



2019/20 Business Plan

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Canadian Beef Cattle Research, Market Development and
Promotion Agency

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I. Executive Summary

This business plan highlights the research programs managed by the Beef Cattle Research Council (BCRC) for the period July 1, 2019 to June 30, 2020. Coming through a transition year in 2018/19, the BCRC programs and budget for 2019/20 reflect the Beef Science Cluster III program funding under Agriculture and Agri-Food Canada's Canadian Agricultural Partnership (CAP) approved June 2018 as well as the increase in the Canadian Beef Cattle Check-Off and adjustments to the provincial funding allocations to support national beef research.

A portion of the funds collected by the Canadian Beef Cattle Research, Market Development and Promotion Agency (Canadian Beef Check-Off Agency) is directed towards the BCRC to fund research and development activities to improve the competitiveness and sustainability of Canada's beef industry. Operating as a division of the Canadian Cattlemen's Association, the BCRC's mandate is to determine research and development priorities for the beef cattle industry and the Council is responsible for administering the Canadian Beef Cattle Check-Off funds allocated to research. Research and innovation are key to driving competitiveness and innovation in the Canadian beef cattle industry and meeting increased consumer demand for beef products on a global scale.

The budgets and programs outlined in this 2019/20 Business Plan are based on information available at the beginning of January 2019. If required, revisions to the BCRC's 2019/20 budget will be managed through a process engaging the BCRC producer council in consultation with the Canadian Beef Check-Off Agency.

As Canada's largest national beef cattle industry research agency, the BCRC takes a leadership role in the development and implementation of Canada's National Beef Research and Technology Transfer Strategy. The [Canadian Beef Research and Technology Transfer Strategy 2018 – 2023](#) was developed with ongoing engagement of researchers, funders and grassroots producers which helped to identify needs in research capacity, infrastructure, programming, funding and coordination, and to ensure priority industry outcomes are being addressed. Working to meet the objectives identified in the Canadian Beef Research and Technology Transfer Strategy 2018 – 2023, the BCRC continues to work closely with other industry and government funding agencies to increase coordination, reduce duplication and to ensure priority research outcomes are addressed. The BCRC's important role in identifying the industry's research priorities subsequently influences public sector investment in beef cattle research.

The three core research objectives identified in the Strategy and supported with the BCRC's programs are:

1. To *enhance industry sustainability and improve production efficiencies*, priority outcomes are to enhance feed and forage production, increase feed efficiency and decrease the impact of animal health issues and production limiting diseases.
2. To *improve beef demand and quality*, priority outcomes are to reduce food safety incidences, define quality and yield benchmarks supporting the Canadian Beef Advantage, and improve beef quality through primary production improvements and the development and application of technologies to optimize cutout values and beef demand.
3. To *improve public confidence* in Canadian beef, outcomes are to improve food safety, strengthen the surveillance of antimicrobial use and resistance, develop effective antimicrobial alternatives, ensure animal care, demonstrate the safety and efficacy of new production technologies, improve environmental sustainability and measure the beef industry's environmental benefits.

These core objectives are supported by the BCRC funding in 2019/20 for research under the following industry-identified priority areas:

1. Beef Quality - Both the consuming public and our competitors continue to change, and the beef industry recognizes the importance of strengthening our competitive advantages through improving product consistency and continuing to enhance carcass and meat quality through research.
2. Food Safety - In order to maintain consumer demand for beef domestically and internationally, research and innovation focus on improving food safety interventions, methods to quantify their effectiveness, and the development of strategies that counteract multiple pathogens.
3. Animal Health and Welfare - Applied research works to develop effective and economical management practices, and diagnostic and treatment tools. These reduce costs and losses associated with animal health and production limiting diseases in primary production sectors.
4. Antimicrobial Use, Resistance and Alternatives - Research in this area provides a better understanding of how antibiotics are being used on farm and how fast resistance is happening. With changing consumer expectations and antimicrobial purchasing regulations, prudent use of antimicrobials is more important than ever. Research into antimicrobial alternatives can help prevent animal disease as well as decrease input costs for producers.
5. Feed Grains and Feed Efficiency - Research in this area provides identification and validation of economical methods of identifying seedstock with improved feed efficiency and the development of new feeds and alternative feeding strategies
6. Forage and Grassland Productivity - Research is focused on the development of strategies that will improve grassland management to increase productivity and sustainability. Research also works to develop annual and perennial forage varieties with increased biomass yield per acre, maintained or improved nutritional value, improved water efficiency, and appropriate economic characteristics
7. Environmental Sustainability - Research on the interface between beef production and the environment in which it is produced is important to providing producers the tools and knowledge they need to be optimal stewards of their land and. Research also demonstrates the environmental benefits of cattle production by measuring its contributions to plant and animal biodiversity, carbon sequestration, reduced soil erosion and watershed protection. It also supports the advancement of science-based regulations.
8. Knowledge and Technology Transfer - Effective knowledge dissemination and technology transfer to influencers of beef production is critical to realize the value of investments in beef research. It enables producers and other industry stakeholders to make informed decisions and adopt innovations to maintain the sustainability and competitiveness of the industry.

The BCRC's 2019/20 core activities and projects funded through the Beef Science Cluster as well as non-cluster funded projects are highlighted in section IV. The budget is discussed in section VI. The BCRC revenue for the period July 1, 2019 to June 30, 2020 is projected at \$6.2 million, expenses are projected at \$5.5 million, for a 2019/20 net surplus of \$655,720. As highlighted in the 2018/19 BCRC annual business plan, it was understood and agreed upon by the BCRC producer council that the reserve will continue to grow in 2019/20 as programming ramps up. Given BCRC project allocations are three to ten years in length, project allocations across multiple years will start to accumulate in the next few years and result in the drawdown of the inflated reserve to its previous level.

II. Environment Scan

As a major player in food production domestically and globally, the Canadian beef industry has the opportunity to meet growing global demand for beef. The challenge is to manage continued industry growth in a sustainable manner that allows for industry profitability, while ensuring environmental sustainability and the maintenance of public confidence.

The global population is projected to grow to 9.8 billion by 2050. Compared to 2010, an estimated 70% more food production is required. With increased urbanization and growth in disposable incomes in developing countries, the Food and Agriculture Organization projects beef consumption to increase 6% in developed countries and 17% in developing countries between 2017 and 2026.

While agriculture globally is challenged to meet increased food demand, natural resources allocated to agriculture are increasingly pressured due to competition between agriculture sectors, urban pressures, and other commercial activities. Environmental challenges, including climate change, add further challenges to sustainably meeting the nutritional needs of a growing population and its demand for beef.

Canada's agriculture and agri-food sector is an important driver of economic growth. The Canadian beef industry represents the second largest single source of farm cash receipts, with cash receipts from cattle and calves totaling \$8.9 billion annually over the last five years (2013-2017 average), representing 15% of total farm cash receipts, contributing \$17 billion to GDP annually, and generating an estimated 228,000 jobs in Canada with every job in the sector yielding another 3.56 jobs elsewhere in the economy. Canada's meat industry is the largest component of the food processing sector, with annual sales surpassing \$28 billion including exports exceeding \$6 billion and providing direct employment for 66,000 people.

The Government of Canada has set an ambitious target to grow agri-trade food exports to \$75 billion annually by 2025. Over 40% of Canadian beef production is exported each year. With increasing global demand for beef, the industry has an opportunity to increase production and exports while building upon Canada's international reputation of being a consistent supplier of high-quality, safe beef. Countries with the most efficient, cost-effective and sustainable beef production systems that provide high-quality product will ultimately be the most competitive.

Compared to global competitors, the Canadian beef industry has a unique asset: access to sufficient land and water. Thirty-one percent of Canadian farm land is grasslands, much of which are unsuitable for annual crop production. In the Canadian grain-fed production system, 80% of a beef animal's diet is grass and forage. Utilizing grasslands for beef production sustainably produces nutrient-dense food while contributing to biodiversity, wildlife habitat, carbon sequestration, and water and nutrient cycling. The Canadian beef industry plays a significant role in maintaining this important land reservoir.

Sustainably meeting the nutritional needs of the world's growing population requires more food produced using fewer resources. The Canadian beef industry demonstrated that ability through advancements driven by research and innovation. A 2015 study on the environmental footprint of Canadian beef production demonstrated that each kilogram of Canadian beef produced in 2011 created 15% fewer greenhouse gas emissions and used 17% less blue water than in 1981 due to improved production; the same amount of beef was produced utilizing 29% fewer cattle and 24% less land.

Opportunities for continued improvements in productivity exist across a variety of disciplines including enhanced feed and forage production, improved animal health and welfare, a reduction in the reliance on antimicrobials, improved genetics and feed efficiency, and knowledge and technology transfer.

Investments in research must also provide science-based information to address public trust. Access to new technologies are essential to meet global food demand. At the same time there is growing perception that the industry should abandon technology and return to previous production practices due to perceptions of innovations' impacts on food safety, the environment and animal welfare. Research is key to providing independent peer-reviewed science to inform public and policy discussions, which can ultimately impact the beef industry's ability to remain competitive and sustainably contribute to global food security. In order to preserve and increase consumer demand for beef domestically and internationally, research and innovation are important in terms of strengthening Canada's competitive advantages through improving product consistency, enhancing carcass and meat quality and addressing food safety concerns.

Maintaining and enhancing industry and government investments in beef and forage research and extension programming, capacity and infrastructure is a top priority for the Canadian beef industry. The Canadian beef industry views innovation as integral to advancing its competitiveness and sustainability. Recognizing this, the Canadian beef industry, through the Canadian Beef Cattle Check-Off, has increased its investments into research.

III. Beef Cattle Research Council Program Overview

The Beef Cattle Research Council (BCRC) programs in 2019/20 are directed by the Canadian Beef Research and Technology Transfer Strategy 2018 – 2023. This five-year Strategy was developed in partnership with the BCRC and the Beef Value Chain Roundtable (BVCRT) and aligns dollars and priorities to achieve a comprehensive outcome-based research program supporting the Canadian beef industry’s vision. The BCRC’s 2019/20 programs guide industry and government research investments at both national and provincial levels across multiple funding agencies. Through implementation of its annual business plans and five-year Strategy, the BCRC continues to work in partnership with industry and government funding agencies across Canada to be more efficient with funding and to ensure key research, capacity, and infrastructure priorities are addressed.

The BCRC continues to lead the development and implementation of the Beef Science Clusters. Launched by Agriculture and Agri-Food Canada (AAFC), the first Beef Cattle Industry Science Cluster under Growing Forward I was a four-year funding initiative between April 1, 2009 and March 31, 2013. Industry and government funding commitments through the first Cluster totaled \$11.25 million directed to 32 research projects managed by the BCRC. Each Canadian Beef Cattle Check-Off dollar was matched by six AAFC dollars.

The second Beef Cattle Industry Science Cluster (Beef Science Cluster II) was a five-year initiative between April 1, 2013 and March 31, 2018, under Growing Forward 2. Joint industry and government funding under the second Cluster totaled \$20 million, including \$14 million from AAFC, \$1 million from provincial governments, and \$5 million from the Canadian Beef Cattle Check-Off and provincial beef industry groups. The BCRC managed 26 research projects under the second Cluster program.

In the fall of 2017, AAFC introduced the third Beef Science Cluster program under the Canadian Agricultural Partnership (CAP). The CAP agricultural policy framework is a five-year, \$3 billion investment by federal, provincial and territorial governments to strengthen the agriculture, agri-food, and agri-based products sector. Under the CAP, the Beef Science Cluster was awarded \$14.1 million of AAFC funding to support beef research and extension initiatives. The AAFC funds, managed by the BCRC, are being leveraged with additional industry funding of approximately \$7.6 million. There are 27 BCRC managed projects funded under the third Beef Cluster program between 2018 and 2023. The majority of these projects commenced April 1, 2018, and will be completed within three to five years. In 2019/20, there are 26 Cluster funded projects managed by the BCRC, as outlined in section IV following.

Program Development and Project Selection Timelines

Funding research and extension projects and initiatives outside of the Beef Science Cluster will be a core component of the BCRC funding plan for 2019/20. The majority of the funds will be made available to researchers through open calls for proposals aimed at achieving specific priority outcomes in identified program areas aligned with the Canadian Beef Research & Technology Transfer Strategy. The call for proposals schedule for 2019/20 is as follows:

Research Area	Call for proposals	Receipt of letters of intent	Invite for full proposals	Receipt of full proposals	Council funding decision
Priority Research Projects	June 28/19	Aug.30/19	Oct.1/19	Nov.20/19	Feb.12/20
Canadian Technology Transfer Network	June 28/19	Aug.30/19	Oct.1/19	Nov.20/19	Feb.12/20
Research Capacity	N/A	N/A	N/A	N/A	N/A

IV. Core Activities for 2019/20

i. Beef Cluster III Overview

The following section – Beef Science Cluster III Projects – highlights the core activities that will be funded with 2019/20 Canadian Beef Cattle Check-Off and supplemental industry funding and managed by the BCRC. Investments focus on a portfolio of research that contributes to the industry’s ability to meet the growing global demand for high quality, safe beef through responsible and profitable production practices that support a sustainable future for the Canadian beef cattle industry.

Beef Cluster III builds upon the success of Cluster II and presents a comprehensive portfolio of research. In certain areas, such as forage breeding and development, investments continue to build upon prior Cluster work, investing in long-term breeding programs to support new variety development and incremental improvements in productivity. Increased priority has been placed on incorporating strategies to both measure and increase carbon sequestration. Building upon the foundational environmental footprint work completed in the second Cluster, a life cycle assessment model will quantify the impact of Canadian Beef production on biodiversity. In the area of animal health, research has transitioned from a primary focus on antimicrobial resistance to look more specifically at evaluating alternative strategies to improve animal health in an effort to reduce the use of antimicrobials. A similar approach across other Cluster themes is evident – building upon previous work and refocusing where applicable.

The Beef Science Cluster program demonstrates significant horizontality in terms of how the cross-cutting nature of activities contribute to achieving industry’s long-term objectives. Activities focused on animal health, welfare, antimicrobial resistance, feed production and feed efficiency all support enhanced industry sustainability and improved production efficiencies. At the same time, improvements in productivity contribute to reducing the industry’s environmental footprint and improved public confidence in Canadian beef. Similarly, the development of alternate treatment strategies for lameness offer an opportunity to improve production efficiencies, while also improving animal welfare and public confidence in Canadian beef.

The BCRC supports research that has broad benefits to beef producers and industry stakeholders throughout Canada. The Cluster funds medium to near-term applied research. Some areas of focus do not attract private investment but have broad industry and societal benefits (i.e. forage variety development, on-farm practices). Other areas require further development in order to attract private sector investment (i.e. probiotic development). Contributing to the training of new research expertise to serve Canada’s agriculture sectors into the future is also a priority.

The Beef Science Cluster III is focused on achieving key outcomes of joint importance to Canada’s beef industry and the federal government, as outlined under CAP. Collaborative research teams from across Canada assembled to address CAP priorities including those aiming to:

- determine how camera-based computerized carcass grading systems can optimize fabrication and direct beef products to the most suitable market to support market growth and trade;

- measure and identify opportunities for further improvements in carcass and beef quality to support value-added product development;
- enhance industry's competitiveness through science and innovation by lowering production costs;
- expand production-limiting disease surveillance across Canada to anticipate, mitigate and respond to emerging disease threats;
- enhance environmental sustainability and address climate change by evaluating carbon sequestration and biodiversity in Canada's grasslands and identify strategies to increase the beef industry's contribution;
- reinforce public trust and support transport regulation development by determining optimal rest intervals and durations for cattle in transit
- support consumer confidence and demand by improving understanding of bacteria and cattle interactions to improve food safety, reduce the risk of *E. coli* O157:H7, and reduce the need for antimicrobials to treat bovine respiratory disease and digestive upsets; and
- strengthen awareness and adoption of research results via the BCRC's innovative knowledge translation and transfer team.

Very specific target research outcomes were identified in Cluster III under the following theme areas: beef quality and food safety (which accounts for 14% of the proposed budget); animal health, welfare, and antimicrobial resistance (24% of the budget); feed grains and feed efficiency (16%); forage productivity and environmental sustainability (28%); and knowledge and technology transfer (7%). Science Coordination and Management account for 11% of the proposed budget.

Forage productivity and environmental sustainability activities contribute to continued improvements in productivity and the reduction of the environmental footprint of Canadian beef production. Research will develop native and tame forage varieties for improved productivity and environmental resilience, as well as research into sustaining the legume component of pastures in Eastern Canada. Overcoming challenges related to legume establishment, seedling vigor, acidic soils, and temperature and moisture extremes will help keep legumes in pasture stands and benefit pasture health, soil fertility, carbon sequestration and animal productivity. A soil nutrient database to track how soil carbon sequestration responds to management practices and pasture productivity will be developed. Alfalfa cultivars with reduced fall dormancy, improved winter hardiness and an improved ability to withstand drought, salinity, frost and flooding will remain more resilient to potential challenges imposed by climate change. With forests being an important grazing resource in many areas, the potential to integrate forage, cattle and timber production in a way that benefits agricultural and forest productivity, wildlife habitat and carbon sequestration will be evaluated. Answers to public trust questions regarding the environmental safety of growth promotants will be provided and an assessment of the economic and environmental impacts of removing these technologies completed.

Specific to animal health, welfare and antimicrobial resistance, finding better ways to prevent and treat lameness in cattle will be investigated to support improvements in productivity, while also helping to avoid chronic welfare issues that require antimicrobial interventions. Research on the effect of transport times and rest stop duration

on the welfare of cattle will provide the science required to inform appropriate transport and rest stop durations for both industry and regulators.

Data collected through an expanded, nationwide Canadian cow-calf surveillance network will be used to measure the economic losses associated with various diseases in the cow-calf sector. This will support evidence-based management, disease prevention and antimicrobial use decision-making and education opportunities. Improving overall animal health is key to reducing antimicrobial use. Research characterizing the microbiome of beef cattle will identify risk factors that affect bovine respiratory health and develop a broader toolbox for disease management. Another activity will investigate antimicrobial resistance and virulence factors of bovine respiratory disease (BRD) pathogens to help identify effective treatment and prevention strategies. BRD is the single leading cause of sickness and mortality for feedlot sector and is estimated to cost the industry \$78 million annually due to fatalities and treatment costs.

Under the area of feed production and efficiency, activities will focus on developing feeding recommendations that allow producers to utilize wheat, while minimizing acidosis and identifying better ways for producers to deal with the increasing prevalence of fusarium-contaminated wheat. Genetic analyses of feed intake, feed efficiency, fertility, and cow lifetime productivity in beef cattle will contribute to herd management and decision making. Work proposed to define optimal fiber requirements for feedlot diets will help avoid acidosis-related digestive upsets, improving both feed efficiency and animal care outcomes. Planned research will also investigate the potential of prebiotics and probiotics to improve productivity and avoid digestive upsets in feedlot cattle.

In the area of beef quality and food safety, grading tools to optimize carcass cut-out values and improved predictions of lean meat yield and retail yield will be developed. This will assist industry to maximize the return of objective grading technologies to enhance market competitiveness, particularly by identifying the most profitable international market and fabrication procedures for individual carcasses. A Beef Quality Audit will measure Canadian beef quality defects at the packer, further processor, retail and consumer levels to identify opportunities for further improvement; supporting improved consumer satisfaction and increased demand for Canadian beef. Food safety research will explore novel sanitization technologies to control food-borne pathogens by determining whether *E. coli* shed by cattle is becoming resistant to antimicrobial interventions in abattoirs. Related research will seek to better understand *E. coli* shedding by beef cattle, reducing risks of environmental transmission through food or water.

Knowledge and technology transfer (KTT) is a core activity of the Beef Science Cluster. Effective KTT prepares and delivers applicable information in readily available formats that are easily accessible to end-users and increases the potential for beneficial adoption of knowledge and innovations, thereby fully realizing the value of research. KTT within individual Cluster activities is limited in most cases to the publication scientific peer-reviewed publications and attendance at scientific and relevant industry conferences. Broader, more applicable industry-based technology transfer is delivered by the BCRC.

Through the last two Beef Science Clusters the BCRC developed and implemented an effective KTT program that continues to be refined. Over the term of third Cluster, the BCRC will utilize numerous mechanisms that speed the uptake of promising research with an emphasis on greater communication, collaboration, and tools that empower existing technology transfer agents so that resources are shared more widely and efficiently. Information will be distributed through www.BeefResearch.ca and social media, agriculture media and other technology transfer agents. Resources will be developed around the priority areas in the Cluster; topics may include (but are not limited to) preconditioning to reduce antimicrobial use, encouraging further uptake of best

practices for animal care, forage stand management and utilization, feed and forage testing, cattle transport recommendations, and on farm practices to improve beef quality and food safety. Resources will include web resources, articles, fact sheets, videos, radio clips, webinars, and interactive decision-making tools for producers to evaluate the practicality and impacts of adopting innovations.

ii. Beef Science Cluster III Projects

Project Number	Project description	2019/20 budget	2018/19 to 2022/23 5-yr budget
Beef Quality and Food Safety			
BQU.08.17	Development of prediction tools to optimize carcass value	204,850	882,929
BQU.10.17	Canada's National Beef Quality Audit at Retail and Processing	0	665,986
FOS.01.17	If <i>E. coli</i> shed by cattle is becoming resistant to antimicrobial interventions in abattoirs, how best to raise the hurdles?	238,805	760,410
FOS.07.17	Identification of genetic and microbial markers for <i>E. coli</i> O157 super-shedders through longitudinal biopsy and monitoring	154,115	472,540
Animal Health, Welfare and Antimicrobial Resistance			
ANH.04.17	Assessing economic impacts and developing evidence-based decision support systems for sustainable parasitic roundworm control in Canadian beef cattle	295,510	811,636
ANH.05.17	Identification of treatment strategies for the most common causes of lameness in feedlot cattle	156,305	470,018
ANH.06.17	Effect of rest stop duration and quality on the welfare of cattle transported by road	253,568	836,021
ANH.13.17	<i>Mycoplasma bovis</i> pneumonia in beef cattle	165,069	389,770
ANH.21.17	The Canadian Cow-Calf Surveillance Network	333,213	1,624,231
ANH.30.17	Investigating antimicrobial resistance (AMR) and virulence factors of <i>Mycoplasma bovis</i>	81,575	291,465
AMR.10.17	Characterizing the microbiome of beef cattle to identify risk factors that affect respiratory health	134,498	505,873
Feed Production and Efficiency			
FDE.01.17	Determining the minimum fibre requirement for feedlot cattle and improving the empirical prediction of ruminal pH	278,850	905,607
FDE.06.17	Genetic analyses of feed intake, feed efficiency, female fertility, and cow lifetime productivity in beef cattle raised under two environments	217,908	1,047,314

FDE.09.17	Further strategies to enhance the use of wheat grain in feedlot diets	124,050	460,927
FDE.13.17	Identification of causal mutations located in distortion regions in beef cattle genome associated with bull and cow fertility and its links to feed efficiency	146,395	337,065
FDE.14.17	Evidence-based prebiotic and probiotic solutions for improving gut health and feed efficiency in cattle	81,725	554,500
Forage Productivity and Environmental Sustainability			
FRG.01.17	Development of native and tame forage varieties and mixtures for improved forage and environmental productivity and resilience	371,000	1,497,174
FRG.02.17	Novel sainfoin cultivars for enhancing production efficiency of pasture and beef cattle and building capacity in forage breeding	144,795	603,204
FRG.06.17	Improving abiotic stress tolerance in alfalfa through the simultaneous down-regulation and/or genome editing-mediated knockout of multiple genes	74,415	311,575
FRG.09.17	Sustaining the legume component of grazed pasture mixtures for summer grazing and stockpiling complex mixtures in Eastern Canada	256,490	1,096,090
FRG.11.17	Increasing fall productivity in winter-hardy alfalfa by selecting for reduced fall dormancy	131,038	618,145
FRG.20.17	Evaluating the potential for increased forage productivity in mid-rotation native forested rangeland sites through an integrated forage, cattle and timber management approach (silvopasture)	113,850	308,200
ENV.07.17	A regionalized life cycle impact assessment model for the quantification of Canadian Beef production impacts on biodiversity	85,099	320,007
ENV.09.17	Assessment of occurrence of synthetic hormones [melengestrol acetate & trenbolone acetate] and the beta-agonist (ractopamine) in cattle operations and associated environments	123,050	400,300
ENV.15.17	Economic and environmental impacts associated with removal of growth-enhancing technologies in the Canadian beef cattle industry	84,468	487,278
Knowledge and Technology Transfer			
TEC.01.17	Enhancing Technology Transfer in the Canadian Beef Industry	279,347	1,419,980
Science Coordination			
SCI.01.17	Science Coordination	166,860	860,080
Total		4,696,846	18,938,324

2019/20 total funding (industry and AAFC) for Cluster III projects = \$4,696,846

2019/20 funding (industry and AAFC) directed to AAFC researchers and managed by BCRC = \$1,857,235

2019/20 funding (industry and AAFC) directed to non-AAFC researchers and managed by BCRC = \$2,839,611

2019/20 industry funding to Cluster III projects = \$1,322,734 (included in \$4,696,846 total)

2019/20 AAFC funding to Cluster III projects = \$3,374,112 (included in \$4,696,846 total)

Note - above totals reflect project funding only and do not include the BCRC project management expenses.

iii. Non-Cluster Programs funded by the BCRC and Industry

In addition to projects funded under Beef Cluster III, the BCRC also manages and funds programs outside of the Cluster. These are in alignment with priorities identified through the *Canadian Beef Research & Technology Transfer Strategy* and *Canada's National Beef Strategy*.

a) Special Projects

The following project is managed by the BCRC in recognition of its priority to industry. This is an ongoing initiative that the BCRC supports based on the identified benefit to industry.

Project description	2019/20 budget
Canadian Global Food Animal Residue Avoidance Database - CgFarad	7,500

BCRC funding to CgFarad = \$7,500

The following project is funded by industry partners and other funding organizations, with BCRC's primary role being project management and technology transfer upon project completion.

Project description	2019/20 budget
MISC.01.18 Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS): Beef Feedlot Antimicrobial Use/Antimicrobial Resistance Surveillance Framework Development.	77,000

Partner (non BCRC) funding to MISC.01.18 = \$77,000

BCRC and partner investments for special projects = \$84,500

b) Priority Research Projects

Over the last ten years, the BCRC's primary means of funding research projects was through the Beef Science Clusters due to limited industry funds. While the Clusters have brought significant benefits to industry, limitations on program size and the activities eligible under the Clusters have meant that certain priority areas have not been funded to the extent needed. Key industry research priorities related to beef demand, industry competitiveness, and productivity need to see industry investment to ensure research outcomes are addressed.

Increased research funding as a result of the increase in the Canadian Beef Check-Off will be allocated to priority research projects outside of the Cluster in 2019/20. Funding for these projects is made available to researchers through an annual open call for proposals directed to achieve specific priority outcomes in identified program areas. Successful applicants leverage the BCRC check-off funding by applying for funding from other federal and provincial government and industry funding programs to fully fund proposed research projects.

Key program areas for 2019/20 include Animal Health and Welfare, Beef Quality & Food Safety, Feed & Forage Productivity and research to support Improvements in Productivity and Sustainability. These areas address priority outcomes outlined in the *Canadian Beef Research and Technology Transfer Strategy* and not currently

addressed. Under the BCRC's current programming, beef quality and food safety research funding is a relatively small proportion and significant research outcomes have been identified in the *Strategy* to validate and support the Canadian Beef Advantage in the areas of beef quality, food safety, and total quality management systems. Priority outcomes have also been identified related to feed grain production, forage production and utilization, animal health and welfare, and improved feed efficiency at both the cow-calf and feedlot level.

Letters of intent and proposals received through BCRC's annual call for proposals will be evaluated through BCRC's robust internal and external independent peer review processes, with evaluation focusing on alignment with priorities, benefit to industry, funding leveragability, and scientific integrity. A decision on the projects to be funded during 2019/20 will be made early February 2019.

BCRC priority research projects investment in 2019/20 = \$1,530,000

c) Research Capacity

As identified through the development of the *Canadian Beef Research & Technology Transfer Strategy*, significant gaps in research capacity led the BCRC to explore options to establish Research Chairs in key priority areas. This investment of Canadian Beef Cattle Check-Off funding in partnership with other funders, such as the National Sciences and Engineering Research Council of Canada (NSERC), will facilitate the strongest opportunities for capacity development and encourage matching investments.

Research Chair concepts were invited through an open call for proposals closing October 1, 2018. Research institutions within Canada with the ability and a track record of success in delivering research programs in areas relevant to the Canadian beef industry were eligible to submit proposals. A total of ten proposals were received focusing on core research capacity objectives as identified in the *Strategy*.

Proposals were evaluated for their likelihood to help the Canadian beef industry remain competitive and sustainable over the short and long term, based on the following criteria:

1. research capacity relevance to the core research objectives and priority areas,
2. incremental nature of the proposed research capacity,
3. institutional and matching investments, and
4. program support provided by the research institution (including available support staff, infrastructure, etc.).

From the proposals submitted, two concepts were selected for further development with funding support to begin in 2019/2020 upon successful completion of funding agreements and the procurement of matching government investments. A Beef Production Systems Chair is proposed to be established at the University of Alberta "to increase the competitiveness of those sectors of the Canadian beef industry that rely heavily on grazing-based forage resources, while maintaining a strong focus on beef production and market outcomes". At the Western College of Veterinary Medicine, University of Saskatchewan, a BCRC Chair in One Health and Production-Limiting Diseases is proposed to be established with the goal "to increase capacity for applied field research and surveillance in specific priority areas outlined by the beef industry including: animal health and welfare, antimicrobial use, resistance and alternatives, and on-farm food safety".

Each of these Chair positions are a five-year commitment of \$150,000/year by the BCRC with the likely potential for a one-time renewal for a maximum BCRC commitment of ten years. Renewal is dependent upon successful review of Chair outcomes and funding availability. Efforts are currently being led by the institutions, supported

by the BCRC, to secure matching funds through sources such as the NSERC Industrial Research Chair (IRC) program with the goal of matching funds and the new Chair positions being in place in 2019/20.

Additional calls for proposals for research capacity in subsequent years will be subject to annual BCRC funding allocations, with the expectation that funding calls in this area will be staggered and only occur every three to five years.

BCRC research capacity investment in 2019/20 = \$300,000

d) Knowledge & Technology Transfer

The transfer of technology and innovations to industry is essential to driving the timely adoption and uptake of research results. Industry has been tasked with taking a leadership role in technology transfer, as governments have largely moved away from agricultural extension in recent decades.

In 2019/20, through the third Beef Science Cluster, the BCRC will continue to advance the implementation of its Technology Transfer Strategy. Regular communication to industry is primarily initiated through the BCRC website, www.beefresearch.ca. Articles that provide overviews and summaries of various research results, advice on adopting technology and innovation into production practices, and cost analysis tools to help producers estimate the impacts of production changes will continually be added to the website and distributed. In addition to written articles, the website features videos, interactive calculators and other decision-making tools. Social media tools will continue to be utilized to make followers aware of new resources and offer seasonal reminders. Communications from the BCRC will also continue through a regular research column in Canadian Cattlemen – the beef magazine, other industry publications, staff presentations at industry events, and through national and provincial producer associations.

Until 2018, BCRC technology transfer activities were limited in scope to the Beef Science Clusters. Since 2018, increased investment in research through the Canadian Beef Cattle Check-Off enabled the BCRC to expand its technology transfer efforts. To address the regionally limited, underfunded, and very fragmented nature of extension efforts across Canada, the BCRC coordinated a National Beef Technology Transfer Network. The BCRC launched its first targeted call for letters of intent of extension projects in 2018/19 to support collaborative development of progressive extension resources that reach beyond regional levels. Another annual call in this area is planned for 2019/20 with the process and timelines mirroring the call for proposals for research projects. Funding decisions for the 2019/20 call for proposals will be made in February 2019. Projects will run from one to two years with a maximum of \$50,000 of funding from the BCRC, and each project requires 50% or greater of the total funding from government or other sources.

With the increased investment in research through the Canadian Beef Cattle Check-Off the BCRC is also working to provide research funding in two key areas that have previously had limited funding. One of these areas is funding to support short-term (six months to one year) proof of concept-based research to help decide whether it's worth pursuing as a larger, more defined research project. Another funding gap is the support for clinical trials to validate certain practices or technologies discovered through research projects and/or to facilitate the adaption of technologies that have been utilized in other sectors, commodities or countries.

The BCRC has committed funding to short-term projects (six months to one year) in these two areas, with a maximum of \$50,000 per project. Ideally this funding would be leveraged by other government and/or industry funds to leverage check-off investments. Given that this is a new funding program for the BCRC, rather than a

formal call for proposals a limited group of researchers will be approached regarding 2019/20 funding projects with a similar timeline for final funding decisions to be made by February 2019.

BCRC knowledge and technology transfer Investment in 2019/20 = \$350,000

e) Surveillance Research Networks

A key priority identified in the *Canadian Beef Research & Technology Transfer Strategy* is supporting the establishment of priority surveillance networks related to production limiting diseases and antimicrobial resistance and use to inform industry practice, policy, and future research priorities. Industry is taking a greater role in animal health and disease surveillance as government moves away from its traditional role in these areas. Maintaining ongoing surveillance networks relative to production limiting diseases and animal health is critical for our industry to demonstrate the integrity of the Canadian beef supply chain to consumers, end users, and global trading partners. Ongoing surveillance enables the industry to validate its animal health and welfare practices, as well as overall efficiency. Ongoing surveillance is also critical for identifying areas where potential improvements can be made through investments in research and/or changes in production practices.

Consumers, end users, and the public are increasingly asking questions about the sustainability of Canadian beef production and are challenging the industry's social license to produce cattle and beef. Proposed investments in surveillance networks are also focused on allowing industry to provide ongoing science-based monitoring in the areas of antimicrobial resistance and use, which are two key areas of focus from both a consumer and regulatory perspective.

A Cost of Production network, aligned with the *Canadian Beef Research & Technology Transfer Strategy's* recognition that sound economic baseline data and economic analysis to create meaningful, relevant scenarios is a priority, will be continued. The Cost of Production network is intended to support industry competitiveness by having Canadian beef cattle cost of production data in every province/eco-region to guide technology transfer and research priorities. A Cost of Production network is one of the most internationally recognized cost-efficient ways of encouraging researchers to address beef industry questions as baseline data will be accessible through a national approach that ensures comparisons can be done across eco-regions, provinces and internationally. This network, a continuation of the network established in 2018/19, will continue to be managed under Canfax Research Services (CRS). CRS has confirmed the commitment of provincial partners to support the development and implementation of the network and continues to work extensively with Agri-Benchmark, which provides oversight and internationally accepted standards and processes for the development of a country-specific network.

BCRC surveillance cost of production network program development investment in 2019/20 = \$67,375

Total industry funding to Non-Cluster programs in 2019/20 = \$2,331,875

f) Verified Beef Production Plus

In addition to sponsoring research and technology development in support of the Canadian beef industry, the BCRC oversees the Verified Beef Production Plus (VBP+) program. The BCRC funding facilitates the ongoing operation of the national VBP+ program, including the maintenance of a national standard, maintenance of the national CORS data management system and national website, and coordination of provincial delivery, audit systems and record keeping.



The VBP+ program grew from its roots in the Quality Starts Here (QSH) program; an educational initiative to help the beef industry move toward the highest beef quality in the world through training and on-farm verification of practices relating to food safety and beef quality. The VBP+ program builds on the success of the QSH program by adding the ability to train on and verify on-farm practices related to animal care, environmental stewardship, and biosecurity.

With the VBP+ now recognized by the Canadian Roundtable for Sustainable Beef (CRSB) as a Certification Body for the CRSB's Certified Sustainable Beef Framework, all VBP+ Certified Operations are also considered Certified Operations under the Certified Sustainable Beef Framework. This is a major positive step towards simplification of the sustainability initiative in the eyes of Canadian beef producers and accessibility for beef producers to the benefits of sustainable beef production.

VBP+ will continue to be involved with the Canadian Beef Sustainability Acceleration (CBSA) pilot over the next year. The CBSA pilot is led by Cargill, BIXS, and VBP+ and hopes to: (i) build the supply of beef intended to be able to meet the Certified Sustainable Beef Framework; and (ii) establish the infrastructure necessary for sourcing beef tracked through a fully certified value chain. The CBSA pilot launched for an initial one-year period in October 2017. It has since been extended indefinitely while Cargill develops a program for certified sustainable beef, meaning that the pilot was successful and there is sufficient end-user demand. The current bottleneck remains having adequate numbers of calves qualifying, therefore, VBP+ is continuing its push to get more producers audited and fully Certified.

The CBSA pilot has been successful at identifying potential areas of improvement throughout the certified sustainable beef value chain. In 2019 work will continue, involving CRSB and the CBSA pilot partners (including VBP+), to make these improvements and ensure that all parts of the value chain are well positioned to make it as easy as possible for Canadian beef producers to access the benefits of beef sustainability initiatives.

VBP+ has chosen to move forward with the implementation of a two-stream approach to delivering the VBP+ program, auditing and training. The auditing program will result in certified operations which qualify for the Certified Sustainable Beef Framework. The VBP+ training program will be enhanced with the recognition that while some stakeholders are looking to procure product from fully verified operations a number of stakeholders are asking for producers to simply be trained at this time, allowing them to communicate the commitment industry has to continuous learning and improvement. VBP+ plans to build on its existing training program with support from Agriculture and Agri-Food Canada through the Canadian Agricultural Partnership (CAP). The training will be improved by adding an assessment element, renewal criteria and further learning modules, and development of materials to improve the ease of delivery to producers. Focus through the CAP project will also be placed on ensuring the continuous alignment and equivalency of VBP+ with other relevant assurance

programs, like the U.S. based Beef Quality Assurance program, to ensure VBP+ trained and/or verified producers are able to access domestic and export markets without additional training and/or verification requirements.

The VBP+ program is a core pillar in championing and verifying sustainable beef production. VBP+ will continually increase its ability to deliver knowledge and practices related to sustainable production to producers while concurrently, in concert with entities like the CRSB, Public and Stakeholder Engagement, and Canada Beef, help communicate the great job Canadian beef producers are doing on their farms and ranches to consumers and the public through various forms of verification and reporting.

BCRC Verified Beef Production Plus investment = \$295,000

V. Organization Overview

Mandate and goals

The BCRC was established in 2001 and operates as a division of the Canadian Cattlemen's Association (CCA).

The BCRC's mandate is to determine research and development priorities for the Canadian beef cattle industry and to administer Canadian Beef Cattle Check-Off funds allocated to research. As the national beef cattle industry research agency, the BCRC plays an important role in identifying the industry's research and development priorities and subsequently influencing public sector investment in beef, cattle and forage research. The BCRC leverages industry funding collected through the Canadian Beef Cattle Check-Off funding with funding from Agriculture and Agri-Food Canada (AAFC) through the Beef Cattle Industry Science Clusters.

As a leader in the development of the Canadian Beef Research and Technology Transfer Strategy, the BCRC facilitates and encourages collaboration and coordination among researchers, other funding agencies and industry in order to maximize the benefits obtained from all investments in beef research.

Overarching goals:

1. Improved communication, collaboration and understanding between researchers and industry
2. Continued industry mentorship of new scientists
3. Cost-benefit analysis completed to support recommendations and technology transfer
4. Encouragement of interdisciplinary teams integrating the entire value chain where appropriate
5. Ensured maintenance, transition and mentorship of key research and extension capacity

Objectives:

1. Continue to enhance the safety and quality of Canadian beef
2. Ensure the integrity and high standards of animal health in the Canadian herd
3. Improve and ensure the dissemination of knowledge throughout the industry
4. Ensure that sound scientific principals and risk assessment are utilized in developing good production practices, industry and government policy and standards
5. Support innovative projects designed to improve industry competitiveness
6. Enhance international acceptance of Canadian beef quality and safety standards

Governance and Board

The BCRC is overseen by a Council comprised of industry representatives appointed by provincial cattle organizations that contribute to the BCRC through the Canadian Beef Cattle Check-Off. There are currently 12 members proportionally representing the provincial allocation of the Canadian Beef Cattle Check-Off to research. The Council is responsible for the direction of all aspects of the BCRC research program development and implementation, annual business plans and results reports are submitted for approval on an annual basis to the Canadian Beef Cattle Research, Market Development and Promotion Agency (Canadian Beef Check-Off Agency), who is responsible for the administering the Canadian Beef Cattle Check-Off, and to the CCA Board of Directors to ratify the budget as presented by the BCRC.

Operational Management

As outlined in the chart below, the BCRC management is overseen by an Executive Director, who takes direction from and reports to the BCRC producer council. This role includes developing and managing the implementation of annual business and program plans and budgets, organizing and facilitating meetings on behalf of the council, and providing the council with advice and input as requested. In addition, the Executive Director acts as a liaison and facilitation link among the BCRC, the CCA, the Canadian Beef Check-Off Agency, the Canadian Beef Advisors, BCRC staff, technical advisors, and national and provincial interest groups with similar research objectives. The Executive Director encourages coordination of priorities and funding allocations between agencies in alignment with the *Canadian Beef Research and Technology Transfer Strategy 2018-2023*.

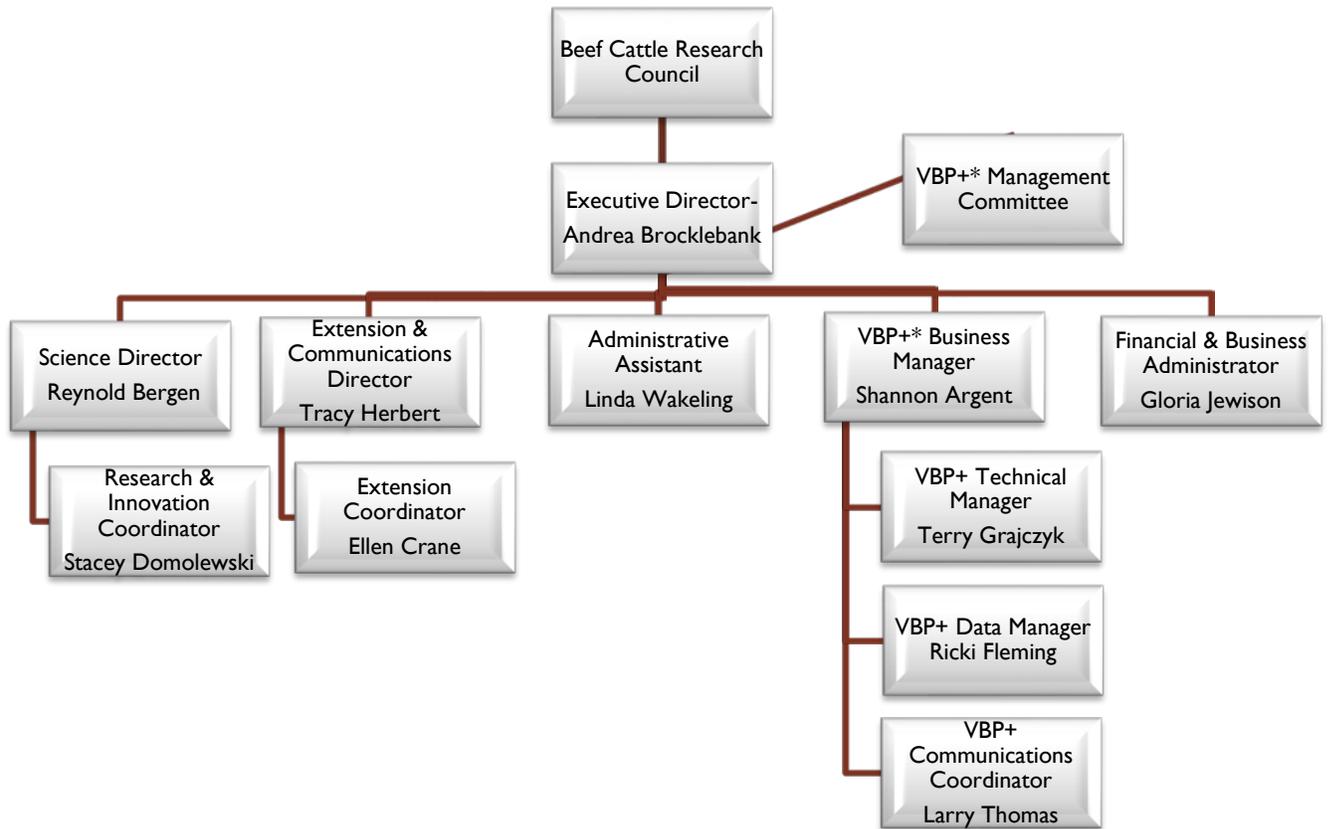
The BCRC Science Director and Research and Innovation Coordinator manage priority research projects as well as projects undertaken within the Beef Cattle Industry Science Clusters. Responsibilities of these staff include oversight of program development and administration, facilitating calls for proposals or directed research requests, coordinating the review of research proposals including the BCRC's internal and peer review process, tracking and monitoring research progress, and working with the science advisory body and the BCRC to aid in research program development.

The Extension and Communications Director and Science and Extension Coordinator support the Technology Transfer & Knowledge Dissemination Strategy. These roles support a comprehensive approach to communications with industry stakeholders and researchers through a dynamic website and other extension tools, and assisting researchers in incorporating effective technology transfer efforts into their research programs.

In addition, administrative, financial and technical expertise as required support the BCRC operations.

A Science Advisory Panel supports the BCRC research program development process to ensure the delivery of research plans that are directed towards industry's research objectives and achieve the outcomes desired by industry. The Panel is comprised of industry, academic and governmental scientific expertise, all considered to be leaders in their field, broad thinkers, and committed to evolving beef research in Canada. The Panel also assists with the technology transfer and knowledge dissemination process and identification of commercialization opportunities.

Beef Cattle Research Council Organization Chart



VBP* = Verified Beef Production Plus

Note: In addition to permanent positions, BCRC and the VBP+ Program hires services from various experts, on a contractual basis as required

VI. Budget

The BCRC is committed to funding leading-edge research to position the Canadian beef cattle industry as a global leader in beef quality, animal health and welfare, food safety and environmental stewardship. Continued progress requires long-term research investments to ensure that our industry can respond and adapt to new issues and opportunities that arise. Industry and government funding play a major role in ensuring that both applied and long-term, high-risk discovery research continues. The BCRC has made significant strides through the Beef Cattle Industry Science Clusters to develop collaborative research initiatives between industry and government that align applied research priorities and funding to ensure that key research outcomes are achieved. Significant effort is also focused on enhancing technology transfer and knowledge dissemination to ensure more immediate uptake of research results by industry.

The Canadian Beef Cattle Check-Off (National Check-Off) increase is now in effect in all provinces except Ontario, increasing the National Check-Off from \$1.00 to \$2.50 per head to support the implementation of activities proposed under Canada's National Beef Strategy.

The National Check-Off revenue for the BCRC was projected at \$5.0 million for 2018/19, as reported in BCRC's revised budget submitted to the Canadian Beef Check-Off Agency in July 2018. For 2019/20, the National Check-Off revenue is projected at \$5.1 million. To the best of our knowledge the long-term intent of the Alberta Beef Producers (ABP) remains to revise their allocations between marketing, research, and issues management to align with recommendations provided under Canada's National Beef Strategy. This would mean that instead of 44% of ABP's National Check-Off being allocated to research, the allocation would be 30%. Consequently, it has been assumed that given timelines for notification and ongoing discussions between ABP and the Canadian Beef Check-Off Agency that BCRC revenues would drop to \$3.8 million in 2020/21.

Section IV of this Business Plan describes the proposed program areas and budget in greater detail including funding for: the third Beef Science Cluster by project; priority research programming outside of the Cluster; priority research capacity; enhanced knowledge and technology transfer; surveillance cost of production network program development; and supporting the advancement of Verified Beef Production Plus. These were the core areas identified for further research investment in Canada's National Beef Strategy and also align with priorities in the renewed *Canadian Beef Research & Technology Transfer Strategy 2018-2023*.

As the collection of the increased Canadian Beef Cattle Check-Off continues, and with provincial allocations to research adjusted the BCRC will continue its research funding planning for 2019/20. Specific to the VBP+ program, the Agriculture and Agri-Food Canadian Agricultural Partnership AgriAssurance program funding was confirmed, supporting the VBP+ program advancement over the next four years.

The following budget includes the operating expenses and revenues for BCRC's fiscal year July 1, 2019 to June 30, 2020. The total revenue for 2019/20 is projected at \$6.2 million and includes funding received from the Canadian Beef Cattle Check-Off, as well as from industry and government partners. These partners, including Agriculture and Agri-Food Canada, Alberta Agriculture and Forestry and provincial beef associations, are major partners in funding research. The budgeted revenue reported from these partners reflects funding provided for research programs, managed by the BCRC.

The 2019/20 expenses include operating expenses and direct expenses for research projects managed and funded through the BCRC and its industry partners. The total 2019/20 BCRC expenses are projected at \$5.52 million for a net surplus of \$655,720 in 2019/20.

As noted in the Beef Science Cluster III Projects section and budget following, industry will contribute \$1.3 million to fund Cluster III projects in 2019/20. This industry investment is leveraging an additional \$3.4 from AAFC (not reported in the BCRC budget as it is administered internally from AAFC to researchers), for a total Cluster III project investment of \$4.7 million in 2019/20.

BCRC Reserve

The BCRC maintains a restricted reserve of \$2.0 million to cover management costs and contracted research commitments in the event the BCRC ceased operations. The reserve is projected to be \$4.86 million at June 30, 2019 and \$5.5 million at June 30, 2020. The majority of the current reserve in excess of the restricted reserve is unallocated and is a result of increased provincial funding allocations to the BCRC over the last two years. It is understood and agreed upon by the BCRC producer council that the BCRC reserve will continue to grow in 2019/20 as the BCRC program ramps up and multi-year projects get underway. The drawdown of funds from project allocations across multiple years will start to accumulate over the next few years and result in the drawdown of the inflated reserve to approximately \$2.7 million after approximately four years depending on program development as directed by the Council. At that point the intent will be for the BCRC to operate on a balanced budget unless otherwise decided by the Council.

Beef Cattle Research Council 2019 - 2020 Budget

Net Assets, beginning of year (July 2018)		3,371,064
Excess (deficiency) of revenue over expenditure - June 2019		<u>1,488,656</u>
Net Assets, June 30, 2019		4,859,720
Projected 2019 - 2020 Revenue		
National Check Off	5,100,000	
Provincial Science Cluster Grant	111,000	
Interest Earned	30,000	
MISC.01.18 CIPARS AMR	77,000	
AAFC Cluster Management	313,508	
AAFC Cluster BQU.10.17	-	
AAFC Cluster TEC.01.17	179,348	
Grant from CCA - VBP	50,000	
AAFC Management for VBP+	22,125	
AAFC VBP+ CAP Contribution	221,250	
VBP Dept 97 Industry Contribution	73,750	
Misc Rev	-	
Total Revenue	6,177,981	
Projected 2019 - 2020 Expenses		
BCRC Division Services	982,904	
Projects	2,331,875	
VBP+ management	589,748	
On Farm Food Safety	0	
Cluster III Projects	1,322,734	
Enhanced VBP+ projects	295,000	
Total Expenses	5,522,261	
Excess (deficiency) of revenue over expenditure	655,720	
Projected Net Assets, June 30, 2020		5,515,440