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CANADIAN BEEF CATTLE CHECK-OFF EVALUATION: 2022 UPDATE
QUESTION & ANSWER

The Canadian Beef Cattle Check-Off provides industry funding for the Beef Cattle Research Council (BCRC) responsible for the industry's national research and extension program; Canada Beef tasked with market development and promotion in domestic and international markets; and Public and Stakeholder Engagement, which works to manage issues and build public trust in Canadian beef cattle production.

1. **Why was the study *Evaluating the Economic Benefits from the Canadian Beef Cattle Check-Off* initiated?**

   The Canadian Beef Cattle Research, Market Development and Promotion Agency (also known as the Canadian Beef Check-Off Agency) completed the first comprehensive evaluation of returns to national check-off dollars in March 2010, reporting on fiscal years 2005/06 to 2007/08. After the formation of Canada Beef, the board made a commitment to update the study every five years to provide greater transparency and accountability back to producers.

   As industry has adapted to the changing landscape, the Canadian Beef Check-Off Agency wanted to address key questions including producer benefit cost ratio (BCR); the extent to which check-off funded investment has affected the industry's competitiveness and demand for Canadian beef; and optimal allocation of funds.

   The second study, completed in July 2016 reported on fiscal years 2011/12 to 2013/14. The 2022 study utilized coefficients and elasticities from the entire dataset and calculated the BCRs on a five-year average from 2016 to 2021. Since the last full study, there have been several structural changes within the industry:

   i. The introduction of the import levy
   ii. The development of the Public and Stakeholder Engagement program in 2016
   iii. The increase in the national check-off from $1 to $2.50 per head by 2018, with the exception of Ontario, who remains at $1

2. **Who did the study and when was it completed?**

   Dr. John Cranfield from the University of Guelph completed the first study in March 2010. Dr. James Rude from the University of Alberta Department of Resource Economics completed the second study in June 2016. Violet Muringai assisted Dr. Rude with the study and a 2018 supplemental report was completed with Dr. Ellen Goddard contributing brand data and analysis for the import levy. Dr. Alan Ker from the University of Guelph Department of Food, Agricultural and Resource Economics completed the third comprehensive study in March 2022.

3. **What are the key findings from the study?**

   A marginal BCR greater than one indicates the last dollar of investment returns more than $1 in benefits. Large BCRs is a sign of under-investment and the Agency should invest more to lower the BCR to closer to one without reducing it below the target of unity.

This study reports that national research, marketing and promotion activities resulted in the following benefit cost ratios:

- ***Research* had a BCR of $63.2**, compared to $34.5 and $46 in the Rude (2011/12 to 2013/14) and Cranfield (2005 to 2008) studies respectively. Historical studies only evaluated carcass weight, while this study added more indicators (see details below).
- ***Domestic Marketing (including the import levy)* had a BCR of $15.4,** compared to $17 and $8 in the Rude and Cranfield studies respectively.
- ***Public and Stakeholder Engagement* had a BCR of $16**, no comparisons are available.

The average benefit cost ratio was expected to decline following the increase in the national check-off from $1 to $2.50 per head in 2018, with the exception of Ontario, who remains at $1. There is generally an inverse relationship between the amount of money spent on a promotion or research activity and its marginal BCR. This is due to what economists refer to as "diminishing marginal returns" which means as more money is spent on an activity, the marginal or incremental gains from it, increase at a decreasing rate. This concept helps explain why as investments increase that BCR's typically decline. The fact that the BCRs are still positive confirms there was under-investment in research, marketing, and promotion activities for the Canadian beef cattle industry. The increased investment is still providing a positive return to producers. Any BCR above one (1:1) indicates that an additional dollar in expenditures will increase benefits above a dollar and thus suggests increasing expenditures. It is clear with respect to research, marketing and PSE expenditures, far greater benefits have accrued than costs.

Marketing

The study estimated BCRs for export promotion expenditures by country for which the necessary data was available. The results clearly suggest that the export promotion expenditures across all categories of marketing have had far greater benefits than costs. No one category stands out as significantly better than the others nor does one category stand out as significantly worse than the others.

Country	Lower CI	Median	Upper CI	Program	Lower CI	Median	Upper CI
Japan	2.7:1	**5.6:1**	8.5:1	Market Development	1.9:1	**5.6:1**	9.4:1
Mexico	3.8:1	**5.5:1**	7.4:1	Consumer Marketing	5.4:1	**9.2:1**	13.0:1
EU ǂ	0.02:1	**0.1:1**	0.4:1	Industry Education	3.5:1	**7.3:1**	11.2:1
Hong Kong	1.4:1	**4.3:1**	7.3:1	Market Intelligence	3.2:1	**6.9:1**	10.6:1
China	2.2:1	**5.3:1**	8.2:1	Stakeholder Communication	3.2:1	**7.0:1**	10.9:1

ǂ Volumes to EU are very small; more detail is provided in the full report

Research

There was interest to recover BCRs for a variety of research metrics not just carcass weights in this study. This significantly altered the way in which the analyses could be undertaken with metrics for both feedlots and cow-calf operations included. Given the fact that more metrics are considered, it is expected that the aggregate BCR will be higher than past studies. The results indicate that BCRs for research expenditures are 63:1. However, our estimated BCR for carcass weight is 16:1 which is lower than both the Cranfield and Rude study. The lower BCR for carcass weights in this study comes from the combination of more dollars invested into research and the change in methodology which separated it from other metrics. Within the research metrics, none stand out as either performing significantly better or worse than other metrics (when the confidence intervals are taken into account).

Feedlot BCRs	Lower CI	Median	Upper CI
Carcass weight	8.5:1	**16.4:1**	24.1:1
Survival Rate	4.6:1	**21.0:1**	47.2:1
Feed Efficiency	0.6:1	**7.2:1**	25.6:1
Beef Quality	9.6:1	**18.7:1**	30.6:1
Total Feedlot	**23.3:1**	**63.2:1**	**127.4:1**
Cow-Calf BCRs	**Lower CI**	**Median**	**Upper CI**
Reproductive Efficiency	2.0:1	**6.9:1**	13.6:1
Survival Rate	1.5:1	**11.7:1**	34.1:1
Tame Hay Yields	10.1:1	**40.1:1**	76.0:1
Total Cow-Calf	**13.7:1**	**58.7:1**	**123.8:1**

Aggregated BCR

Aggregating across marketing and research categories, the overall BCR is 33:1. This compares to 9:1 found by Cranfield and 14:1 found by Rude. The large increase is caused by the inclusion of benefits (i.e. survival rate, reproductive efficiency, and tame hay yields) from research expenditures that were excluded in the previous studies. Note, if these benefits were also excluded in the current study, we would find an overall BCR of 13:1. This is lower than the Rude study at 14:1, as expected given the increase in investment with the national check-off moving from $1 per head to $2.50 per head, with the exception of Ontario.

4. Are these benefit cost ratios good or bad?

Any BCR above one (1:1) indicates that an additional dollar in expenditures will increase benefits above a dollar and thus suggests increasing expenditures. It is clear with respect to both marketing, PSE, and research expenditures, *far greater benefits have accrued* than costs thereby suggesting increases in investments could be supported while still providing a positive return.

5. Is it recommended to shift the allocations for marketing, research and public and stakeholder engagement?

No. Like past studies the BCRs for research are roughly double to triple that of marketing BCRs. However, the very large confidence intervals for the estimated BCRs indicate that the benefits from research expenditures are not statistically higher than benefits from marketing expenditures. It should be noted that past studies did not provide confidence intervals.

The wide confidence intervals are an artifact of the underlying variation in reproductive efficiency or carcass weight and how much of that is explained versus unexplained by the research expenditures. Simply put, the large confidence intervals are due to the small number of observations (less than 500) in all the regressions.

6. What was the methodology to calculate benefit cost ratio?

The analysis in this study uses an econometric simulation model that mimics the workings of beef and cattle markets in Canada and the United States, and explicitly accounts for the impact of Canadian cattle producer investment in beef cattle marketing, promotion and research activities on prices and quantities in these markets. The model enables one to calculate retail and farm level prices, final consumer demand for beef, production of beef, packer demand for cattle, supply of fed and non-fed cattle, and beef and cattle trade (both between Canada and the U.S., and between Canada and the rest of the world) for a baseline situation and under a variety of "what-if" scenarios. The baseline situation reflects what actually happened in these markets and is used as the basis of comparison for the different "what-if" scenarios. The "what-if" scenarios allow one to determine the retail and farm level prices and quantities (i.e. demand for beef, beef production, slaughter,

cattle supply and trade volumes) that would result if investment in beef cattle marketing, promotion and research activities was different from the actual level of investment. Once these prices and quantities are determined, they are used to calculate producer benefits associated with the respective "what-if" scenario and compared to the baseline level of producer benefits.

Refer to the full study available at cdnbeefcheckoff.ca/value for detailed information on benefit-cost ratio methodology, calculations and data sources.

7. Were there changes to the methodology from the last study?

While using the same overall framework as the 2016 study, Dr. Ker did make some changes to the methodology. To see the methodology used in the 2016 study, visit cdnbeefcheckoff.ca/value.

Two studies (Cranfield 2010 and Rude and Goddard 2016) were previously tasked with evaluating the investments in marketing and research from the mandatory national check-off dollars. These studies were based on developing an economic model of the beef industry and then solving for producer surplus with and without the expenditures in marketing and research. The driving force behind their benefit cost ratios is the estimated expenditure elasticities. An elasticity estimate is simply an estimate of the percentage change in one variable caused by a percentage 1% change in another variable. That is, for example, how much did per capita disappearance change for a 1% change in marketing expenditures.

While estimated elasticities are the driving force behind this study, Ker (2022) used a direct accounting approach rather than integrating under an estimated supply curve. This was chosen for a number of reasons. First and foremost, the various disaggregated benefit cost ratios required by this study cannot be recovered using the previous approach. Additional benefits of using a more direct accounting approach is transparency and avoiding misleading year-to-year variations. Moreover, the two approaches yield almost identical results given that the change in domestic price is constant in our approach and essentially constant in the previous approach. Another notable difference in our methodology is that Bayesian econometric methods were used which allows for the use of prior information to enter the estimation process. This was deemed necessary as the amount of data in many of the estimations was fairly limited.

The Ker (2022) results yield very similar BCRs to previous studies where they are comparable.

8. Why is there no separate import levy BCR?

Domestic Marketing (including the import levy) had a BCR of $15.4, compared to $17 in the Rude study and $8 in the Cranfield study.

As with the Cranfield and Rude studies, domestic marketing expenditures are included in the domestic per capita disappearance equation. Ker (2022) added the import levy revenue to the marketing expenditure data, as the import levy is used for generic domestic marketing and thus non-differentiable from the branded domestic marketing expenditures. This departs from the Rude 2018 supplemental study which used different data to distinguish the benefits from branded programming. Given that both the generic and branded domestic marketing efforts are focused on supporting per capita consumption it was acceptable that they were combined.

The 2018 supplemental report showed that on average from 2014/15 to 2016/17, every dollar invested from the import levy resulted in a benefit cost ratio (BCR) of 6.42:1 or a $6 of benefit for Canadian importers. This supplemental report was made possible with the brand data provided by Dr. Ellen Goddard that differentiated between the generic marketing for imports versus the Canada Beef branded marketing. This data series was not available for the 2022 Ker study.

9. How does Public and Stakeholder Engagement have a different BCR than domestic marketing?

The domestic per capita disappearance equation is of the same form as previous studies, in that it is a function of the beef retail price, pork retail price, chicken retail price, per capita income, quarterly binary variables to account for seasonality, BSE, lagged disappearance, marketing expenditures, and public and stakeholder engagement (PSE) expenditures.

Unlike previous studies, all variables were entered linearly into the equation. Also, unlike previous studies, prior distributions were put on select parameters. With respect to the beef price, we assumed a uniform prior over the non-positive real line; that is, if beef price increases, everything else equal, per capita disappearance will not increase. With respect to per capita income, we assumed a uniform prior over the non-negative space; that is, if per capita income increases, per capita disappearance will not decrease. With respect to marketing expenditures, we assumed a uniform prior over the non-negative real line; that is, the marketing expenditures may not have a negative effect on disappearance.

Given that the PSE program is relatively new with very few data points we imposed a second prior. We first estimated the model without PSE and used the estimated posterior distribution on marketing expenditures as the prior for PSE expenditures. As a result, this also assumes that PSE expenditures may not have a negative effect on disappearance.

Recall, an elasticity represents the percentage change in one variable for a 1% change in a second variable. These estimated elasticities, derived directly from the estimated coefficients, are the driving force of the BCRs in this study as well as both the Rude and Cranfield studies. In this case, they measure the change in disappearance for a change in marketing or PSE expenditures.

10. What data gaps exist, that should be improved for the next study?

There was insufficient data for a veal analysis. Two problems were encountered. First, the assumption to use the beef retail price as a proxy for the veal price. This would be valid if in fact the veal and beef prices moved together (or were strongly correlated). However, during the project it was brought to our attention that this is not the case. Second, to convert the estimated veal elasticity into a BCR, a cost of production for veal producers is required. Unfortunately, this does not exist. A veal retail price and a veal cost of production are required to undertake the veal analysis moving forward.

Similarly, there was insufficient data for the Verified Beef Production plus expenditures, beefresearch.ca webinars and webpage views. These programs have not been around sufficiently long to include them into the research metric base equations. Moreover, for webinars and webpage views, constructing the costs associated with these activities may be significant.

11. How does the Canadian beef cattle benefit cost ratio compare to Australia and the U.S.?

Canada's beef cattle check-off benefit cost ratio of $13 for every dollar invested (13:1) is higher than Australia ($6.2) and the United States ($11.9). BCRs in Australia and the United States have both increased since their last study, indicating under-investment.

The most recent review of the U.S. check-off (2019) showed an average return of 11.9:1. From 2014 to 2018, the Cattlemen's Beef Board's (CBB) promotion activities increased total domestic beef demand by 12.8 billion pounds in total, or 2.6 billion pounds per year. In other words, had there been no CBB funded domestic marketing activities, domestic beef demand would have been 14.3% lower than it actually was.

In comparison, had there been no Canadian check-off funded domestic marketing activities, domestic beef demand would have been 9.1% lower than it actually was.

Meat and Livestock Australia's 2010/11-14/15 impact assessment found an estimated benefit cost ratio (BCR) of 6.2:1 to red meat.

By program area:

- Market access provided a BCR of 14.8:1
- Growing demand provided a BCR of 5.2:1
- Productivity provided a BCR of 4.5:1
- Integrity/Sustainability provided a BCR of 3.8:1

By Industry sector:

- Grass fed cattle BCR 8.8:1
- Grain fed cattle BCR 4.1:1
- Processing BCR 3.0:1 (includes sheep/goats)
- Live Exports BCR 7.8:1 (includes sheep/goats)

12. How does the Canadian beef check-off compare to other major beef-producing countries?

In comparison to other countries Canada has a smaller national check-off to invest in marketing, promotion and research at $17.2 million in check-off and $1.2 million in import levy for 2020/21. Australia, New Zealand and the U.S. all have beef check-offs, none of which are refundable. New Zealand is the only country with a smaller revenue from check-off.

Country	Check-off levy	Applies to imports?	2020/21 Revenue (millions)
Canadian beef	CDN$2.50 per head marketed	Yes	CDN$18.4
Australia beef	A$5 per head marketed	No	A$65.6 ŧ
New Zealand beef	NZ$5.20 per head on cattle slaughtered	No	NZ$15.4 ŧ
U.S. beef	US$1 per head marketed	Yes	US$42.8*

ŧ About your levy | Meat & Livestock Australia (mla.com.au) ($52.8 grass-fed+$12.8 grain-fed = $65.6 M) see page 73 https://www.mla.com.au/globalassets/mla-corporate/about-mla/documents/planning--reporting/2020-21-ar/2020-21_mla-annual-report.pdf

ŧ https://beeflambnz.com/sites/default/files/content-pages/BLNZ-AR-2020.pdf for 2020 p 52

** States retain up to 50 cents on the dollar and forward the other 50 cents per head to the Cattlemen's Beef Promotion and Research Board, which administers the national checkoff program, subject to USDA approval.*

13. How does the Canadian beef cattle benefit cost ratio compare to other agricultural commodities?

The "benefit-cost ratio" is the most common analysis used in check-off studies for agricultural commodities. In the simplest terms, it is an indication of how much has been earned for what was spent.

The BCR for Canadian Beef Cattle Check-Off at 13:1 is on the high end of the range of values for returns to marketing, promotion and research reported in previous studies for other regions and commodities.[1] Recent studies on BCRs for other commodities range from 1.7:1 (Canadian Cheese) to 25:1 (US Pork); putting Canadian beef right in the middle of the pack.

[1] The 13:1 is used here as it is the most comparable methodology to these other studies.

Region	Commodity	Time Period	BCR	Source
US	Pork	2011-2016	25:1 *	Kaiser (2017)
Norway	Seafood	2013-2017	12.5:1	Texas A&M (2020)
Canada	Cheese	2007-2011	1.7:1	Doyon & Cranfield (2013)
Canada	Fluid Milk	2007-2011	4.5:1	Doyon & Cranfield (2013)
US	Fluid Milk	2006-2015	5.6:1	Schmit and Kaiser 2006
Canada	Fresh Produce	projection	4.7:1 to 9.1:1	The Conference Board of Canada (2013)
Prairies Canada	Combined Crops	1971:2015	7:1	CDC (2016)
Saskatchewan Canada	Pulse	1984-2024 projection	20.19:1	Gray et al. (2008)

* Includes production research (83:1), international marketing (24.1:1), domestic marketing (14.2) and research market drivers of demand (8.3:1).

14. Will this study be used as a benchmark going forward?

Yes, this is the third comprehensive study evaluating the economic benefits of the Canadian Beef Cattle Check-Off. It is expected that the information will be updated in the future to provide cattle producers with an indication of their return on investment and to assist with future check-off planning.

15. Was the study done to make the case for an increase in the Canadian Beef Cattle Check-Off?

No, the study was initiated to obtain an independent evaluation of the economic benefits from the Canadian beef cattle check-off. It provides the third comprehensive analysis of national check-off-funded expenditures. Other major beef producing countries such as Australia, New Zealand and the U.S. regularly review the return to their check-offs.

While the Canadian Beef Cattle Check-Off provides the core industry funding for BCRC, Canada Beef and PSE it does not fully cover the costs of all programs and activities. Supplementary funding is obtained by leveraging the national check-off, attracting on average $3 for every $1 for research and $1.20 for every $1 for marketing. In the 2018/19 fiscal year, grant applications provided an additional $90,000 in funds to Public and Stakeholder Engagement for consumer communication tools and resources. The results imply that despite the significant increased investment in marketing, promotion, and research activities; and that the return to producers remains positive.

16. How are Canadian Beef Cattle Check-Off dollars allocated between marketing, promotion and research?

Canada's National Beef Strategy promotes a united approach to position the Canadian beef industry for greater profitability, growth and continued production of a high-quality beef product of choice in the world. Within the strategy are recommended provincial allocations to fully fund the strategy. The Canadian Beef Check-Off Agency encourages provincial cattle associations to allocate according to the recommendations, however each provincial beef cattle organizations determine how they want their national check-off allocated between marketing, promotion, and research. Each province submits their allocations to the Canadian Beef Check-Off Agency one year in advance of taking effect.

The ratio of investment in marketing, research, and PSE was 61:34:5[2] (61 per cent to marketing, 34 per cent to research, and 5 per cent to PSE) over the current three-year average.

[2] The *Evaluating the Economic Benefits from the Canadian Beef Cattle Check-Off* study excluded the analysis of provincial investment

To learn more about the allocation percentages or see how each province allocates their check-off dollars, visit cdnbeefcheckoff.ca/programs/allocations.

The complete study *Evaluating the Economic Benefits from the Canadian Beef Cattle Check-Off* is available on the Canadian Beef Check-Off Agency website at cdnbeefcheckoff.ca/value.