#02-July 2021

2020 Results

Executive summary

The 2020 CDN COP Network is made up of 25 cow-calf and 3 dairy-beef production systems with 115 participants across Canada. The Network represents a wide variety of production systems varying in animal performance traits, economies of scale, labour productivity, feeding systems, and financials. The purpose of the network was to provide national coverage, and therefore, oversampling in the east was deliberate; to fill data gaps. Future data collection will focus on adding missing productions systems such as herds over 400 head, a wider variety of herd sizes in each province, and operations using primarily by-product feedstuffs.

The CDN COP Network provides detailed data for producers when evaluating similar production systems; this reflects the type of producers that participated and is different from the 2017 Farm Management Survey (FMS) results for several production parameters. For example, the average mature cow weights were higher in the CDN COP Network at 1,325 lb compared to FMS (2017) at 1,256 lb. The 205-day adjusted weaning weights were also higher at 566 lb in the CDN COP network compared to an average of 529 lb in the 2017 FMS. The CDN COP Network producers reported a higher weaning rate at 88.5% than the 2017 FMS Canadian average of 81% for cows and 72% for heifers.

For feedstuffs in the 2017 FMS, there was a lower representation of swaths or windrow crops at 19% of Canadian farms compared to the CDN COP Network with swaths at 28%. Cereal silage use was similar around 40% for both, but there was a lack of corn only silage use in the CDN COP Network. In the FMS (2017), 43% of Canadian farms use residuals or aftermath growth, this was under-represented in the network as only 8% of production systems used crop residue or aftermath grazing. Some points the CDN COP Network missed relative to the FMS (2017) were grazing details such as the breakdown of pasture types (native versus tame grasses).

Cost takeaways

The CDN COP Network average total costs were $1,123 per cow, with cash cost at 64% or $704/cow, depreciation cost at 11% or $130/cow, and opportunity costs at 25% or $290/cow. Eighty-four percent (21 out of 25) of farms covered short-term (cash) costs, 72% (18 out of 25) of farms were covering medium-term (cash and depreciation) costs, and 32% (8 out of 25) of farms were covering long-term (cash, depreciation and opportunity costs).

Producers who could cover all long-term costs often had two or more enterprises generating revenue. They also only generated revenue from agricultural activities and had lower unpaid hours per cow spent. Rather than working off the farm to generate income, these operations focused on having multiple enterprises and building positive economies of scale. AB-5 represented one of these operations and had the lowest costs per cow and per pound weaned. Its success was due to using a variety of feedstuffs such as hay, swaths, and silage, and reducing equipment costs through contracting custom work. This operation illustrates that producer can still have low costs even if they have to purchase a portion (20%) of their feed.

Future of CDN COP Network

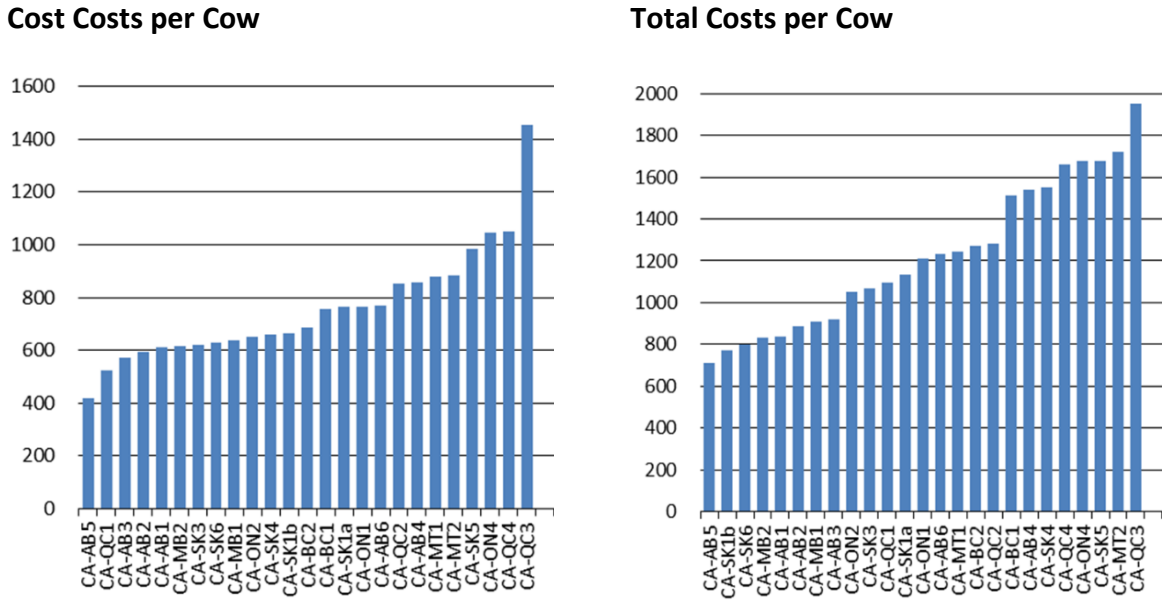
The CDN COP Network provides opportunities for producers to compare their operations to a similar production system. Although not all productions systems are represented yet, the 25 cow-calf baselines provided a starting point to compare cow-calf production nationally and internationally. Over 2022 and 2023, data collection will continue with a focus on filling the missing production systems.

Introduction

The CDN COP Network is the first standardized cost of production information available for every province with data collected from British Columbia to Prince Edward Island. A standardized methodology allows the information to be compared between provinces. In addition, this system will allow for international comparisons to be made with similar production systems in other countries. There were 25 baseline cow-calf farms and 3 dairy-beef farms developed, with 115 producers participating, using 2020 data with two farms in B.C., six in Alberta, six in Saskatchewan, two in Manitoba, three in Ontario, four in Quebec, and two beef and three dairy-beef in the Maritime provinces. Backward indexing to 2016 was completed, and individual farm summaries can be found at canfax.ca.

The CDN COP Network provides benchmarks based on specific production systems. This will allow producers to select the benchmark that makes the most sense for their operation, regardless of provincial boundaries. It also recognizes that within a province, there is significant variation in the choice of production systems.

Figure 1: CDN cow-calf supply curve based on cost per cow

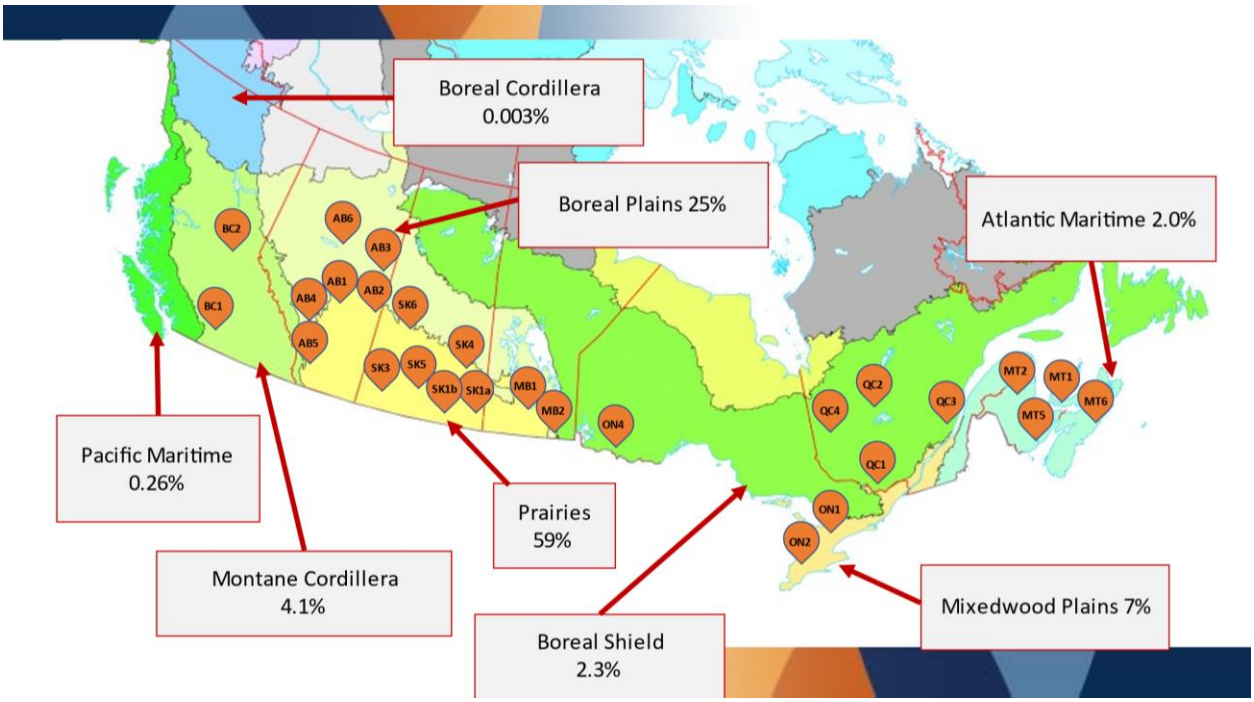


This variety in production systems creates a supply curve, as shown in Figure 1, with the cost structures for different cow-calf production systems. This highlights the opportunities available by examining differences in cost structures. It should be noted that the sample size is too small to create provincial averages at this point as some provinces may have production systems that are to the left or right of a normal distribution and therefore are not representative of production as a whole in those provinces. Further data collection is planned for 2022 and 2023 to fill gaps in production systems in various provinces.

Geographic locations

The 25 baseline cow-calf farms were located in a variety of eco-regions. Figure 2 provides the general locations of each of the baseline farms included in the 2020 CDN COP Network and the percentage of the national beef cow herd in each eco-region. The purpose of the network was to provide national coverage, and therefore, oversampling in the east was deliberate; in an effort to fill data gaps. In the west, most baseline farms were located in the Aspen Parkland, along the boundary between the Prairies and Boreal Plains. It could be argued that more farms are needed in the Prairies, where 59% of the national beef cow herd is located.

Figure 2: CDN COP Network baseline farm locations

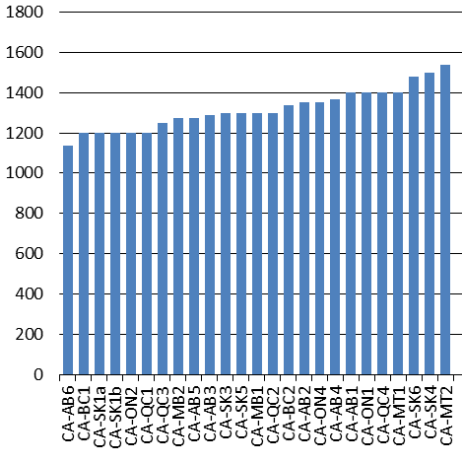


Animal performance

The following statistics compare the animal performance metrics from the CDN COP Network to the 2017 Farm Management Survey to provide an indication of the robustness of the dataset and make clear where differences occur as these limitations need to be kept in mind when interpreting the CDN COP Network results.

Mature cow weight

Figure 3: Mature cow weight by baseline farm



Mature cow weights ranged from 1,138 lb for the AB-6 production system to 1,540 lb for the MT-2 production system. The average mature cow weight for the CDN COP Network was 1,325 lb. The 2017 Farm Management Survey (FMS) reported mature cow weights to be lower with a CDN average of 1,256 lb with a range of 1,196 lb in Ontario to 1,299 lb in Saskatchewan. However, the 2013 Western Cow-Calf Survey reported an average cow weight of 1,374 lb.

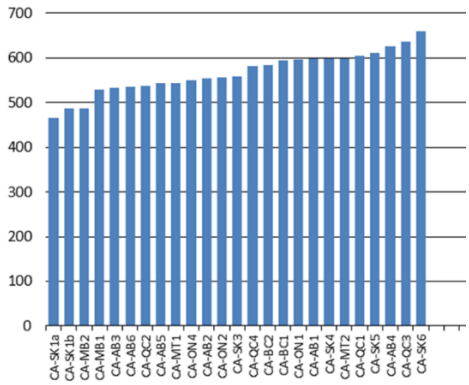
See the "Cow weights and profitability" section for more information.

Weaning weights

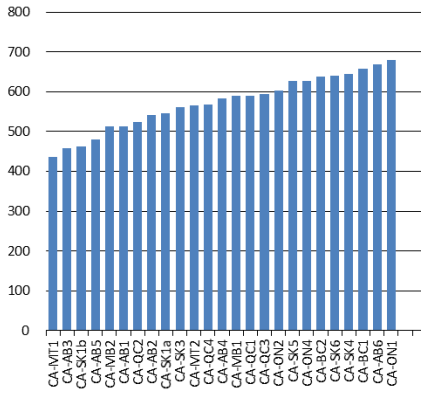
Weaning weights ranged from 465 lb (SK-1a) to 659 lb (SK-6) (Figure 4). The average weaning weight for the CDN COP Network was 558 lb compared to the 2017 FMS at 523 lb. The 205-day adjusted weaning weight ranged from 436 lb (MT-1) to 680 lb (ON-1) with an average of 566 lb in the CDN COP network compared to an average of 529 lb in the 2017 FMS weaning weight. The heavier weaning weights reflect the heavier cow weights in the CDN COP Network.

Figure 4: Ranked weaning weights across Canada

Weaning weight



205-day adjusted weaning weight



The 205-day adjusted weaning weight as a percentage of mature cow weight was on average 44% (ranging from 31% in AB-6 to 59% in MT-1) for the CDN COP Network, compared to the FMS (2017) with a CDN average of 43% (ranging from 45% in BC to 41% in M.B.).

Calf mortality and weaning rates

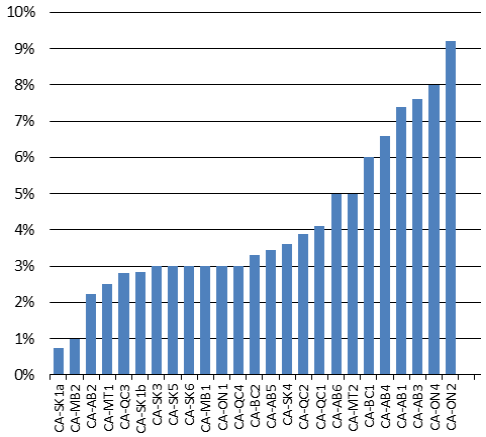
The CDN COP Network defines calves born alive after 24 hours, and therefore, calf death loss is calculated from 24 hours old to weaning. The lowest calf death loss after 24 hours was 0.8% (SK-1a) and the highest at 9.2% (ON-2) as illustrated in Figure 5. It should be remembered that

the farms with the lowest calf mortality may have higher losses within the first 24 hours that are captured in the calves born alive after 24 hours and weaning rate. When evaluating calf mortality after 24 hours, the herd size will also impact the calf death loss percentage as a small herd with a loss of four calves may have a 5% calf death loss. In addition, some of the production systems, such as BC-1 and ON-2, experienced high losses due to predators.

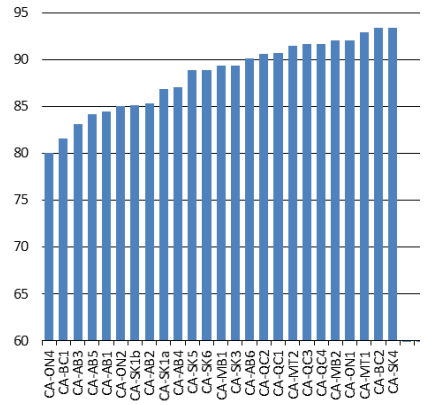
The weaning rate for calves weaned per 100 cows ranged from 80 (ON-4) to 93 (SK-4), with an average of 88.5 (Figure 5). The CDN COP Network producers reported a higher weaning rate than the 2017 FMS at 81% and for heifers at 72% for the CDN averages. As weaning rate is a critical contributor to profitability, this would suggest that the CDN COP Network results are skewed to the more productive operations.

Figure 5: Ranked calf mortality and weaning rates across Canada

Calf mortality

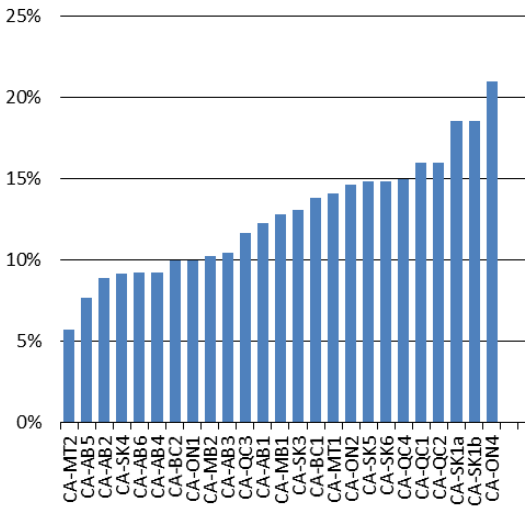


Weaning rate



Replacement rates

Figure 6: Ranked replacement rate across Canada



The CDN COP Network calculates replacement rate as the number of cull cows plus the number of cows that died as a percentage of the total cows (Agri benchmark, 2015). Replacement rates ranged from 6% (MT-2) to 21% (ON-4). In the 2017 Western Canadian Cow-calf Survey (WCCCS), the culling rate was 11.7%, similar to a replacement rate of 12.2% for the western production systems in the COP Network.

Producers with higher replacement rates tend to cull cows earlier, decreasing their productive years. This is offset by the fact that younger cows tend to have lower depreciation due to a higher salvage value as opposed to selling older cows the depreciation increases (see Equation 1) (Berger, 2014). See the Cow Depreciation fact sheet for more details on strategies to decrease cow depreciation.

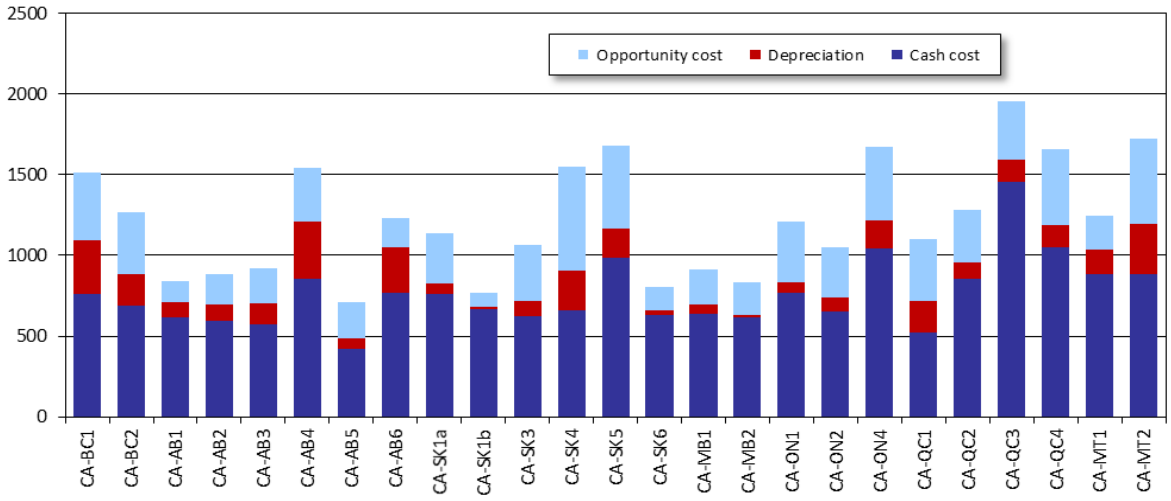
Equation 1: $\text{Cow depreciation} = \frac{(\text{Purchase Price or Replacement Cost} - \text{Salvage Value})}{\text{Productive Years in the Herd}}$

Cow-calf profitability

The CDN COP Network average total costs were $1,123 per cow, with cash cost at 64% or $704/cow, depreciation cost at 11% or $130/cow, and opportunity costs at 25% or $290/cow (Figure 7). QC-3 has the highest cost at $1,952 per cow, and AB-5 has the lowest costs at $709 per cow. Refer to the *Case study* section for a further discussion on AB-5 low-cost methods.

Eighty-four percent (21 out of 25) of farms covered short-term (cash) costs, 72% (18 out of 25) of farms were covering medium-term (cash and depreciation) costs, and 32% (8 out of 25) of farms were covering long-term (cash, depreciation and opportunity costs).

Figure 7: Cash, depreciation, and opportunity costs CDN / per cow



Opportunity costs are calculated for land, labour, and capital. The opportunity cost of land is the land rent for a new contract in the case that farm rent out their own land, reflecting the future cost of renting land. The opportunity cost of labour is the calculated wage for unpaid family labour, either as an off-farm salary or farm manager salary. The opportunity cost of capital is calculated as the interest rate for long-term government bonds multiplied by equity without land.

Economies of scale

In the CDN COP Network, there are a range of herd sizes in most provinces, but currently, the large 400 head or greater herds are missing as shown in Figure 8. Compared to the 2016 Census of Agriculture (COA) (Figure 9), operations for 237 head or greater make up 28% of Canada's beef cows. Ideally, these would be captured in the next round of data collection for the CDN COP Network. The largest production system in the CDN COP Network has 350 head (SK-1b), and the smallest with 35 head (MT-2). Manitoba only has more than 200 head operations, while Saskatchewan only has less than 100 head operations. Having a range of herd sizes in each province would be ideal.

Figure 8: Network herd sizes

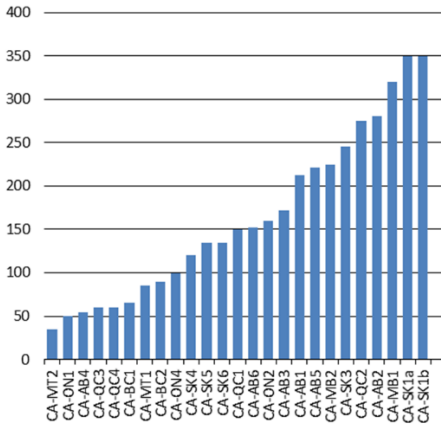
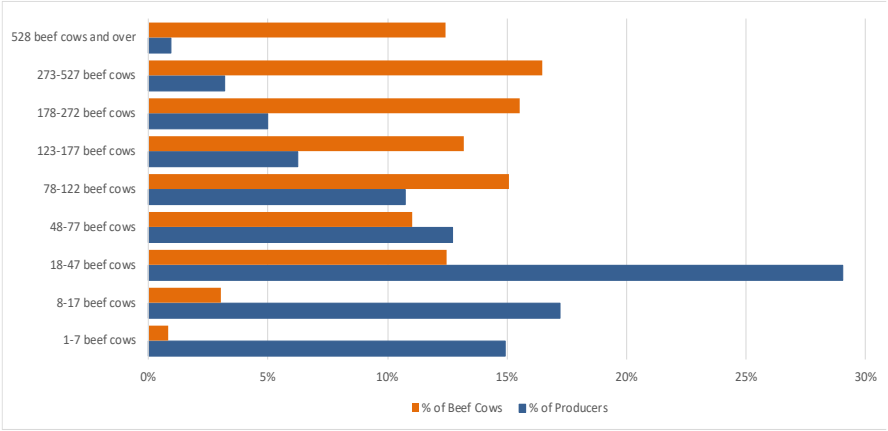
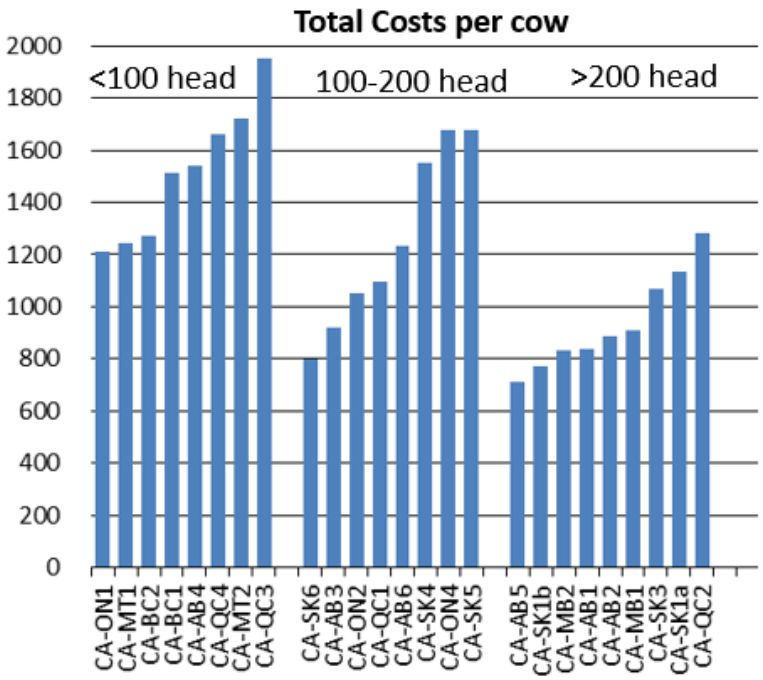


Figure 9: Herd size and producers' percentage across Canada



In the CDN COP Network, the cost per head is relatively lower as herd sizes grow, as shown in Figure 10. Larger heads may experience decreasing costs per unit of output, commonly known as economies of scale. As some operations get larger, they may experience diseconomies of scale when the costs per unit begin to increase, however that is typically seen at much larger herd sizes than seen here. Therefore, the upward slanting slope within each of the herd size categories reflects competitiveness and opportunities for improvement within each herd size grouping.

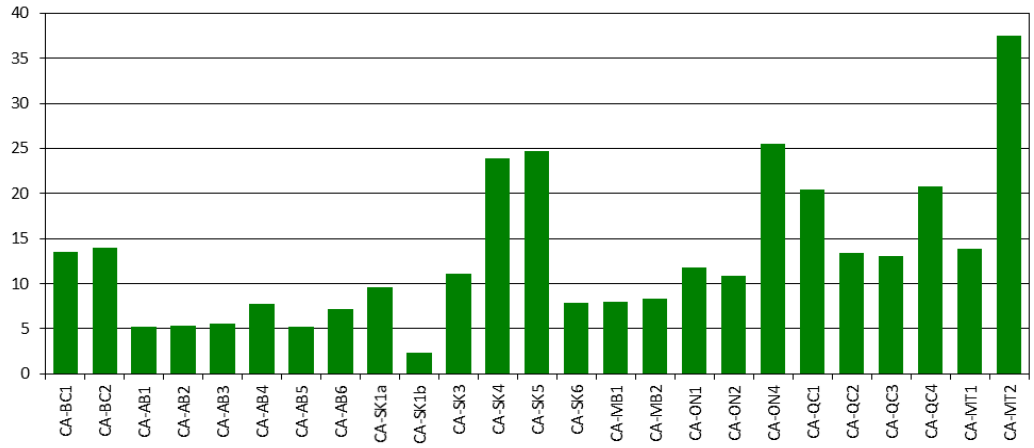
Figure 10: Cost per cow based on herd size



Labour productivity

Labour productivity (hours per cow) widely varied within the CDN Network, with a range of 2.4 hours per cow to 37.6 hours per cow with an average of 12.5 hours per cow (see Figure 11). Overall, 81% of the average labour hours were unpaid within the production systems.

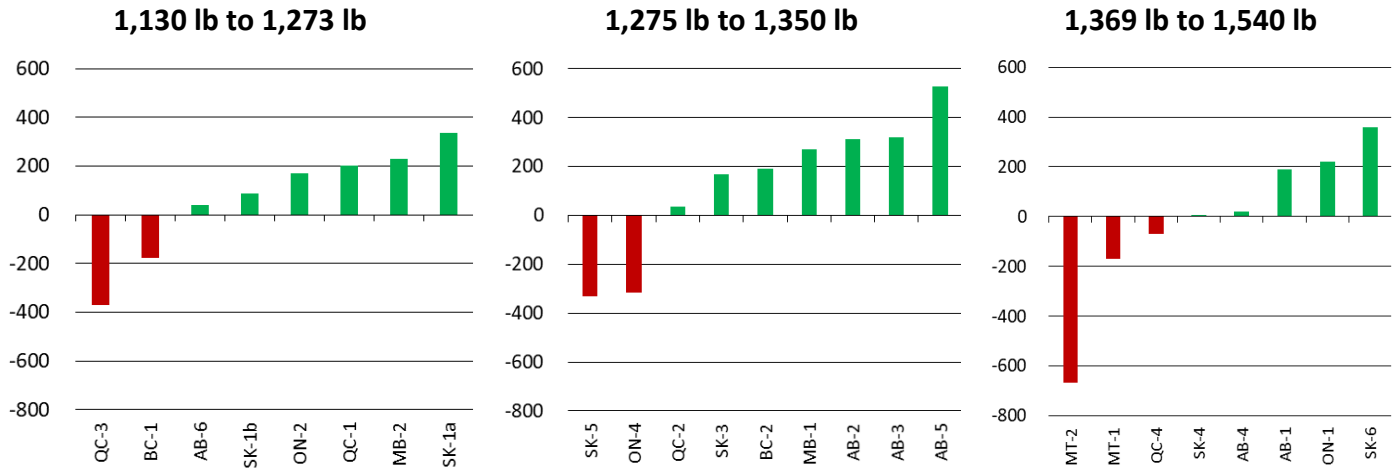
Figure 11: Labour hours per cow



Cow weights and profitability

A study by Feuz, Russell, and Fuez (2021), found that smaller cows (1,000 lb) generate the greatest net returns when grazing is charged on an Animal Unit Equivalent (AUE basis). Smaller cows have significantly lower costs per head for a resource basis, but smaller cows were not found to generate the most revenue per cow. This was offset by being able to run more head per acre. In comparison, when grazing is charged per head, the larger cows (1,400 lb) generate a greater net revenue as the revenue from heavier calves outweighs the feed costs (Kelln, et al., 2011). Figure 12 represents the lowest to highest average mature cow weights impact on the production systems income within the CDN COP Network. Producers face the trade-off between larger cows to wean heavier calves or smaller cows that save on inputs. It should be noted that there are both profitability and negative returns for each weight category as things other than cow weight have a greater impact on profitability.

Figure 12: Profitability sorted by cow weight



Lowest one-third cow weight

Six out of eight (75%) of production systems within the lowest one-third cow weights make a profit. In this category, the largest herds of 350 head were included with small mature cows (SK-1a and SK-1b). Producers with smaller mature cows can often have higher inventories without the need to expand their land base compared to the same inventory with larger cows. When looking at weaning weights, the SK-1a and SK-1b production systems have the lowest weighing weight, and the 205-day adjusted weaning weights are in the bottom half. Sale weight is made up of numbers, not weight per animal. Weaning weight as a percentage of mature cow weight ranged from 37% (SK-1a) to 49% (QC3), with an average of 42% for the lowest one-third mature cow weights. The CDN COP production systems show it is easier to get a higher percentage weighing weight relative to mature cow weight with smaller cows, but it is not necessarily profitable solely on this indicator.

Highest one-third cow weight

Five out of eight (62.5%) production systems with the highest one-third cow weights make a profit. The production systems with larger mature cows have 135 head or less, possibly showing that it is more sustainable to have lower cattle inventories with more resources needed. The increased calf value must outweigh the increased cow costs to acquire income (Lalman & Beck, 2019). The weaning weights and the 205-day adjusted weaning weights from the larger mature cows are not constant like the calves from the small mature cows. Producers may need to evaluate their cattle genetics and nutrition to ensure their cows are paying off their trade-off in more resources for increased weight sold per calf. Weaning weight as a percentage of mature cow weight ranged from 39% (MT-2) to 49% (AB-4 & SK-4), with an average of 43% for the highest one-third mature cow weights. The profitable farms had percentages of 41% or higher, showing that a greater weaning weight relative to mature cow weight is preferred to make a profit.

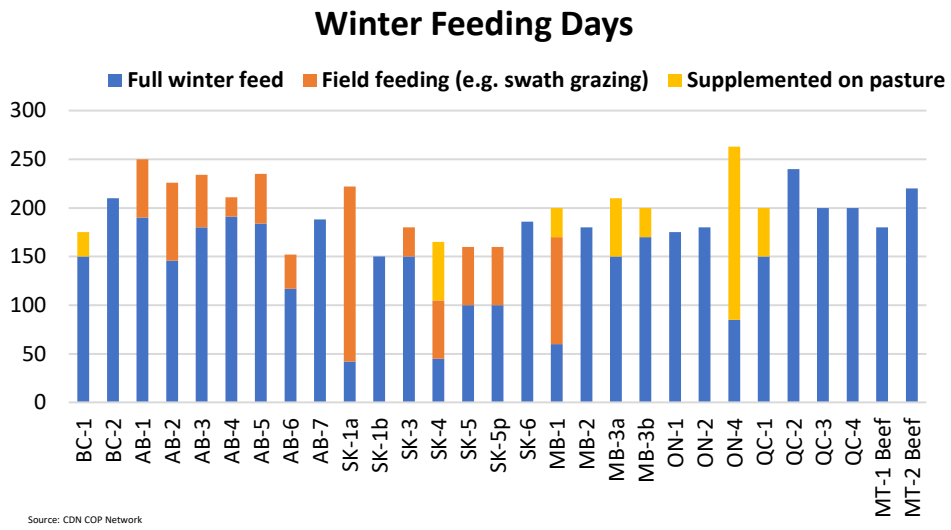
Winter-feed systems

The winter feed rations are a key part of a cow-calf operations cost structure. The model uses the winter feed rations to calculate feed requirements and costs. Cost of production is used for homegrown feed and market value for any purchased feed as rations are entered "as fed," including moisture content. This is where there is the greatest risk of error as moisture content can vary significantly from year to year depending on harvest conditions. It also makes the cost estimates sensitive to the moisture content used. All rations were reviewed by one of five nutritionists located across Canada, who were familiar with the regional weather conditions and different feedstuffs.

Winter feeding days

Total winter-feeding days ranged between 150 and 263 days. Some farms used a combination of field feeding (such as swath or corn grazing) or supplementing a partial ration on pasture before going onto a full winter feed ration.

Figure 13: CDN COP Winter feeding days



According to the FMS (2017), 19% of CDN farms (29% of Alberta farms and 15% of SK farms) use swaths or windrow crops. The proportion in the CDN COP Network was greater at 28% using swaths was across Canada. Fifteen percent of CDN farms (17% of SK farms and 14% of Alberta farms) use standing corn in the FMS (2017), compared to the 12% of all CDN COP production systems. Nine percent of Ontario and 8% of MB farms use corn silage (5% CDN), with 41% of CDN farms using other field crop silage (ranging from 24% to 46%) compared to 40% of CDN COP Network farms using mixed cereal silage. In the FMS (2017), 43% of Canadian beef farms use residuals or aftermath growth, ranging between 31-53% in provinces. This is under-represented in the CDN COP Network as only 8% of production systems using crop residue or aftermath grazing.

Feed costs

A large proportion of cow-calf producers' total cost of production is associated with winter feed costs. Feed costs make up approximately 60% of production costs in Kaliel and Kotowich's (2002) study and 41% in CDN COP Network 2020 data. Using different winter-feeding systems, feed costs can vary by $0.70/hd/day between the highest and lowest cost system (Kelln, et al., 2011). Since Kelln's (2011) study a decade ago, there have been significant changes in the cost of feeds. A study by Jose et al. (2020) found that swath grazing was the lowest cost method, with forage costing $1.43/head/day[1] compared to drylot greenfeed forage costs at $1.75/head/day.[2]

Using the cost of production for homegrown feed and market value for purchases in the network divided by feeding days resulted in a range of $1.20/head/day (AB-5) to $3.94/head/day (BC-1) with an average of $2.30/head/day excluding QC-3[3] (Table 1). AB-5 has the lowest cost feed system feeding primarily hay along with swath grazing for 51 days, followed by 184 days on silage, straw, greenfeed, and barley in a pasture system with animals confined for 60 days for calving from mid-March to mid-May. The production systems with feed cost less than $1.50/head/day utilize swath grazing followed by a mix of silage and hay. The cases where production systems (AB-4, AB-6, SK-1a) used swath grazing, but the costs were greater than $2.00/head/day were due to higher non-factor feed costs. Non-factor costs are the sum of total costs minus the sum of labour, land, and capital costs including opportunity costs) (Agri benchmark, 2015). All the production systems with feed cost less than $2.00/head/day purchased 20% of their feed or less. QC-1 was unique where only home-produced hay was fed alongside purchased mineral and salt with low feed costs at $1.50/head/day. QC-3 was excluded from the average as it was 100% purchased hay. Overall, producers with the lowest winter feed cost primarily utilized extensive feeding and many used annual crops, hay and silage, as their feedstuffs.

Table 1: Winter feeding system for cow-calf production systems

Production system	Winter feeding days	$/head/day	Primary feedstuff
BC-1	**150**	**$3.94**	**Hay**
BC-2	210	$2.41	Hay
AB-1	190	$1.33	Silage
AB-2	146	$1.44	Annuals
AB-3	180	$1.32	Annuals
AB-4	191	$3.04	Hay
AB-5	**235**	**$1.20**	**Hay**
AB-6	117	$3.02	Hay
SK-1a	222	$2.22	Annuals
SK-1b	150	$3.50	Hay
SK-3	150	$1.98	Hay
SK-4	165	$2.98	Annuals/Hay
SK-5	160	$2.63	Silage
SK-6	186	$1.77	Silage

[1] Total swath grazing costs including forage, bedding, salt/mineral, labour ($18/hr), machinery, and infrastructure was $2.30/head/day.
[2] Total drylot greenfeed costs including forage, bedding, salt/mineral, labour ($18/hr), machinery, infrastructure, and manure removal costs was $3.12/head/day.
[3] QC-3 is an outlier as it is a start-up operation purchasing 100% of their hay.

MB-1	146	$1.65	Annuals
MB-2	180	$2.26	Silage
ON-1	175	$2.12	Hay/Silage
ON-2	180	$2.05	Hay
ON-4	233	$1.91	Silage
QC-1	200	$1.50	Hay
QC-2	240	$2.41	Hay
QC-3	200	$5.32	Hay
QC-4	200	$3.81	Hay
MT-1 Beef	180	$3.55	Hay
MT-2 Beef	220	$2.69	Hay

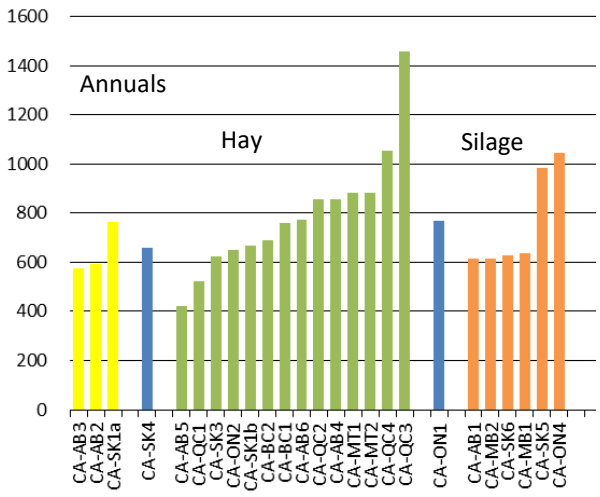
Each baseline farm was grouped based on their primary winter feedstuff. In general, there were those who used:

1. Hay/Haylage (operations with a hay/greenfeed mixed ration were included here)
2. Grazed Annuals (e.g. standing cover crops, swath grazing, corn grazing)
3. Silage
4. By-products

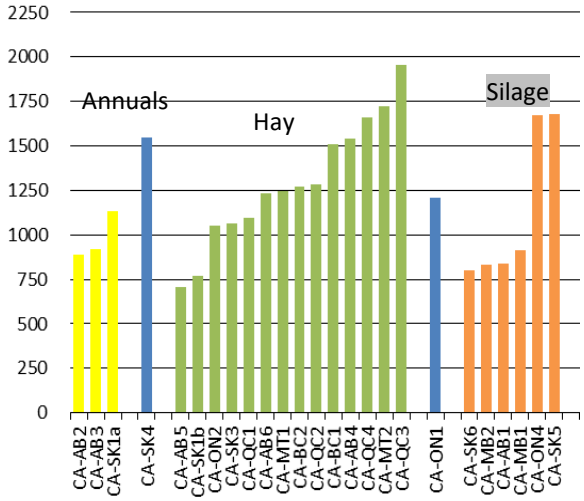
None of the 2020 baseline farms used primary by-products. This is something that could be included in future data collection. Cost structures by winter feeding system show that any feedstuff can be low cost and any feedstuff can be high cost (see Figure 14).

Figure 14: Cost per cow based on feedstuffs

Cash cost per cow



Total cost per cow



Case study

Lowest annual costs per cow wintered and per pound weaned annually

AB-5 was overall the production system with the most costs savings in terms of per cow wintered and per pound weaned annually within the 2020 CDN COP Network. The total production costs are the lowest at $671 per cow wintered and $1.62 per pound weaned. AB-5 has 221 head and calves in late March, weaning in early January at 543 lb. Calves are then

backgrounded for 45 days and sold at a weight of 600 to 660 lbs. By keeping calves for a pre-conditioning period, the producer can better market calves and hold for higher sale prices. AB-5 also has a relatively low cow culling rate at 6%, requiring fewer replacement heifers and a relatively low mature cow weight at 1275 lbs.

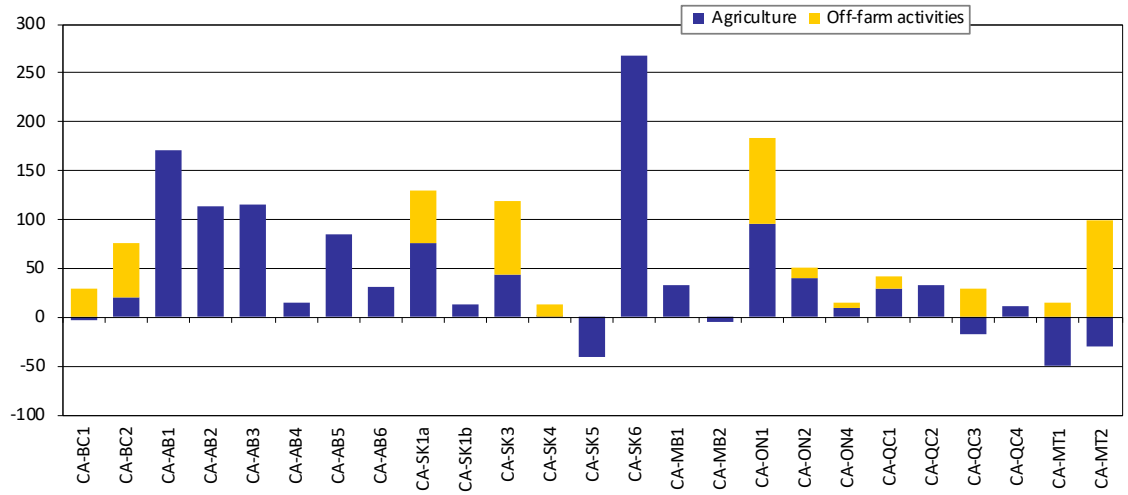
AB-5 feed costs were the lowest in the CDN COP Network at $167 per cow wintered and $0.40 per pound weaned (five-year average). AB-5 utilizes a mix of swath grazing, hay, and silage over 235 days. Their feed costs make up 25% of their total production costs (based on the 5-year average), which is significantly lower than the CDN COP Network average at 41%. Even though AB-5 has a feed deficit and purchases 20% of their feed, they manage costs by reducing equipment and fuel requirements through contracting custom work and reducing machinery costs.

Operation finances

Off-farm income versus farm income

Many production systems utilized off-farm activities to generate income. Producers often use off-farm income as a risk management strategy to ensure there is a source of revenue when farm production and profitability are low. In the CDN COP Network, various start-up, medium, and mature production systems had off-farm income (Figure 15). Forty-eight percent had off-farm income and 52% of farms only had agricultural-related income. Of those with off-farm income, 12% of all farms (3 out of 25) relied on off-farm income to be viable; while 36% (9 out of 25) had off-farm income that supplemented a profitable cow-calf enterprise.

Figure 15: Off-farm income versus farm income 1000 CDN$ per year



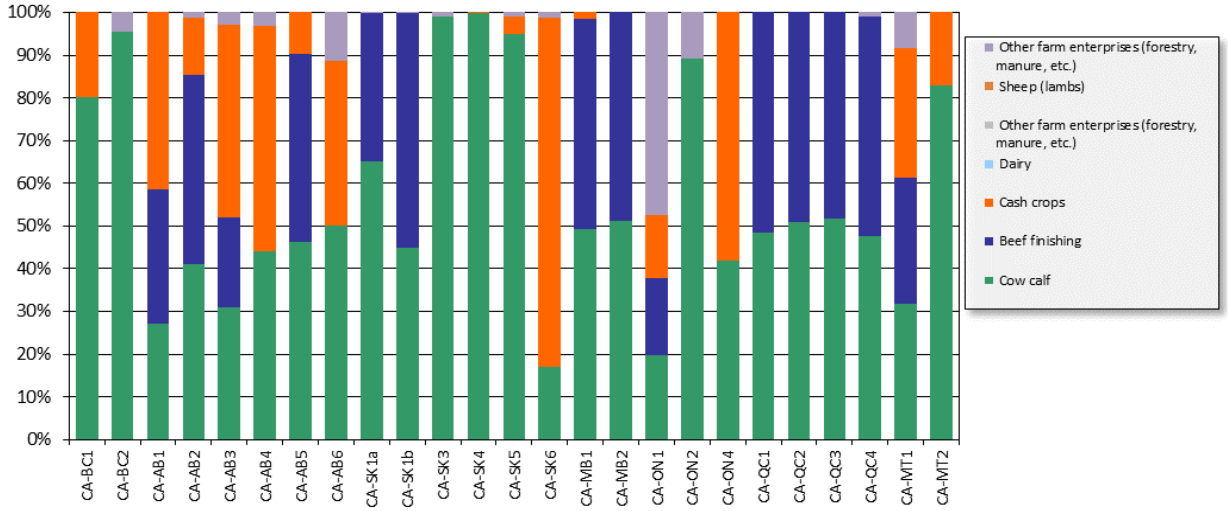
Enterprise revenue

Farm revenue can be broken down into the different enterprises on each baseline farm. Figure 16 illustrates the income percentage of different enterprises across the baseline farms. To calculate the costs of each enterprise, generic allocation was used for overhead costs. This method splits overhead costs based on the percent revenues from each commodity. The main concern is that all the overheads are covered by a mix of commodities rather than each

enterprise paying its own way. For more information on generic allocation, refer to the Methodology Fact Sheet.

Forty-eight percent of farms had the cow-calf enterprise represent greater than or equal to 50% of revenue, 44% of farms had the cow-calf enterprise represent between 25% to 50% of revenue, and 8% of farms had the cow-calf enterprise represent less than 25% of revenue. Diversified income streams on operations are a risk management tool used to counter-cyclical commodity cycles. Within the CDN COP Network, production systems with greater diversification had a greater return structure relative to those solely relying on cow-calf returns.

Figure 16: Percent of revenue from different enterprises



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