Economic Impact of Large Animal Livestock Production in the Yukon

Prepared For

Yukon Agricultural Association

Prepared By

Serecon Inc.

September 2019

serecon

September 30, 2019

Ms. Jennifer Hall
Yukon Agricultural Association
#203-302 Steele Street
Whitehorse, YT
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Dear Jennifer:

RE: ECONOMIC IMPACT OF LARGE ANIMAL LIVESTOCK FARMING
OUR FILE #347A19.1

We have attached our Final Report outlining the significant contribution that large animal production makes to Yukon. Our approach includes the use of economic multipliers and we have outlined our methodology and the results in the attached document. This includes estimates of the direct, indirect and induced impacts on the economy.

It has been a pleasure to conduct this study on behalf of Yukon Agricultural Association. Please do not hesitate to contact me with any requests for clarification or edits, or should you require any additional information.

Yours truly,
SERECON INC.

Markus Weber, B.Sc.Ag, MBA, LL.B., P.Ag.
Edmonton Office

Enclosure

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1.0 Executive Summary

This report outlines the past, current and future economic impact of large animal livestock sectors in the Yukon including elk, bison, and beef production. In general, it provides an economic impact assessment of game farming and the beef industry over the past 15 or 20 years, including a discussion of the current period. Net economic impacts to the Yukon economy have been determined from a valuation perspective, including consideration of all relevant revenues and costs related to the farming operations. To accomplish this task, estimates of the net value of three different but realistic operating realities have also been provided. This includes an estimate of historic industry operations before Chronic Wasting Disease (CWD) and regulatory change impacted the elk sector, current operating realities for all three sectors, and the potential economic impact of a realistic future industry state based on consultations with growers, government, and our understanding of the reality of these industries in other jurisdictions.

We begin by providing some background the industry in general to lay the foundation for how the industry has changed today and where it might go in the future. Following the background, we move on to our Industry Analysis section, which includes input from our consultations with industry stakeholders in the Yukon and from several other sources. Our financial projections show that under the irrigated scenarios, all three large animal livestock operations have encouraging results. What comes out in our analysis is the importance of irrigation to all three operations. For instance, for a cattle operation to payback an investment in land under the irrigated scenario (30 acres) it can do so in 6 years, however, under the dryland scenario (90 acres) it takes nearly 60 years. While the difference between dryland and irrigated are not quite as divergent for elk and bison, the importance of irrigation is still apparent. Using irrigation allows large animal livestock operations in the Yukon is important to the viability of these sectors going forward.

We recommend the following strategy for establishing a foundation for growth in the large-animal livestock sector in the Yukon:

- As the industry grows and develops critical mass, it will be essential that extension and outreach capacity be developed for new entrants. This should probably be an agriculture industry-led initiative, perhaps supported by public sector resources.
- To further develop the large-animal sector in a deliberate and organized fashion, having the responsibility for all of the species in the large animal sector will be essential. Given the scale of each of the sectors and the similar production techniques, it might make sense to have all three species under the responsibility of the Yukon Agriculture Branch.
- Producers would benefit from assistance with bringing in irrigation equipment and negotiating favourable purchase and freight prices.
- Given the high up-front capital cost of fencing, producers will need to find ways to finance their start-up. This could be through a combination of debt and equity financing, but could also benefit from public-sector contributions

to assist with either subsidizing the cost of the fencing or providing low-interest loans to facilitate construction.

- For the industry to grow, it will need access to more high-quality agricultural land. There is a need to develop the underutilized agricultural areas of the region surrounding Whitehorse. This land is lying dormant and utilizing it for sustainable grazing purposes offers an opportunity for the sector to contribute to the Yukon economy.

The financial projections and overall data on large scale animal production in the Yukon are used to complete our economic assessment for the Yukon in the following section. This can be broken down into the impact large animal agriculture has on Yukon's GDP, labour income, employment, and economic output. The direct and indirect impacts of Yukon large animal production on economic output were quantified at $880,425 at current output levels, and at $2,030,045 at future output levels. Our estimates indicate that, under the right conditions, the sector could generate over $2 million in total economic impact for the Yukon in the medium term.

2.0 Background

Large animal production has a long history in Yukon going back to the 1800's. The number of farming and livestock operations increased significantly during the Gold Rush in the region surrounding Dawson City, and today there are numerous large animal producers. Producers in the region have been focusing on increasing the size and health of the livestock industry, however, they face challenges due to their northern location.

For the sake of this economic assessment, large animal livestock production refers to three sectors: elk, bison, and beef. Serecon has conducted similar economic assessments for livestock production systems across Canada. Our work in the northern regions of Canada confirm that there are many challenges to conducting agricultural activities in this part of the world. Regarding growing crops, challenges are present with not only traditional row crops and horticultural products but also with livestock feed. In addition, the relatively short growing season provides fewer days without snow for grazing livestock, but also a limited season to grow and store feed for the long winter, which creates a challenge for raising livestock and providing locally produced protein sources.

Additional challenges for the sector include high freight costs to bring in any kind of inputs, building materials or equipment. Machinery costs, parts and other inputs that are necessary to raising livestock are all more expensive as a result of the distance from more populated agricultural areas such as, for example, central Alberta. These challenges can have an impact on the production of large animals because it increases costs. However, despite the challenges associated with raising livestock in the Yukon, there is a clear desire from local farmers to diversify their livestock production systems and increase their herd sizes. The latest report[1] on the state of agriculture from the Government of Yukon shows growth in the cattle sector and some signs of increased interest in elk and bison production.

Cattle numbers in the Yukon have increased over the last two decades. The cattle industry in the region has a history going back to the gold rush days, and it appears to be starting to grow again. The breeds, corresponding sizes and meat characteristics of cattle vary widely among the 10 producers operating in the Yukon, with some raising large framed animals and some raising smaller or miniature breeds. Animals' live weights range between 650 pounds for the smaller breeds to 1200 pounds and up for larger breeds. Interviews with producers suggested that greater consistency in cattle breeds or crosses in the Yukon beef cattle industry may be beneficial. The large divergence between breed sizes leads to different processed meat "cut" sizes.

While the farmed elk numbers are nearly half what they were in 2001, they appear to have stabilized. One contributing factor to the decline in elk production in the Yukon is the volatile market for elk velvet, a product critical to the success of the industry. Elk velvet is used as a traditional form of medicine in some cultures, prized

[1] Yukon Agriculture: State of the Industry Report (2013 to 2017)

for its supposed restorative and strengthening qualities. In the late 1980's and early 1990's, elk velvet prices were as high as $120/lb, driven largely by demand from South Korea. After chronic wasting disease was discovered in Canada in 2000, South Korea barred all imports from Canada. Prices dropped to as low as $10/lb before starting to recover in 2006 when they increased to $15/lb. Elk velvet prices have only just reached a price again, currently around $50/lb, where producers feel they can again make a profit.

The domestic bison herd in the Yukon is relatively small compared to the cattle and elk operations. Resulting from the small sample size, Statistics Canada has suppressed the numbers from their census data. In 2015 the Government of the Yukon lifted their moratorium on importing bison[2], which resulted in bison being brought in the test the market. This could signal a positive sign for the market going forward.

[2] Yukon Agriculture: State of the Industry Report (2013 to 2017)

3.0 Large Animal Industry Sector Profiles

3.1 Operations

In order to conduct the economic assessment of large animal agriculture in the Yukon, which is the main objective of this work, we first must begin by compiling data on both dryland and irrigated cattle, elk and bison farms in the Yukon. This data came from industry consultation, interviews with producers and firsthand research. We used this data to build economic models for each representative farm in the Yukon and show the financials out ten years. In this section we begin by describing the operating assumptions made for both dryland and irrigated cattle, bison and elk production systems and then provide financial projections for each representative farm.

3.1.1 Cattle

We have built our representative cattle farm using the average farm size of 11 cows and 1 bull (plus calves). Like cattle farms in the rest of North America, cattle farms in the Yukon are considered cow-calf operations, meaning they raise beef cattle with a semi-fixed herd of cows that are used to produce calves. Cattle operations in the Yukon differ slightly in the fact that there is a limited market for feeder cattle, meaning that producers will finish their own calves for slaughter rather than sell them at 7-9 months old to a feedlot or "backgrounder". In our model, starting in year 3, we assume that 5 steers and 5 heifers are sold every year as beef. This 50/50 split is based on the idea that the male/female ratio is roughly equal.

To maintain the constant herd size of 11 cows, there is a replacement rate of roughly 10-15%, meaning that a typical cow on a cow-calf operation is replaced after 6-8 years for various reasons (e.g. it is no longer able to become pregnant (it is "open"). As a result, these cattle are culled and replaced with heifers, typically from the herd itself. Every year roughly 10-20% of the herd is replaced with young heifers. Starting in year 5, two cows are culled and replaced from within the herd for every year following. The sale price for culled cows is assumed to be $1,000 each.

We assume that cattle operations in the Yukon adopt a similar breeding cycle to other operations in North America. A typical cow-calf operation births calves in the early spring, allows the cattle a brief recovery period, puts the bulls out with the cattle to get them pregnant in the summer, and then feeds them hay supplies during the winter. A bull is left with a group of cattle during the summer at a given date that is roughly 9 months (283 days) prior to the date the rancher wishes to begin calving in the spring (e.g. bulls are put in with a herd of cattle in June/July so that cattle are calving 9 months later in February/March). In the model, we also adopt a survival rate of 90% for calving, meaning that on our representative farm we assume that 1.1 calves do not survive every year.

Given the small size of the cattle operations in the Yukon, we have assumed that all bulls are purchased off farm. In our model, the young bull calves on farm are all castrated into "steers" and sold as beef. Steers are much easier to manage than bulls

as they mature. Starting in year 5, one bull is culled, and one new replacement bull is purchased at two-year intervals. The sale price for culled bulls is assumed at $3,000.

On our representative farm we use the following livestock weights:

Steers:	1,080 lb
Heifers:	1,030 lb
Cows:	1,000 lb
Bulls:	2,000 lb

Given the limited market for cattle in the Yukon, in our representative model breeding stock prices are based on the Alberta market. Equipment costs are based on custom operation rates and include all operational costs including fuel, repairs and maintenance. Feeding costs are included in equipment costs. We also assume the operation builds a handling facility (e.g. for sorting cattle) at a cost of $35,000, amortized over 30 years at an interest rate of 7%.

The critical input cost to a cow-calf operation is feed. Growing feed on site is typically the most cost-effective way of producing hay because freight costs to haul it long distances can be prohibitive. Hay production is stored and used to feed the livestock over the long winter months when grazing is no longer an option. Based on consultation with producers in the Yukon, we adopt a hay yield of 1 MT/acre for dryland and 3 MT/acre for irrigated fields. At the lower yield, dryland operations require 87 acres (supports 11 adult animals and 10 feeders eating 2.5% of their weight/day). In our model we round up to 90 acres for dryland production. At the higher yield, an irrigated operation requires 29 acres for the same amount of livestock. We round up to 30 acres in the model.

Fencing costs associated with a cattle operation differ from elk and bison operations in the sense that they are less complex. Cattle are simply easier to fence than the other two large animal livestock operations. For the dryland operation (based on the numbers above), fences are priced at $11,880 amortized over 30 years. For the irrigated operation, fences are priced at $6,859, accounting for the fewer acres that need to be fenced. All other cost assumptions are the same as for the dryland operation.

3.1.2 Elk

Our representative elk farm for the Yukon has 26 bull elk and 13 cow elk (plus calves). One fundamental difference from cattle farming is that elk are raised more for their velvet antlers than they are for their venison (meat). Therefore, there are considerably more male animals on farm than females in an elk operation. Mature bull elk produce velvet every year, with mature elk producing approximately 30 pounds of velvet per year. In our model we assume 30 lbs/yr velvet production at an average price $50/lb. In year 3 the velvet from 5 bulls starts to be sold in our model.

The breeding schedule for elk also differs from cattle. The gestation period for elk is slightly less (255 days) than for cattle and they also have a much stronger rutting (mating) season, which is normally the end of September and the beginning of October in the wild. Elk livestock producers in the Yukon time the breeding for mid-September to the end of October. This leads to calving in May and June the

following year, which is slightly later than for cattle operations (Table 1). Elk have a calving survival rate of 80%. At roughly two months old, elk calves are weaned from their mothers and placed in a separate paddock so that they are not with the mother during the rutting season.

Table 1: Example Breeding/Calving Dates (Elk)

Breed	Calve
September 15	May 28
October 1	June 12
October 20	July 2

Source: University of Saskatchewan

The replacement rate on elk operations is also 10-15%. Elk cows are replaced with elk heifers, typically from herd itself. In this way, every year roughly 10-15% of the herd is replaced with young heifers. If elk cows need to be purchased off-farm they must come from the Yukon, therefore, we price them the same as if they were sold for meat (275 lbs hanging weight x $11.50 = $3,150). Starting in year 3, 5 cows are culled and sold per year. Elk cows are sold at a price of $11.50/lbs (275 lbs hanging weight). The herd is built up so that by year 6 it is maintained at 26 bulls and 13 cows. By year 6 the operation begins to sell 5 bulls per year.

On our representative farm we use the following livestock weights:

Cows: 450 lb
Bulls: 600 lb

As with the cattle operation, equipment costs on the elk operation are based on equipment custom rates, which include all costs including price of the machines, fuel, repairs and maintenance, as well as fertilizer. Feed costs are comprised primarily of this cost of the equipment used to grow it. A handling facility has also been included in the model, priced at $70,000 and amortized over 30 years.

Regarding hay production, yields on dryland are typically between 0.5 and 2 tonnes per acre, so we have used 1 tonne per acre as a realistic average. Yields on irrigated land range between 2.5 and 5 tonnes per acres, so we have assumed 3 tonnes as a safe average.

The estimate of feed required for the sample herd is based on daily consumption of 9 pounds per animal and a herd size of 39 adult animals. From there, calculations deliver the amount of irrigated land and dryland needed to provide the necessary annual feed volume. Irrigated land requirement is 25 acres (rounded up to 30 acres in our model), and the dryland requirement 75 acres, which we have rounded to 90.

This model assumes the producer installs elk fence around all his land, whether dryland or irrigated. While land utilized to grow hay is not typically grazed, the producer has that option if all of it is fenced. Another reason to fence all the land would be to protect it from crop damage by wild elk. If the producer chooses not to fence non-grazed hay land, the cost reduction would be directly related to the reduction in linear footage. Another consideration is that hay land not protected from wild elk by fencing could suffer reduced yields, resulting in a need for increased acres of hay production and the accompanying increased costs.

Based on fencing all the land in both dryland and irrigated operations, fencing costs also differ. To fence a dryland operation, we have factored $79,200, and for an

irrigated operation we have used $45,726.[3] Both are amortized over a 30-year period. All other cost assumptions are the same.

3.1.3 Bison

Our representative bison farm has 13 bison cows and 1 breeding bull (plus calves). Bison cattle typically have one calf per year with a gestation period of 283 days (9 months), like cattle. Bison calves are naturally weaned from their mothers roughly 1 month prior to them having another calf. Similar to the elk production system above, we have used a survival rate of 80% for bison during calving. Calving typically takes place in May or June with breeding in early summer the previous year. In the model we maintain a cull rate of 10-15% for bison, meaning that starting in year 5, 2 cows are culled and replaced from within the herd (heifer). Cull cows are sold at $2,000 each.

Based on consultation with bison producers, we replace the breeding bull after year five and then every two years thereafter. Cull bulls are sold at $3,000 each. However, much of the remaining operational aspects of managing a bison farm are like the description above for managing a cattle farm. There is a requirement to replace culled animals and the main revenue is generated from the sale of fattened bison for meat. In our model we assume that revenue is generated by the sale of 5 bull and 5 heifers starting in year 3 (animals are harvested at age 2).

One key remaining distinction is that bison can be dangerous animals to handle compared with cattle for people not trained in working with them. They also require more complex fences and sturdier sorting pens and other handling facilities. Similar to the elk description above, we have used a price of $70,000 for a handling facility (amortized over 30 years).

On our representative farm we use the following livestock weights:

Cows:	1,000 lb
Breeding Bulls:	1,500 lb
Fed Heifers:	750 lb
Fed Bulls:	900 lb

Given the limited market for purchasing bison livestock in the Yukon, purchased breeding stock are based on Alberta market prices. Equipment costs are based on custom operation rates and include all operational costs including fuel, repairs and maintenance. Feed costs are included in equipment and irrigation costs. Operating Interest (Line of Credit) assumes an interest rate of 7%/year.

A dryland bison operation in the Yukon produces 1 MT/acre of hay production and requires 75 acres of land (rounded up to 90 acres). This is enough to support 21 adult animals eating 2% of their weight/day. For an irrigated operation the hay production increases to 3 MT/acre, which reduced the land requirement to 25 acres of land (our model rounds up to 30 acres). Fences for the irrigated operation are priced at $45,736 and for the dryland operation they are set at $79,200. All other cost assumptions are the same as for the dryland operation.

[3] Elk are able to jump over low fences and push through high tensile wire spacing that is not tight, unlike cattle which are relatively easy to fence. Therefore, the cost associated with fencing elk (and bison) is much higher than for cattle.

3.2 Financial Projections

Using the representative farm data explained above, we show the financial projections for six scenarios below (two projections for each livestock production system: cattle, elk, and bison). The important distinction between the models is that half are irrigated, and half are dryland. As noted above, the dryland operations require more land and therefore more fencing. Irrigated operations would require less land, but higher equipment costs for irrigating.

CATTLE - Irrigated Land	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Fed Steers	-	-	20,102	20,102	20,102	20,102	20,102	20,102	20,102	20,102
Fed Heifers	-	-	17,715	17,715	10,629	10,629	10,629	10,629	10,629	10,629
Cull Cows	-	-	-	-	2,000	2,000	2,000	2,000	2,000	2,000
Cull Bulls	-	-	-	-	3,000	-	3,000	-	3,000	-
Total Revenue	**-**	**-**	**37,817**	**37,817**	**35,731**	**32,731**	**35,731**	**32,731**	**35,731**	**32,731**
Operating Costs										
Cash Position from previous year		- 23,459	- 48,560	- 38,101	- 26,911	- 21,022	- 7,361	6,257	21,389	35,522
Livestock Purchased										
Cow/Calf pairs (10) plus 1 bull, amortized over 5 years	6,361	6,361	6,361	6,361	6,361	-	-	-	-	-
Bull replacement	-	-	-	-	4,000	-	4,000	-	4,000	-
Supplements	330	330	630	630	630	630	630	630	630	630
Veterinary	220	220	420	420	420	420	420	420	420	420
Equipment, Freight & Transportation										
Truck/Vehicle Operation	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Equipment & Irrigation	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349
Office & Business Costs										
Legal, Accounting & Marketing, Office Equipment & Supplies	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Insurance	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**20,710**	**20,710**	**21,210**	**21,210**	**25,210**	**14,849**	**18,849**	**14,849**	**18,849**	**14,849**
Capital Costs										
Investment Cost										
Investment Cost - Fences	450	450	450	450	450	450	450	450	450	450
Handling Facility	2,299	2,299	2,299	2,299	2,299	2,299	2,299	2,299	2,299	2,299
Operating Interest (Line of Credit covering losses)	-	1,642	3,399	2,667	1,884	1,472	515	-	-	-
Total Capital Costs	**2,749**	**4,391**	**6,148**	**5,416**	**4,633**	**4,221**	**3,264**	**2,749**	**2,749**	**2,749**
Total Cost of Production	**23,459**	**25,101**	**27,358**	**26,626**	**29,843**	**19,070**	**22,113**	**17,598**	**21,598**	**17,598**
Contribution Margin	**- 23,459**	**- 25,101**	**10,459**	**11,191**	**5,888**	**13,661**	**13,618**	**15,133**	**14,133**	**15,133**
Gross Cash Position	- 23,459	- 48,560	- 38,101	- 26,911	- 21,022	- 7,361	6,257	21,389	35,522	50,655

CATTLE - Dryland	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Fed Steers	-	-	20,102	20,102	20,102	20,102	20,102	20,102	20,102	20,102
Fed Heifers	-	-	17,715	17,715	10,629	10,629	10,629	10,629	10,629	10,629
Cull Cows	-	-	-	-	2,000	2,000	2,000	2,000	2,000	2,000
Cull Bulls	-	-	-	-	3,000	-	3,000	-	3,000	-
Total Revenue	**-**	**-**	**37,817**	**37,817**	**35,731**	**32,731**	**35,731**	**32,731**	**35,731**	**32,731**
Operating Costs										
Cash Position from previous year		- 25,330	- 52,432	- 44,115	- 35,216	- 31,780	- 20,742	- 9,932	2,635	14,897
Livestock Purchased										
Cow/Calf pairs (11) plus 1 bull, amortized over 5 years	6,361	6,361	6,361	6,361	6,361	-	-	-	-	-
Bull replacement	-	-	-	-	4,000	-	4,000	-	4,000	-
Supplements	330	330	630	630	630	630	630	630	630	630
Veterinary	220	220	420	420	420	420	420	420	420	420
Equipment, Freight & Transportation										
Truck/Vehicle Operation	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Equipment	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891
Office & Business Costs										
Legal, Accounting & Marketing, Office Equipment & Supplies	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Insurance	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**22,252**	**22,252**	**22,752**	**22,752**	**26,752**	**16,391**	**20,391**	**16,391**	**20,391**	**16,391**
Capital Costs										
Investment Cost										
Investment Cost - Fences	779	779	779	779	779	779	779	779	779	779
Handling Facility	2,299	2,299	2,299	2,299	2,299	2,299	2,299	2,299	2,299	2,299
Operating Interest (Line of Credit covering losses)	-	1,773	3,670	3,088	2,465	2,225	1,452	695	-	-
Total Capital Costs	**3,078**	**4,851**	**6,748**	**6,166**	**5,543**	**5,303**	**4,530**	**3,773**	**3,078**	**3,078**
Total Cost of Production	**25,330**	**27,103**	**29,500**	**28,918**	**32,295**	**21,693**	**24,921**	**20,164**	**23,469**	**19,469**
Contribution Margin	**- 25,330**	**- 27,103**	**8,317**	**8,899**	**3,436**	**11,038**	**10,810**	**12,567**	**12,262**	**13,262**
Gross Cash Position	- 25,330	- 52,432	- 44,115	- 35,216	- 31,780	- 20,742	- 9,932	2,635	14,897	28,159

ELK - Irrigated Land	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Elk Meat Sales										
Cows	-	-	17,213	17,213	17,213	17,213	17,213	17,213	17,213	17,213
Bulls	-	-	-	-	-	22,950	22,950	22,950	22,950	22,950
Other Revenue										
Velvet	-	-	15,000	22,500	31,500	39,000	39,000	39,000	39,000	39,000
Total Revenue	**-**	**-**	**32,213**	**39,713**	**48,713**	**79,163**	**79,163**	**79,163**	**79,163**	**79,163**
Operating Costs										
Cash Position from Previous Year		- 35,342	- 73,673	- 82,783	- 85,278	- 79,369	- 32,373	17,812	70,278	122,744
Livestock Purchased										
Cows, amortized over 5 years (buy 13 cows @ $3150 each)	10,020	10,020	10,020	10,020	10,020	-	-	-	-	-
AI	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250
Supplements	475	840	1,059	1,231	1,533	1,424	1,460	1,460	1,460	1,460
Veterinary	195	345	435	510	630	535	600	585	585	585
Equipment, Freight & Transportation										
Truck/Vehicle Operation	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Equipment & Irrigation	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349
Office & Business Costs										
Legal, Accounting & Marketing, Office Equipment & Supplies	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Insurance	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**27,739**	**28,254**	**28,563**	**28,810**	**29,232**	**19,008**	**19,109**	**19,094**	**19,094**	**19,094**
Capital Costs										
Investment Cost										
Fences	3,005	3,005	3,005	3,005	3,005	3,005	3,005	3,005	3,005	3,005
Handling Facility	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598
Operating Interest (Line of Credit covering losses)		2,474	5,157	5,795	5,969	5,556	2,266			
Total Capital Costs	**7,603**	**10,077**	**12,760**	**13,398**	**13,572**	**13,159**	**9,869**	**7,603**	**7,603**	**7,603**
Total Cost of Production	**35,342**	**38,331**	**41,323**	**42,208**	**42,804**	**32,167**	**28,978**	**26,697**	**26,697**	**26,697**
Contribution Margin	**- 35,342**	**- 38,331**	**- 9,110**	**- 2,495**	**5,909**	**46,996**	**50,185**	**52,466**	**52,466**	**52,466**
Gross Cash Position	- 35,342	- 73,673	- 82,783	- 85,278	- 79,369	- 32,373	17,812	70,278	122,744	175,210

ELK - Dryland	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Cows	-	-	17,213	17,213	17,213	17,213	17,213	17,213	17,213	17,213
Bulls	-	-	-	-	-	22,950	22,950	22,950	22,950	22,950
Other Revenue										
Velvet	-	-	15,000	22,500	31,500	39,000	39,000	39,000	39,000	39,000
Total Revenue	**-**	**-**	**32,213**	**39,713**	**48,713**	**79,163**	**79,163**	**79,163**	**79,163**	**79,163**
Operating Costs										
Cash Position from Previous Year		- 39,070	- 81,390	- 94,769	-101,831	-100,810	- 59,043	- 14,453	33,272	82,010
Livestock Purchased										
Cows, amortized over 5 years (buy 13 cows @ $3150)	10,020	10,020	10,020	10,020	10,020	-	-	-	-	-
AI	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250
Supplements	475	840	1,059	1,231	1,533	1,424	1,460	1,460	1,460	1,460
Veterinary	195	345	435	510	630	535	600	585	585	585
Equipment, Freight & Transportation										
Truck/Vehicle Operation	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Equipment	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891
Office & Business Costs										
Legal, Accounting & Marketing, Office Equipment & Supplies	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Insurance	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**29,281**	**29,796**	**30,105**	**30,352**	**30,774**	**20,550**	**20,651**	**20,636**	**20,636**	**20,636**
Capital Costs										
Investment Cost										
Investment Cost - Fences	5,191	5,191	5,191	5,191	5,191	5,191	5,191	5,191	5,191	5,191
Handling Facility	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598
Operating Interest (Line of Credit covering losses)		2,735	5,697	6,634	7,128	7,057	4,133	1,012		
Total Capital Costs	**9,789**	**12,524**	**15,486**	**16,423**	**16,917**	**16,846**	**13,922**	**10,801**	**9,789**	**9,789**
Total Cost of Production	**39,070**	**42,320**	**45,591**	**46,775**	**47,691**	**37,396**	**34,573**	**31,437**	**30,425**	**30,425**
Contribution Margin	**- 39,070**	**- 42,320**	**- 13,379**	**- 7,062**	**1,021**	**41,767**	**44,590**	**47,726**	**48,738**	**48,738**
Gross Cash Position	- 39,070	- 81,390	- 94,769	-101,831	-100,810	- 59,043	- 14,453	33,272	82,010	130,747

BISON - Irrigated Land	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Fed Bulls	-	-	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500
Fed Heifers	-	-	27,500	27,500	16,500	16,500	16,500	16,500	16,500	16,500
Cull Cows	-	-			4,000	4,000	4,000	4,000	4,000	4,000
Cull Bulls	-	-	-	-	3,000	-	3,000	-	3,000	-
Total Revenue	**-**	**-**	**55,000**	**55,000**	**51,000**	**48,000**	**51,000**	**48,000**	**51,000**	**48,000**
Operating Costs										
Cash Position from Previous Year		- 29,443	- 60,947	- 40,156	- 17,910	- 2,107	23,144	47,542	72,940	97,338
Livestock Purchased										
Cow/Calf pairs (13) plus 1 bull, amortized over 5 years	7,341	7,341	7,341	7,341	7,341	-	-	-	-	-
Bull replacement	-	-	-	-	4,000	-	4,000	-	4,000	-
Supplements	420	420	720	720	720	720	720	720	720	720
Veterinary & Medicines	280	280	480	480	480	480	480	480	480	480
Equipment, Freight & Transportation										
Truck/Vehicle Operation	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Equipment & Irrigation	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349	10,349
Office & Business Costs										
Legal, Accounting & Marketing, Office Equipment & Supplies	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Insurance	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**21,840**	**21,840**	**22,340**	**22,340**	**26,340**	**14,999**	**18,999**	**14,999**	**18,999**	**14,999**
Capital Costs										
Investment Cost										
Fences	3,005	3,005	3,005	3,005	3,005	3,005	3,005	3,005	3,005	3,005
Handling Facility	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598
Operating Interest (Line of Credit covering losses)		2,061	4,266	2,811	1,254	147	-	-	-	-
Toal Capital Costs	**7,603**	**9,664**	**11,869**	**10,414**	**8,857**	**7,750**	**7,603**	**7,603**	**7,603**	**7,603**
Total Cost of Production	**29,443**	**31,504**	**34,209**	**32,754**	**35,197**	**22,749**	**26,602**	**22,602**	**26,602**	**22,602**
Contribution Margin	**- 29,443**	**- 31,504**	**20,791**	**22,246**	**15,803**	**25,251**	**24,398**	**25,398**	**24,398**	**25,398**
Gross Cash Position	- 29,443	- 60,947	- 40,156	- 17,910	- 2,107	23,144	47,542	72,940	97,338	122,736

BISON - Dryland	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Fed Bulls	-	-	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500
Fed Heifers	-	-	27,500	27,500	16,500	16,500	16,500	16,500	16,500	16,500
Cull Cows	-	-			4,000	4,000	4,000	4,000	4,000	4,000
Cull Bulls	-	-	-	-	3,000	-	3,000	-	3,000	-
Total Revenue	**-**	**-**	**55,000**	**55,000**	**51,000**	**48,000**	**51,000**	**48,000**	**51,000**	**48,000**
Operating Costs										
Cash Position from Previous Year		- 33,171	- 68,664	- 52,141	- 34,462	- 23,546	- 3,524	16,899	38,569	59,239
Livestock Purchased										
Cow/Calf pairs (13) plus 1 bull, amortized over 5 years	7,341	7,341	7,341	7,341	7,341	-	-	-	-	-
Bull replacement	-	-	-	-	4,000	-	4,000	-	4,000	-
Supplements	420	420	720	720	720	720	720	720	720	720
Veterinary & Medicines	280	280	480	480	480	480	480	480	480	480
Equipment, Freight & Transportation										
Truck/Vehicle Operation	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Equipment	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891
Office & Business Costs										
Legal, Accounting & Marketing, Office Equipment & Supplies	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Insurance	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**23,382**	**23,382**	**23,882**	**23,882**	**27,882**	**16,541**	**20,541**	**16,541**	**20,541**	**16,541**
Capital Costs										
Investment Cost										
Fences	5,191	5,191	5,191	5,191	5,191	5,191	5,191	5,191	5,191	5,191
Handling Facility	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598	4,598
Operating Interest (Line of Credit covering losses)		2,322	4,806	3,650	2,412	1,648	247	-	-	-
Total Capital Costs	**9,789**	**12,111**	**14,595**	**13,439**	**12,201**	**11,437**	**10,036**	**9,789**	**9,789**	**9,789**
Total Cost of Production	**33,171**	**35,493**	**38,477**	**37,321**	**40,083**	**27,978**	**30,577**	**26,330**	**30,330**	**26,330**
Contribution Margin	**- 33,171**	**- 35,493**	**16,523**	**17,679**	**10,917**	**20,022**	**20,423**	**21,670**	**20,670**	**21,670**
Gross Cash Position	- 33,171	- 68,664	- 52,141	- 34,462	- 23,546	- 3,524	16,899	38,569	59,239	80,909

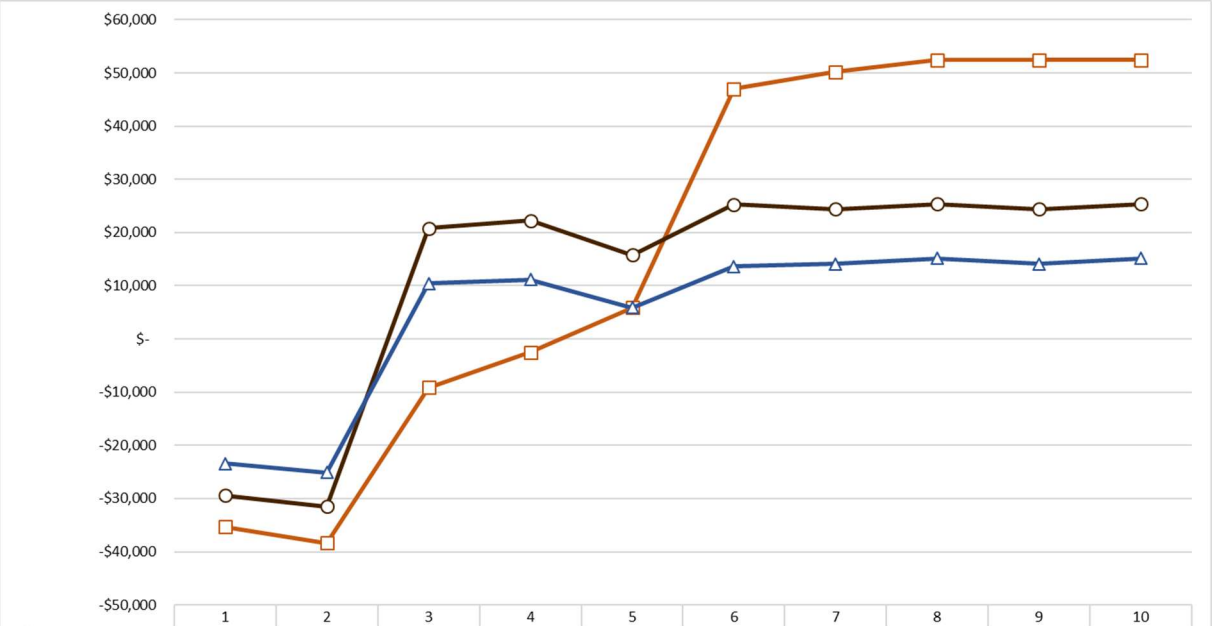
3.3 Comparative Profitability

The tables above outline our estimates of annual Contribution Margin for each species and production type, which is the net of revenues and all costs of production. They then sum the annual contribution margins to generate estimates of the aggregated Gross Cash Position.

All three species show positive Contribution Margin relatively soon, with bison and cattle operations having positive cash flows as early as year 3. Contribution margins for elk do not become positive until year 5, largely because stock would be held for velvet production and bulls would not be sold until year 6.

In the longer-term, however, the estimated contribution margins for elk are considerably higher than those for the other species. We estimate that long-term annual contribution margins could be as high as $52,466 for our model herd of 39 animals on 30 acres of irrigated land. In comparison, the same 30 acres would carry a bison herd of 24 animals and generate a contribution margin of $25,398. A 21-head cattle herd on the same land base would be estimated to generate $15,133 annually.

Figure 1: Estimated Annual Contribution Margins



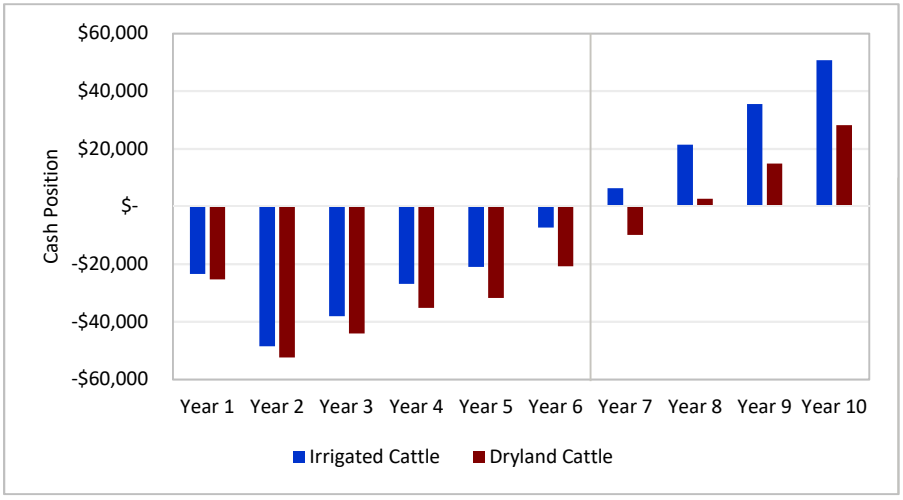
	1	2	3	4	5	6	7	8	9	10
Elk Irrigated	-$35,342	-$38,331	-$9,110	-$2,495	$5,909	$46,996	$50,185	$52,466	$52,466	$52,466
Bison Irrigated	-$29,443	-$31,504	$20,791	$22,246	$15,803	$25,251	$24,398	$25,398	$24,398	$25,398
Cattle Irrigated	-$23,459	-$25,101	$10,459	$11,191	$5,888	$13,661	$14,133	$15,133	$14,133	$15,133

3.4 Cost of Production Summary

3.4.1 Cattle

The above financial projections show positive cash flow at different times for the different operations. A dryland cattle operation has a positive cash flow by year 8 and for the irrigated operation it is by year 7 (Figure 2). The potential long-term annual contribution margin for a dryland operation is approximately $13,000 while an irrigated operation is closer to $15,000. However, the years it takes to pay for the investment is where the largest difference between the irrigated and dryland operations takes place. While the 11 cows, 1 breeding bull, 5 bulls and 5 heifers can be raised on 30 acres of irrigated land, it requires 90 acres of dryland. At $3,000/acre to purchase farmland, the investment in land for an irrigated operation is $90,000, whereas the investment for a dryland operation is $270,000. Under the irrigated scenario, a cattle operation can pay back the investment for 30 acres of land in roughly 6 years while the dryland operation takes nearly 59 years. These payback periods are referring to the time it takes to pay off the investment in land once the operation begins generating a positive cash position. Therefore, the irrigated cattle operation has a much quicker breakeven period when compared to the dryland operation.

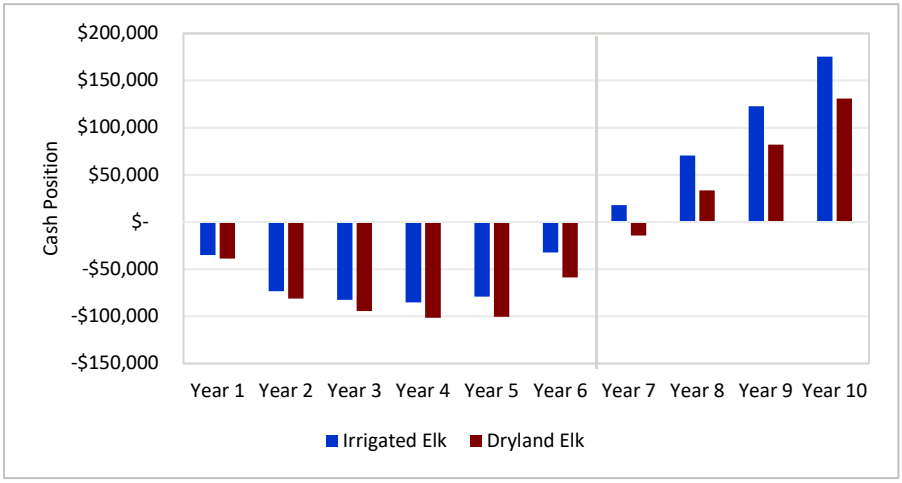
Figure 2: Gross Cash Position (Cattle)



3.4.2 Elk

Focusing on elk, the irrigated operation has a positive cash flow by year 7, while the dryland operation takes until year 8. Positive cash flow comes later because the main revenue generator on an elk farm is velvet, which starts being produced in larger quantities as male elk mature. An elk operation does not begin to sell bulls for meat until year 6, whereas the bison and cattle operations begin selling steers and bulls from year 3 onwards. The potential long-term contribution margin for the dryland elk operation is nearly $49,000 and for the irrigated operation it is $52,000. However, as with the cattle and bison operations, the benefit of the irrigated operation shows when one considers the purchase of land. At $270,000 for dryland farming and $90,000 for irrigated farming, the years to payback the investment for a dryland operation is 15 years, whereas the irrigated operation is 2 years. These payback periods are referring to the time it takes to pay off the investment in land once the operation begins generating a positive cash position.

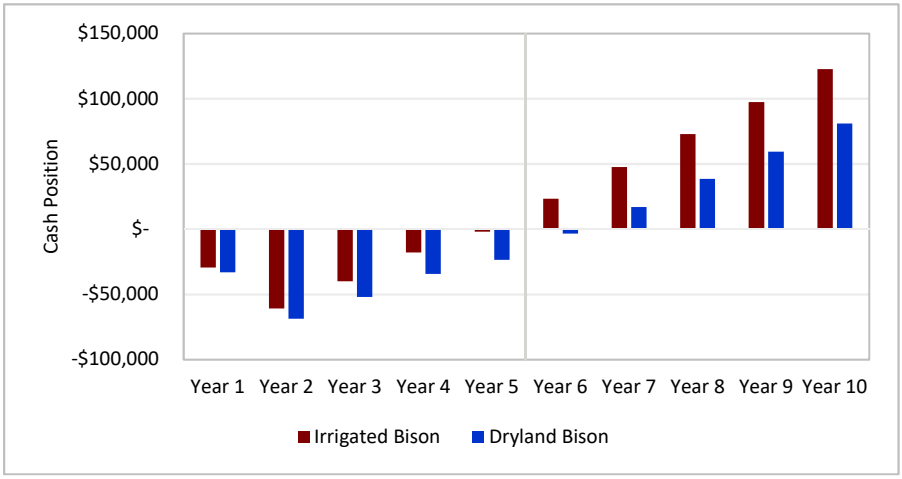
Figure 3: Gross Cash Position (Elk)



3.4.3 Bison

Regarding bison, a dryland operation has a positive cash flow by year 7 and for the irrigated operation it is by year 6. The potential long-term annual contribution margin for the dryland operation is approximately $21,000 while the irrigated operation is closer to $25,000. However, it takes fewer years to pay for the bison operation under the irrigated model when considering the purchase of land. As with the cattle operation, the land purchase requires $270,000 for dryland and $90,000 for irrigated. Under the irrigated scenario, a bison operation can payback the investment for 30 acres of land in 4 years whereas the dryland operation requires 37 years. The benefit of irrigation is considerable to this operation.

Figure 4: Gross Cash Position (Bison)



The overall financial viability of these large animal livestock operations improves considerably with the addition of irrigation, especially for a cattle operation. Without irrigation it is difficult for us to suggest that investing in a cattle or bison operation reflects a realistic return on capital, however, with irrigation it is a different story. There is considerable room for optimism once irrigation is factored into the equation.

4.0 Large Animal Industry Economic Impact

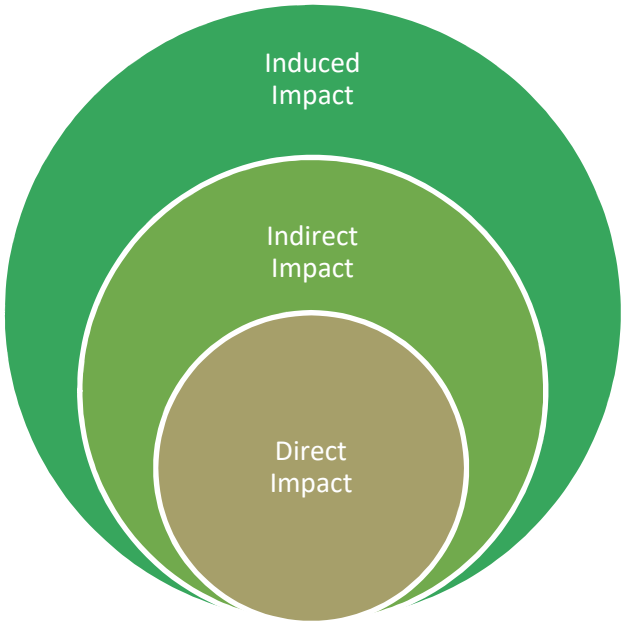
4.1 Economic Impact Methodology

This section of the report outlines the methodology and the results of our economic impact assessment. While the section above outlines financial projections for individual representative herds, the purpose of the economic impact analysis was to estimate the current and potential future impact of Yukon's large animal industry as a whole.

4.1.1 Types of Economic Impact

Economic multipliers are used to measure the economic activity that is generated when purchases and investments are made by a business or sector, including the resulting spin-off activities. Types of economic impacts measured for large animal livestock farming in the Yukon include: Induced Impact, Indirect Impact, and Direct Impact (Figure 5).

Figure 5: Types of Economic Impact



4.1.2 Different Levels of Inclusiveness

- **Direct Impacts**

  impacts on the expanding industry - payments made to suppliers of labour, equipment and services by the industry where the new economic activity takes place (i.e. payments by large livestock operations to employees, for feed, etc.)

- **Indirect Impacts**

  impacts on the backward-linked industries that supply inputs to the industry creating the new economic activity (e.g. feed producers must increase production)

- **Induced Impacts**

  impacts of spending the increased household income resulting from the new economic activity (e.g. spending by employees of the livestock operation and its upstream industries)

4.1.3 Categories of Economic Impact

The direct, indirect and induced impacts of Yukon large animal livestock production can be quantified in several different ways, each of which describes a different aspect of the economic impact. The categories of economic impact that were calculated for the large animal production sector include the following:

- **Economic Output:** is a measure of all sales by businesses in the province or territory. This includes intermediate goods and services consumed in the production process
- **GDP:** Gross Domestic Product can be defined as output with all intermediate goods and services subtracted. It is a measure of value added, where value added = economic output – intermediate inputs
- **Labour Income:** the gross income earned by employees in the province or territory
- **Employment:** the number of people employed in the province or territory

4.1.3.1 Example: Impact on Employment

Each of these categories will have direct, indirect and induced effects. For example, the employment impact would include the following types of impact:

- **Direct employment impact**: the employees working in the large animal livestock production sector – farm workers and managers
- **Indirect employment impact**: the employees working in the agribusiness supply industries that supply inputs used in large animal livestock production – workers in feed companies and plants producing other inputs
- **Induced employment impact**: the additional employment that results from the increased consumer spending flowing from direct and indirect impacts – spending by workers in large animal livestock operations and upstream input industries leads to creation of jobs in other industries, e.g. Tim Horton's

4.1.4 Economic Multipliers

The following multipliers (Table 2) were used for the purpose of estimating the economic impact of large animal livestock production in the Yukon. They are taken from Statistics Canada Table 36-10-0595-01, *Input-Output Multipliers, Provincial and Territorial, Detail Level,* 2015, Animal Production Industry (except Aquaculture).[4]

[4] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610059501

Table 2: Economic Multipliers

Impacts	GDP at Basic Prices ($)	Labour Income ($)	Employment (jobs)	Economic Output ($)
Direct	0.084	0.213	8.05	1
Indirect	0.289	0.188	2.787	0.505
Direct & Indirect	0.374	0.401	10.837	1.505
Induced	0.078	0.025	0.432	0.112
Total Impacts	0.452	0.426	11.268	1.617

4.1.5 Economic Impacts Specific to Yukon's Economy

Multipliers for the direct, indirect and induced impacts resulting from the economic activity of animal production on the economy of the Yukon are presented in Statistics Canada's Table 36-10-0595-01. The impacts on GDP, labour income and economic output are expressed as impacts per dollar of output in animal production. The impacts on employment are expressed as jobs per $1,000,000 of output in animal production.

4.1.6 Interpretation of Results – Relative Impacts

Generally speaking, economic multipliers are best suited to making relative, rather than absolute estimates. In other words, economic multipliers are best used to assess which of several activities has greater impacts on the economy, rather than the absolute impact of any single activity. Thus, where multipliers are used to estimate the impacts of a given activity, as in the analysis presented here, the results should be treated as general estimates, and not as absolute values.

4.1.7 Generalized Employment Estimates

It should also be noted that the multipliers provided by Statistics Canada, and used in the estimates reported here, are for production of all animals. They are specific to the Yukon, but do not differentiate large animal production from other livestock production sectors. In particular, we recommend caution in the interpretation of employment impacts. It is well known that there are large differences in terms of labour requirements per dollar of output between, e.g., a cow-calf operation and a hog barn. However, the same multiplier is used for all animal production. Again, these results should be treated as general estimates.

4.2 Economic Impact Results

4.2.1 Yukon Large Livestock Production – Economic Impact

The economic impact of large animal livestock production on the Yukon economy was estimated using data from a survey of costs and revenues conducted in 2019. Current output levels for each of cattle, elk and bison are derived from current and projected future revenues from production of an average-sized herd (see Table 3). These revenue levels are scaled up to reflect the sizes of current and realistic future herds in the Yukon. For the three large animal species combined, this gives an estimated current revenue of $585,000, and an estimated potential large-animal industry future revenue of $1,349,000. These are the output levels for the Yukon's

large animal production sector, to which economic multipliers were applied (see economic impacts below).

The estimates of current territorial herd sizes are based on our team's conversations with Yukon growers currently producing these species. While they are not based on exhaustive survey, we do believe that they constitute a reasonable estimate of the current number of animals on Yukon farms in 2019. The future estimates are relatively conservative, but are for the medium to long term (5 to 10 years). They also assume that the precursors to herd growth can be met. This would mean, for example, that the industry is able to access sufficient land for forage production, obtain all the necessary regulatory approvals, erect sufficient fencing, and bring the required genetic materials into the territory.

If these conditions are met, we feel that the contribution margins for elk and bison would suggest potentially stronger growth in those sectors, to approximately three times the current herd in the medium term. The cattle sector would also be expected to grow due to producer familiarity with beef production, though we have projected only a doubling of the herd in the 5-10-year window. These estimates are outlined in the table below.

Table 3: Projected Output Levels for Economic Impact Analysis

Species	Annual Revenue (Established Herd)	Average Established Herd Size	Territorial Herd Estimates		Territorial Outputs *(rounded to thousand $)*	
			Current	Future	Current	Future
Cattle	$34,000	21	250	500	$405,000	$810,000
Elk	$79,000	39	64	192	$130,000	$389,000
Bison	$50,000	21	21	63	$50,000	$150,000
		Total	**335**	**755**	**$585,000**	**$1,349,000**

Figure 6: Projected Direct Revenues, by Species

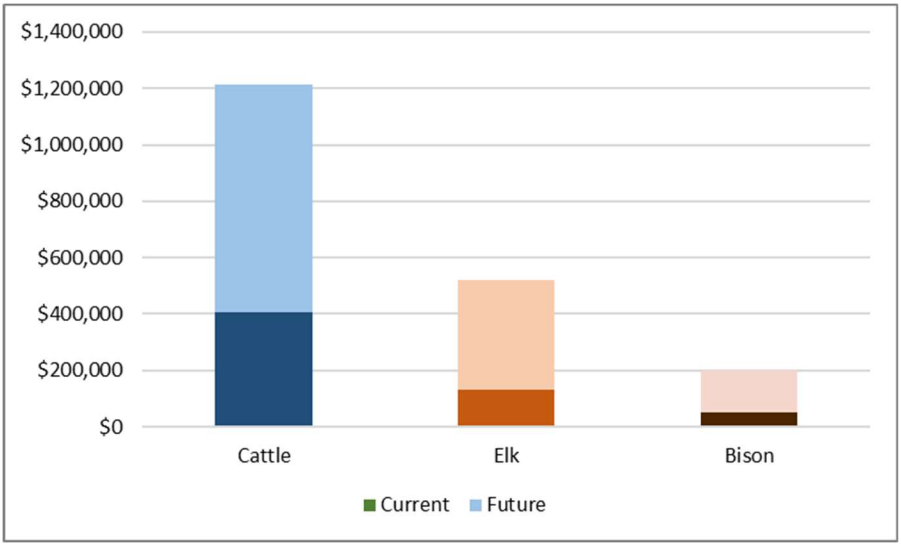
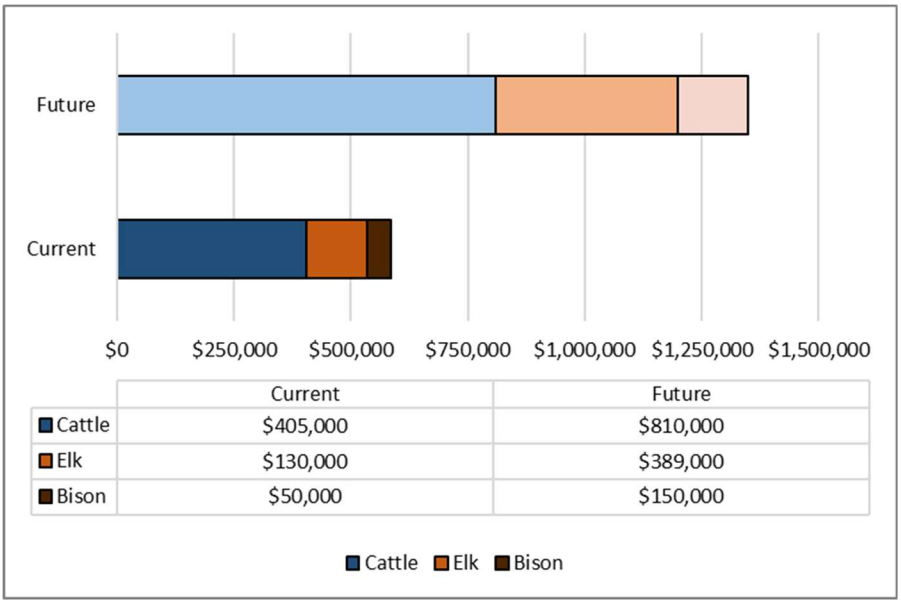


Figure 7: Projected Direct Revenues, Large-Animal Industry



	Current	Future
Cattle	$405,000	$810,000
Elk	$130,000	$389,000
Bison	$50,000	$150,000

4.2.2 Impact on Yukon's GDP

Direct and indirect impacts of Yukon large animal production on the territory's GDP were quantified at $218,790 at current output levels, and at $504,526 for future output levels. When induced impacts are also included (to give total economic impact), the impact on the Yukon's GDP is $264,420 (current output), and $609,748 (future output). This also quantifies the impact of the large animal livestock sector on the Yukon's economy, with the difference that this GDP measure nets out the value of intermediate inputs from economic output, and only includes value added.

This total economic impact on the Yukon's GDP can be broken down as:

- Cattle - $183,060 (current output), $366,120 (future output)
- Elk - $58,760 (current output), $175,828 (future output)
- Bison - $22,600 (current output), $67,800 (future output)

See Appendix A for a more detailed breakdown of these impacts on the Yukon's GDP.

4.2.3 Impacts on Labour Income

Direct and indirect impacts of Yukon large animal production on the territory's labour income were quantified at $234,585 for current output levels, and at $540,949 for future output levels. When induced impacts are also considered, the impact on the Yukon's labour income is $249,210 (current output), and at $574,674 (future output). Thus, when the responses of related industries and households are accounted for, the impact of the Yukon's large animal livestock sector on the territory's labour income is projected to reach $574,674.

This total economic impact on the Yukon's labour income can be broken down as

- Cattle - $172,530 (current output), $345,060 (future output)
- Elk - $55,380 (current output), $165,714 (future output)
- Bison - $21,300 (current output), $63,900 (future output)

See Appendix A for a more detailed breakdown of these impacts on the Yukon's labour income.

4.2.4 Impacts on Employment

Direct and indirect impacts of Yukon large animal production on the territory's employment requirements were estimated to amount to 6.3 jobs at current output levels, and at 14.6 jobs at future output levels. When also considering induced impacts, the total economic impact on labour requirements is estimated at 6.6 jobs (current output), and at 15.2 jobs (future output). That is, labour requirements driven by large animal production, when accounting for related industries and households, are projected to reach 15.2 jobs.

This total economic impact on the Yukon's employment level can be broken as

- Cattle – 4.6 jobs (current output), 9.1 jobs (future output)
- Elk – 1.5 jobs (current output), 4.4 jobs (future output)
- Bison – 0.6 jobs (current output), 1.7 jobs (future output)

See Appendix A for a more detailed breakdown of these impacts on employment in the Yukon.

4.2.5 Impacts on Yukon's Economic Output

Direct and indirect impacts of Yukon large animal production on economic output were quantified at $880,425 at current output levels, and at $2,030,045 at future output levels. When induced impacts are also included, the total impact on economic output is $945,945 (current output), and at $2,181,333 (future output)/ This tells us that, when the responses of related industries and households are considered, the total impact of the large animal sector's projected $1,349,000 of output on the Yukon economy is projected to reach $2,181,333 of total output.

This total economic impact on the Yukon's economic output can be broken as

- Cattle – $654,885 (current output), $1,309,770 (future output)
- Elk – $210,210 (current output), $629,013 (future output)
- Bison – $80,850 (current output), $242,550 (future output)

See Appendix A for a more detailed breakdown of these impacts on economic output in the Yukon.

4.2.6 Summary of Economic Impacts

It is our opinion, based on the financial data we were able to obtain from Yukon producers to estimate the costs of production, that the large-animal industry together (cattle, elk and bison) currently generates $945,945 of total economic impact on the Yukon economy. If enabled through the right conditions for herd growth, the sector could generate over $2 million in total economic impact in the medium term. We estimate that this industry growth would have the net effect of adding approximately 8.6 jobs to the Yukon economy.

Table 4: Economic Impact from Large Livestock Production, Yukon

Impacts	GDP at Basic Prices ($)		Labour Income ($)		Employment (jobs)		Economic Output ($)	
	Current	Future	Current	Future	Current	Future	Current	Future
Direct	49,140	113,316	124,605	287,337	4.7	10.9	585,000	1,349,000
Indirect	169,065	389,861	109,980	253,612	1.6	3.8	295,425	681,245
Direct & Indirect	218,790	504,526	234,585	540,949	6.3	14.6	880,425	2,030,245
Induced	45,630	105,222	14,625	33,725	0.3	0.6	65,520	151,088
Total Economic Impact	**264,420**	**609,748**	**249,210**	**574,674**	**6.6**	**15.2**	**945,945**	**2,181,333**

5.0 Conclusions

When accounting for the direct and indirect impacts of large animal livestock production in the Yukon we find that, under the right conditions, the sector could generate $2 million in total economic impact in the medium term, in addition to adding an additional 8.6 jobs. In order to accomplish this growth, large animal livestock producers in the Yukon must overcome some production challenges faced by producers in their region. However, producers are keen to develop a strategy to promote growth in their sector.

Producers in the Yukon have higher costs associated with importing feed relative to their counterparts in the prairie provinces of Canada. As we have shown in our assessment, there is also an opportunity for producers to grow more feed on fewer acres by irrigating, but the cost of bringing in equipment can be prohibitive. While the equipment itself is relatively inexpensive, the freight costs can double or triple the acquisition costs by the time it is brought into the region. Access to summer grazing pasture is equally as important to large animal livestock production. For livestock production to grow producers need more access to the underutilized land surrounding Whitehorse so that it can be used for pasture or hay production. This underutilized land is lying dormant and using it for sustainable grazing purposes is an environmentally sound opportunity for the region.

One option for supporting the growth of large animal livestock in the Yukon is through the Canadian Agricultural Partnership (CAP). In the context of large animal agriculture in the Yukon, responsible utilization of the local farmland, given that crops, especially perennial grass crops, are an effective and well-recognized carbon sink, lies well within the stated goals of CAP. By increasing locally produced sources of protein, large animal livestock producers in the Yukon reduce the carbon footprint that comes with trucking food from a long distance in the south. Further, applying good management practices to the utilization of the local land for grazing, while balancing with the environmental and social concerns of the residents, offers an opportunity to sustainably increase local food production and food security for the region. The expansion of regional livestock production also supports the local economy, including input companies, retailers, and the hospitality industry in general. Whitehorse, and the surrounding area, has approximately 32,000 people, offering a large market for locally produced animal protein.

We recommend the following strategy for establishing a foundation for growth in the large-animal livestock sector in the Yukon:

- As the industry grows and develops critical mass, it will be essential that extension and outreach capacity be developed for new entrants. This should probably be an agriculture industry-led initiative, perhaps supported by public sector resources.
- To further develop the large-animal sector in a deliberate and organized fashion, having the responsibility for all of the species in the large animal sector will be essential. Given the scale of each of the sectors and the similar

production techniques, it might make sense to have all three species under the responsibility of the Yukon Agriculture Branch.

- Producers would benefit from assistance with bringing in irrigation equipment and negotiating favourable purchase and freight prices.
- Given the high up-front capital cost of fencing, producers will need to find ways to finance their start-up. This could be through a combination of debt and equity financing, but could also benefit from public-sector contributions to assist with either subsidizing the cost of the fencing or providing low-interest loans to facilitate the construction.
- For the industry to grow, it will need access to more high-quality agricultural land. There is a need to develop the underutilized agricultural areas of the region surrounding Whitehorse. This land is lying dormant and utilizing it for sustainable grazing purposes offers an opportunity for the sector to contribute to the Yukon economy.

Large animal livestock, unlike other proteins, are ideally suited to local production in the Yukon. Elk, bison and cow-calf beef operations rely primarily on forage diets, with little need for supplementary grain. This means that the entire protein-production chain is within the Yukon itself, without the need for bulky imports of feeds.

This work has demonstrated the positive economic impact large animal livestock production has on the Yukon economy and the potential it has under the right circumstances. We have also shown how the overall financial viability of cattle, bison and elk operations improve considerably with the addition of irrigation, especially for cattle.

6.0 Appendix A – Detailed Summary of Sectoral Economic Impacts

The tables below provide the details of our estimates of current economic output by each of the large-animal industry sectors, as well as the potential economic output if herd size were to grow by 2-3 times over the next 5-10 years.

Table 5: Economic Impact from Cattle Production, Yukon

Impacts	GDP at Basic Prices ($)		Labour Income ($)		Employment (jobs)		Economic Output ($)	
	Current	Future	Current	Future	Current	Future	Current	Future
Direct	34,020	68,040	86,265	172,530	3.3	6.5	405,000	810,000
Indirect	117,045	234,090	76,140	152,280	1.1	2.3	204,525	409,050
Direct & Indirect	151,470	302,940	162,405	324,810	4.4	8.8	609,525	1,219,050
Induced	31,590	63,180	10,125	20,250	0.2	0.3	45,360	90,720
Direct, Indirect & Induced	**183,060**	**366,120**	**172,530**	**345,060**	**4.6**	**9.1**	**654,885**	**1,309,770**

Table 6: Economic Impact from Elk Production, Yukon

Impacts	GDP at Basic Prices ($)		Labour Income ($)		Employment (jobs)		Economic Output ($)	
	Current	Future	Current	Future	Current	Future	Current	Future
Direct	10,920	32,676	27,690	82,857	1.0	3.1	130,000	389,000
Indirect	37,570	112,421	24,440	73,132	0.4	1.1	65,650	196,445
Direct & Indirect	48,620	145,486	52,130	155,989	1.4	4.2	195,650	585,445
Induced	10,140	30,342	3,250	9,725	0.1	0.2	14,560	43,568
Direct, Indirect & Induced	**58,760**	**175,828**	**55,380**	**165,714**	**1.5**	**4.4**	**210,210**	**629,013**

Table 7: Economic Impact from Bison Production, Yukon

Impacts	GDP at Basic Prices ($)		Labour Income ($)		Employment (jobs)		Economic Output ($)	
	Current	Future	Current	Future	Current	Future	Current	Future
Direct	4,200	12,600	10,650	31,950	0.4	1.2	50,000	150,000
Indirect	14,450	43,350	9,400	28,200	0.1	0.4	25,250	75,750
Direct & Indirect	18,700	56,100	20,050	60,150	0.5	1.6	75,250	225,750
Induced	3,900	11,700	1,250	3,750	0.0	0.1	5,600	16,800
Direct, Indirect & Induced	**22,600**	**67,800**	**21,300**	**63,900**	**0.6**	**1.7**	**80,850**	**242,550**

Table 8: Economic Impact from Large Livestock Production (Cattle, Elk and Bison), Yukon

Impacts	GDP at Basic Prices ($)		Labour Income ($)		Employment (jobs)		Economic Output ($)	
	Current	Future	Current	Future	Current	Future	Current	Future
Direct	49,140	113,316	124,605	287,337	4.7	10.9	585,000	1,349,000
Indirect	169,065	389,861	109,980	253,612	1.6	3.8	295,425	681,245
Direct & Indirect	218,790	504,526	234,585	540,949	6.3	14.6	880,425	2,030,245
Induced	45,630	105,222	14,625	33,725	0.3	0.6	65,520	151,088
Direct, Indirect & Induced	**264,420**	**609,748**	**249,210**	**574,674**	**6.6**	**15.2**	**945,945**	**2,181,333**

7.0 Appendix B: Acknowledgments

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