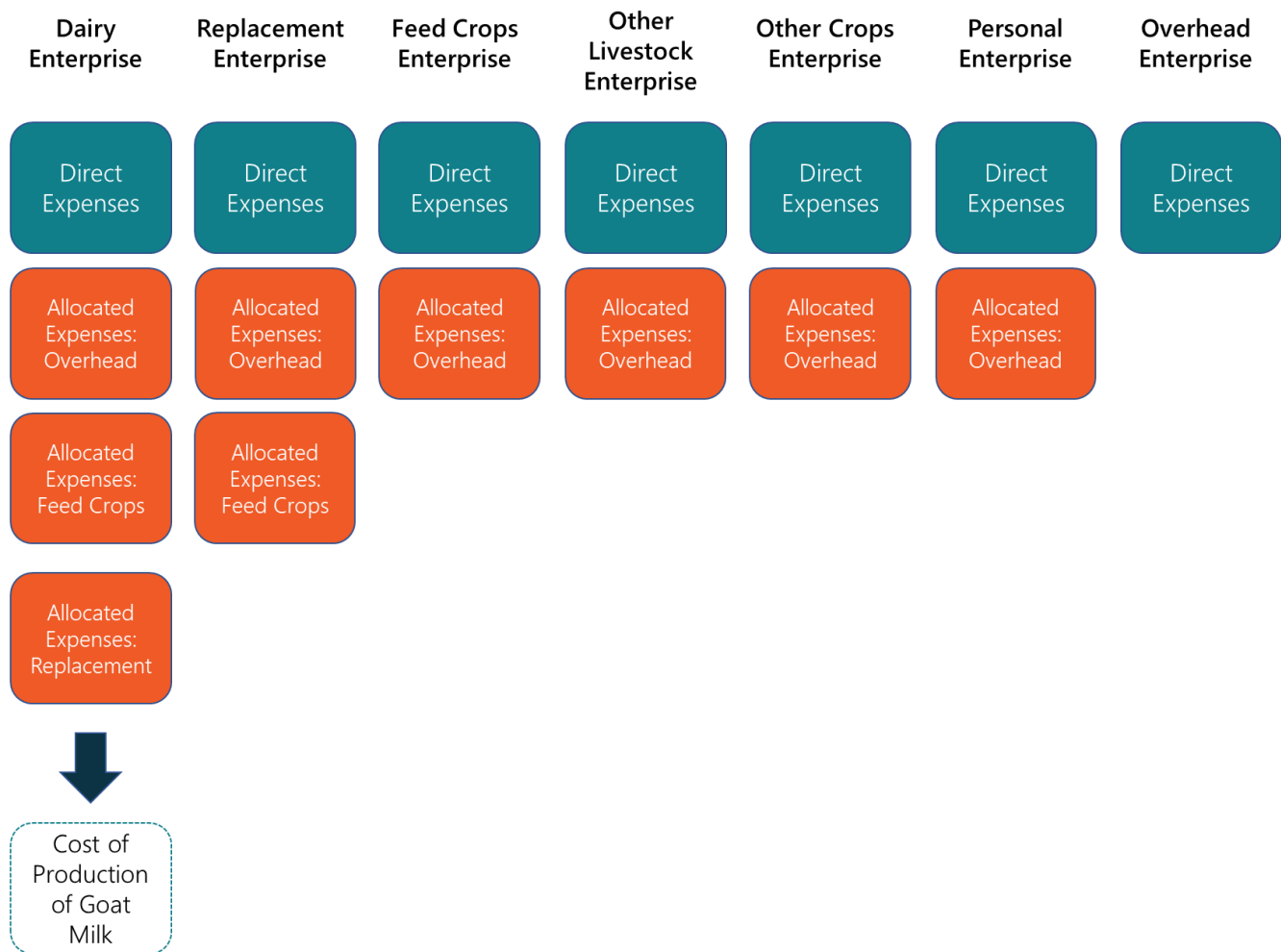
Transactions occurring on the farm were separated and categorized into enterprises, which include:

- The dairy herd enterprise, which accounts for all transactions incurred in the direct production of milk.
- The replacement herd enterprise, which accounts for all transactions directly related to the raising of replacement doelings.
- The feed crops (i.e., hay, haylage, silage, corn, other grains) enterprise, which accounts for all transactions directly related to the growing of crops for feed on the farm.
- The other livestock (e.g., beef cattle, horses, poultry) enterprise, which accounts for all transactions directly related to the raising of other types of livestock not used for goat milk production.
- The other crops or cash crops enterprise, which accounts for all transactions directly related to the growing of other types of crops not used for feeding the dairy herd or replacement herd.
- The personal enterprise, which accounts for all transactions directly related to personal matters.

- The overhead enterprise, which accounts for costs jointly used by all farm enterprises and subject to allocation.

After all the data (e.g., income and expenses, assets and liabilities, labour costs) for the period of a calendar year had been categorized into these enterprises, all costs were reallocated from the overhead enterprise as well as the various crop enterprises to the dairy and replacement enterprises using an appropriate allocation methodology. This is to account for the fact that the cost of growing feed crops that are being fed to either the dairy herd or replacement herd are included in the cost of producing milk, based on the amounts consumed by the various enterprises. Since every producer operates his farm slightly different from others, the appropriate allocation methodology was discussed with the producer during data collection as opposed to choosing standardized allocations used in previous COP studies for this industry.

In addition, costs associated with raising the replacement herd were also reallocated to the dairy herd based on the percentage of the replacement herd that was transferred to the dairy herd during the year. As such, this allows the final COP to only consider those costs associated with goat milk production and excludes any other costs. The process of reallocating costs is shown in Figure A.1. Figure A.1: Process of Cost Reallocations



COP Components

The actual costs of the dairy herd enterprise and the replacement herd enterprise that make up the Cost of Production for producing goat milk were reported separately for the following four major cost categories:

- Cash costs: this category includes annual costs related to the dairy and replacement herds.
- Government rebates and other income: this category includes any rebates and income received that reduce the COP.
- Family labour: this category includes the return provided to the producer based on the labour hours supplied by the producer and other family members to manage and run the farm daily based on standard labour rates.
- Capital expenses: this category includes the expenses associated with the financing and depreciation from the use of fixed assets on the farm.

It should be noted that actual costs for the dairy herd enterprise include those costs related to the replacement herd enterprise but were transferred to the dairy herd enterprise based on the percentage of the replacement herd that is transferred to the dairy herd during the year. This percentage is calculated as the number of fresh does transferred to the dairy herd divided by the number of animal units produced in the replacement herd, where the latter element is based on the change in inventory and net sales of each replacement category during the year and a unit weight based on the average live weight of a mature doe (see Table A.1). An example of this calculation is provided below.

Table A.1: Animal Unit Weights

Type of Livestock	Weight	Animal Unit Weight
Doe	75 kg	1.00
Bred Doeling	45 kg	0.60
Open Doeling	45 kg	0.60
Female Kid	15 kg	0.20

Step 1: Calculate the number of animals raised within the replacement herd during the year.

Category	Opening Inventory	Births / (Deaths)	Purchases / (Sales)	Transferred In	Transferred Out	Ending Inventory
Female Kids	11	4	0	NA	(6)	9
Open Doelings	9	(1)	(1)	6	(2)	11
Bred Doelings	10	0	2	2	(3)	11

Step 2: Calculate the number of animal units for the year.

Category	Ending – Opening – Sales – Deaths	Animal Unit Weight ⁷	Animal Units
Female Kids	9 – 11 – 0 = (2)	0.20	(0.40)
Open Doelings	11 – 9 – 1 – 1 = 0	0.60	0.00
Bred Doelings	11 – 10 = 1	0.60	0.60
Transferred to dairy	3 (equals bred doelings transferred out)	1.00	3.00
Total			3.20

Step 3: Determine the number of fresh does transferred to the dairy herd during the year.

For example, the number of fresh does transferred to the dairy herd during the year was 3 (see Step 1).

Step 4: Calculate the portion of costs to be transferred from the replacement herd enterprise to the dairy herd enterprise.

$$\begin{aligned} \% &= \text{fresh does transferred to the dairy herd} / \text{number of animal units produced in the replacement herd} \\ &= 3.00 / 3.20 \\ &= 93.75\% \end{aligned}$$

Cash Costs

Annual costs related to the dairy and replacement herds include the following:

- Purchased Feed: e.g., rations, milk replacer, forage purchases (including straw), feed grain purchases, protein supplements, vitamins and minerals, bedding
- Artificial Insemination and Veterinary Services: e.g., AI and other breeding costs (not including any purchases of breeding bucks), embryo transplants, veterinary services, drugs, and medicines
- Transportation, Fees, and Promotions: e.g., milk transportation, livestock registration, licensing fees, milk testing or laboratory fees
- Machinery & Equipment Repair & Maintenance: e.g., on dairy equipment, feeding equipment, field machinery equipment, tractors, trucks, cars, machinery rentals
- Fuel & Lubricants: e.g., diesel fuel, gas (regular and dyed), propane, oil
- Custom Work: e.g., hoof trimming, manure removal, manure spreading, field activities
- Crop Inputs: e.g., fertilizers, chemicals, seed, seed treatments or cleaning, soil testing, and other crop costs such as baler twine and silage bags.
- Professional Fees: e.g., accounting fees, legal fees
- Other Animal Costs or Miscellaneous Costs: e.g., office supplies, subscriptions, driver's licenses, farm advertising and promotion, milking supplies, livestock transportation, deadstock removal, registration and show fees
- Land & Building Repairs & Maintenance: e.g., on buildings, fences, drainage, small tools and hardware, pest control and sanitation, land and pasture rent, building rent

⁷ Based on the live weight of a mature goat.

- Property Taxes and Insurance: e.g., property taxes, fire insurance premium, insurance on machinery and equipment, livestock insurance, crop insurance premiums, car and truck insurance, accident and liability insurance, life insurance
- Utilities: e.g., telephone, internet, alarm system, hydro, natural gas, water services
- Hired Labour: e.g., salaries and wages for non-family members, employment insurance premiums, worker's compensation, pensions, health benefits, other staffing costs for non-family members
- Purchase and Sale of Animals, e.g., breeding bucks

Many of these costs were recorded using the producer's Income & Expense statement, excluding GST and PST, and appropriate allocations for the different enterprises.

Government Rebates and Other Income

Rebates received that reduce the COP include the following:

- Rebates received from government, e.g., COVID-19 related income
- Other income received, e.g., manure sales, patronage dividends, exhibition prizes, gasoline rebates (if not included in patronage dividends)

Family Labour

Family labour costs were estimated based on the number of hours worked by the producer and their family and a set of fixed wage rates. The following categories make up the total family labour costs:

- Management Labour
- Other Family Labour

A producer was defined as the individual or individuals with a share of ownership of the farm, a vested interest and is directly involved in the daily operations of the farm. Since there are significant differences among farms in terms of labour compensation paid out to producers and family members (both monetary and non-monetary), MNP's recommendation was to estimate the number of hours worked by a producer and their family members and multiply these hours by a set of fixed wage rates. As such, any labour from the producer and their family members received a return for the number of hours worked on the farm to produce milk and other activities, regardless of whether the producer or their family members received a salary for their labour provided. It is for that reason that all family members' salaries are **excluded** from hired labour cash costs.

Family members included the producers themselves, the producer's spouse, children, grandchildren, siblings, parents, and in-laws. Any other individual working on the farm who does not meet this definition was considered as hired labour, and their salaries and benefits are reported as hired labour cash costs.

Data collectors collected data on labour hours by using timesheets (Figure A.2), which were completed by all individuals working on the farm, both family members and hired employees, to record all time spend on activities related to the dairy as well as other activities on the farm. This process was done together with the producers and their employees in the first COP year, to ensure all categories are captured. Timesheets were reviewed and adjusted accordingly in the following two COP years.

All timesheets were validated for reasonability by both data collectors and MNP’s central data processing team given a set of parameters. Total labour hours are reported as total family labour hours (full-time and part-time) and total hired labour hours (full-time and part-time).

Figure A.2: Example of Timesheet

Timesheet by Month

PERSON'S NAME: _____

CLASSIFICATION - Owner, Family, or Employee: _____

		January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
WORK IN THE BARN	DAIRY COWS & BULLS Milking, feeding, herd management, milking equipment maintenance, milk house maintenance, health care, breeding, manure removal etc.													0.00
	REPLACEMENT HERD Feeding, health care, herd management, manure removal etc.													0.00
	OTHER LIVESTOCK: BEEF, SWINE, ETC. Feeding, health care, herd management, manure removal etc.													0.00
	COMMON LIVESTOCK WORK Cleaning stables and troughs, preparing rations, silo unloading, etc.													0.00
MAINTENANCE & REPAIRS	FIELD MACHINERY Maintenance and repairs of field machinery													0.00
	OTHER BUILDINGS Maintenance and repairs of farm buildings other than the main dairy barn and the house													0.00
	BARNYARD & FENCES Maintenance and repairs of barnyard and fences, snow removal, mowing, etc.													0.00
	LAND Stone picking, road ditches, farm lanes, etc.													0.00
FIELDWORK	ADMINISTRATION & MANAGEMENT Bookkeeping, dairy and professional meetings, errands, professional reading, agricultural courses, banking, training of employees, scheduling, etc.													0.00
	FIELDWORK FOR FEED CROPS Cultivating, planting, spraying, spreading manure, harvesting, hauling, etc. of feed grains and hay/storage/silage crops													0.00
	FIELDWORK FOR OTHER CROPS Cultivating, planting, spraying, spreading manure, harvesting, hauling, etc. of other crops not used for feed													0.00
OTHER WORK	CONSTRUCTION, LAND CLEARING Building construction, tree removal, etc.													0.00
	CUSTOM HIRE FOR OTHERS Off-farm work for others using farm equipment													0.00
TOTAL		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Once the labour data was received, MNP’s central processing team applied an adult equivalency adjustment to the labour hours of non-adult family members, defined as younger than 16 years of age. The adjustment reflects 80% of the adult hours, which reasonably reflects the ability of the non-adult family members to perform specific tasks.

As the timesheet had a separate section to record any hours related to administration and management, which can be performed by both family labour and hired labour, no additional adjustment was applied to the total hours received and accepted for the specific farm to ensure administration and management hours are recorded.

Capital Expenses

Expenses associated with the financing and use of capital items include the following:

- Interest Paid
- Building Depreciation

- Machinery & Equipment Depreciation
- Inventory Value Adjustment

Interest Paid

Interest expenses were recorded from a producer's Income & Expense statement, like the cash costs described above.

Building, Machinery & Equipment Depreciation

Depreciation for buildings, machinery and equipment was automatically calculated by recording all fixed assets that are owned by the farm, its original purchase price and date, allocation across the different COP enterprises, and by applying a 20% salvage value of the asset. Table A.2 shows the recommended depreciation rates for the different asset classes.

Table A.2: Recommended Depreciation Rates

Asset Class	Description	Depreciation Rate
0	Land	0%
6	Buildings Drainage structures Silage pits, grains bins, and any other form of silos	5%
7	Manure storage structures	10%
8	Milking equipment Feeding equipment Fieldwork equipment	10%
9	Manure handling equipment	15%
10	Motorized equipment	15%
11	Electronic equipment	40%

An overall list of fixed assets was recorded in the first COP year, whereas in the following COP years only asset purchases and sales of the respective year were recorded. For asset sales, only the sale date was required, as depreciation then was calculated for the time the asset was present at the farm. The original purchase price of fixed assets was determined using an asset list from the producer's accountant, an invoice or a best guess or reasonable estimate by the producer in case the first two options were not available.

Inventory Value Adjustment

To be able to take into account price changes of major categories of inventory, MNP recommends allowing for an inventory value adjustment as part of the capital expenses. As such, the following inventories are recorded at the beginning and end of each COP year:

- The value of animal inventory: the sum of the number of head for every livestock category (i.e., milking and dry does, bred does, open does, female kids, male kids, and breeding bucks) multiplied by their

respective unit value. Table 16 shows the average price reported per livestock category by all producers in the sample that were applied across the entire sample.

Table 16: Average livestock values, 2019-2021

Livestock Category	2019	2020	2021
Milking does	\$452.35	\$464.84	\$487.50
Bred doelings	\$405.94	\$410.31	\$415.63
Open doelings	\$334.38	\$335.16	\$350.12
Female kids	\$165.57	\$170.39	\$187.50
Male kids	\$123.93	\$145.00	\$165.28
Bucks	\$712.53	\$732.97	\$777.69

- The value of feed crop inventory: the total number of metric tonnes for every feed crop multiplied by their respective unit value, as reported by the producer.

COP Calculation

After the data had been received and validated, MNP's central processing team calculated the Ontario COP for goat milk production according to the following steps:

- An exclusion factor is applied by removing those farms from the sample for which the data has been deemed incorrect and any follow-ups with the producer did not result in a clarification of the data.
- Removed any outliers with a total COP outside two standard deviations of the mean of the COP.
- Calculated the provincial COP by calculating the weighted average of the participating farms in terms of standardized litres produced and per doe.

Reporting

After the Ontario COP for goat milk production has been calculated, MNP distributed producer benchmark reports among the participants. The report consisted of the Ontario COP, certain line items as well as the producer's own information for the three COP years (i.e., 2019, 2020, and 2021). Besides reporting on cost items, the producer benchmark report also showed the following:

- Revenue items: milk sales and livestock sales per standardized litre, per year, and per doe
- Balance sheet items:
 - Value of other assets such as supplies, cash, equity in cooperatives, investments, and equity in federal business risk management programs (e.g., AgriInvest), all per standardized litre, per year, and per doe
 - Value of both short-term (with a term of less than one year) and long-term liabilities, such as bank loans and mortgages, all per standardized litre, per year, and per doe.



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