



# 2018/19 Business Plan

Submitted to:

Canadian Beef Cattle Research, Market Development and  
Promotion Agency

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## I. Introduction

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The Beef Cattle Research Council (BCRC) is entering a transition year in terms of funding and program administration. The Beef Science Cluster II, under Agriculture and Agri-Food Canada's AgriInnovation Program (AIP) wraps up March 31, 2018. The Beef Science Cluster III program, under the Canadian Agricultural Partnership (CAP) is set to be in place for April 1, 2018, but final decisions are yet to be made on the submitted Beef Science Cluster III application. These research programs, further discussed in Section III, direct government funding to the BCRC to leverage industry funding and the industry driven research initiatives are managed by the BCRC. In addition to the uncertainties surrounding the Cluster III program, an increase in the Canadian Beef Cattle Check-Off, a portion of which funds national beef research, could impact programs administered by the BCRC over the next year.

The budgets and programs outlined in this 2018/19 Business Plan are based on information available at the beginning of January 2018, however funding uncertainties could lead to adjustments to programming and/or budgets outlined in this Plan. Until the collection of an increased Canadian Beef Cattle Check-Off occurs and provincial allocations to research are fully confirmed, the BCRC will continue in its planning for 2018/19, but final program priorities and budgets will be subject to change. If required, revisions to the BCRC's 2018/19 budget will be managed through a process engaging the BCRC producer council in consultation with the Canadian Beef Cattle Research, Market Development and Promotion Agency (the Agency).

As noted above, a portion of the funds collected by the Agency is directed towards the BCRC to fund research and development activities to improve the competitiveness and sustainability of Canada's beef industry. The BCRC was established in 2001 as an operating division of the Canadian Cattlemen's Association (CCA), the national association representing the interest of Canada's beef cattle producers. 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.

As a 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. Building upon the successes of the 2012 National Beef Research Strategy, the BCRC and national Beef Value Chain Roundtable (BVCRT) led the development of the [Canadian Beef Research and Technology Transfer Strategy 2018 – 2023](#). The renewed Strategy, developed with ongoing engagement of researchers, funders and grassroots producers, highlights the global beef market outlook, the role of research in today's competitive environment, and key research priorities and outcomes over the next five years. Throughout the Strategy development process, input was sought from industry stakeholders through various means including direct consultation, an online survey, and most importantly, two workshops. This engagement 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 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 research objectives are supported by the following industry-identified priority areas:

1. Beef Quality
2. Food Safety
3. Animal Health and Welfare
4. Antimicrobial Use, Resistance and Alternatives
5. Feed Grains and Feed Efficiency
6. Forage and Grassland Productivity
7. Environmental Sustainability
8. Technology Transfer

The Canadian Beef Research and Technology Transfer Strategy 2018 – 2023 directly supports Canada's 2013-2018 National Beef Strategy and its four pillars, namely beef demand, competitiveness, productivity and connectivity. It promotes research to maintain or improve consumer confidence and demand for Canadian beef by investing in beef quality and food safety research, and to maintain or improve production competitiveness with advancements in animal health and welfare, feed grains and efficiency, and forage and grassland production. It further emphasizes the importance of coordinated technology transfer to ensure continued productivity improvements within the beef industry.

The BCRC and BVCRT will continue to engage industry stakeholders as the Canadian Beef Research and Technology Transfer Strategy 2018 – 2023 is implemented to ensure priority research needs are met in a coordinated manner to advance the competitiveness and sustainability of the Canadian beef industry.

## II. Environment Scan

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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 9.7 billion in 2050. Compared to 2010 production levels, an estimated 70% more food 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 over the next ten years.

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 \$8.6 billion in 2016, 14.4% of total farm cash receipts. It is responsible for \$44 billion worth of direct and indirect sales of goods and services per year, 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. Currently, 45% of Canadian beef production is exported and 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 competitive 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 20% less blue water than in 1981 due to improved production; the same amount of beef was produced utilizing 29% fewer cattle, 24% less land and 17% less water.

Opportunities for continued improvements in productivity exist across a variety of disciplines including enhanced feed and forage production, improved animal health and welfare, the 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.

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. National Beef Research Strategy and the Beef Cattle Industry Science Clusters Background

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The BCRC and the Beef Value Chain Roundtable (BVCRT) developed Canada's initial five-year (2013-2018) National Beef Research Strategy in 2012. It provided a framework towards achieving national coordination of beef research priorities, funding and communication efforts. Bringing together Canada's largest industry and public beef research funders, to align dollars and priorities to achieve research outcomes that will meet industry needs, provides a more comprehensive outcome-based research program that is more directly aligned with industry's vision and priorities.

The BCRC took a leadership role in developing the Beef Cattle Industry 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 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. Every Canadian Beef Cattle Check-Off dollar was matched by six AAFC dollars.

The second Beef Cattle Industry Science Cluster (Beef Science Cluster II) is a five-year initiative between April 1, 2013 and March 31, 2018, under Growing Forward 2. The BCRC managed 26 research programs under the Beef Science Cluster II all of which will be completed March 31, 2018. These projects are jointly funded by government and industry through producer check-off and partner investments. Five additional beef industry funders (Alberta Beef Producers, Alberta Cattle Feeders' Association, Manitoba Beef Producers, Beef Farmers of Ontario and Quebec Beef Producers) invested producer dollars in Beef Science Cluster II.

In early 2017, the Canadian Beef Research and Technology Transfer Strategy 2018 – 2023 Strategy was developed, building on the success of the 2013-2018 National Beef Research Strategy. These Strategies are instrumental in guiding industry and government research investments at both national and provincial levels across multiple funding agencies. Through implementation of the Strategy, the BCRC continues to work in partnership with industry and government funding agencies across Canada to be more efficient with limited funding and to ensure key research, capacity, and infrastructure priorities are addressed.

In the fall of 2017, AAFC introduced the third Science Cluster 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. The Cluster III will run from April 1, 2018 to March 31, 2023.

The BCRC was very engaged with AAFC and industry stakeholders in the CAP program development. Guided by the Canadian Beef Research and Technology Transfer Strategy 2018 – 2023 along with the AAFC program guidelines, the BCRC submitted a funding application for 5-year funding under CAP. Approval is pending, with the projects funded under Cluster III expected to start in April 1, 2018.

## IV. Core Activities for 2018/19

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### i. Research Priorities and Beef Cluster III Overview

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Developing research priorities for the BCRC's next five-year (2018-23) funding plan under the Cluster and additional initiatives was an extensive process that was guided by the Canadian Beef Research and Technology Transfer Strategy 2018 – 2023. 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. The following section – Beef Science Cluster III Projects – highlights the core activities that are proposed to be funded with 2018/19 Canadian Beef Cattle Check-Off and supplemental industry funding, and managed by the BCRC. As 2018/19 is a transition year (AAFC research funding transitioning from Cluster II to Cluster III) funding for the projects included in the following section has not yet been approved. Subject to AAFC's recommendations and approval expected by February 2018, there may be revisions to the projects listed. As required, further planning will occur upon confirmation of funding by AAFC and prioritization by the BCRC. All projects included in the CAP application as well as a five-year program overview are included in this Business Plan. The 2018/19 Results Report will report on those projects undertaken in 2018/19.

The Beef Cluster III builds upon the success of the second Cluster and presents a comprehensive portfolio of research. In certain areas, such as feed grain and forage 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 to quantify the impact of Canadian Beef production on biodiversity is proposed. In the area of animal health, proposed 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.

Horizontality across funding agencies is also demonstrated. Cluster activities focus on priorities in the Canadian Beef Research and Technology Transfer Strategy 2018-2023 with consideration of research being supported by other funding agencies and gaps in funding when compared to the Strategy. Awareness of other funding commitments is possible through the ongoing Beef and Forage Research Inventory, which funding agencies

contribute information to and the BCRC manages. It reduces duplication, improves horizontality, and enables limited funds to be utilized more efficiently.

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. Examples of collaborative research teams from across Atlantic and Central Canada, the Prairies and BC assembled to address CAP priorities include 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 13% of the proposed budget); animal health, welfare, and antimicrobial resistance (25% of the budget); feed grains and feed efficiency (19%); forage productivity and environmental sustainability (28%); and knowledge and technology transfer (6%). Science Coordination and Management account for 9% 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. In Western Canada, research examining different ways to combine extended winter grazing strategies will help the industry further reduce feeding costs and fuel use. 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 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. Similarly, efforts to develop user-friendly and cost-effective options to further reduce the pain associated with branding and castration in will be advanced.

Addressing prevention of animal disease, data collected through an expanded, nation-wide 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 increasing the yield and agronomic performance of barley. Opportunities to improve disease resistance, water and nitrogen use efficiency will also be identified, as climate change is anticipated to impact crop yields, water requirements, and water availability. Research will also develop 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. 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 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 Science Clusters the BCRC has developed and implemented an effective KTT program that continues to be refined. Over the term of this 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](http://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	2018/19 budget	2018/19 to 2022/23 5-yr budget
<b>Beef Quality and Food Safety</b>			
BQU.08.17	Development of prediction tools to optimize carcass value	276,602	882,929
BQU.10.17	Canada's National Beef Quality Audit at Retail and Processing	0	888,587
FOS.01.17	If E. coli shed by cattle is becoming resistant to antimicrobial interventions in abattoirs, how best to raise the hurdles?	224,340	760,410
FOS.07.17	Identification of genetic and microbial markers for E. coli O157 super-shedders through longitudinal biopsy and monitoring	65,720	472,540
<b>Animal Health, Welfare and Antimicrobial Resistance</b>			
ANH.04.17	Assessing economic impacts and developing evidence-based decision support systems for sustainable parasitic roundworm control in Canadian beef cattle	302,761	798,721
ANH.05.17	Identification of treatment strategies for the most common causes of lameness in feedlot cattle	229,428	470,018
ANH.06.17	Effect of rest stop duration and quality on the welfare of cattle transported by road	226,705	836,021
ANH.08.17	Pain mitigation strategies for branding and castration alone or in combination in beef calves	211,013	965,245
ANH.13.17	Mycoplasma bovis pneumonia in beef cattle	83,975	389,770
ANH.21.17	The Canadian Cow-Calf Surveillance Network	126,356	1,624,231
ANH.30.17	Investigating antimicrobial resistance (AMR) and virulence factors of Mycoplasma bovis	59,375	291,465
AMR.10.17	Characterizing the microbiome of beef cattle to identify risk factors that affect respiratory health	9,900	505,873
<b>Feed Production and Efficiency</b>			
FDE.01.17	Determining the minimum fibre requirement for feedlot cattle and improving the empirical prediction of ruminal pH	149,500	905,607
FDE.04.17	Increasing the yield threshold and enhancing the ideotype and quality of barley cultivars for feed in Western Canada	208,435	1,095,904
FDE.06.17	Genetic analyses of feed intake, feed efficiency, female fertility, and cow lifetime productivity in beef cattle raised under two environments	157,438	1,047,314

FDE.09.17	Further strategies to enhance the use of wheat grain in feedlot diets	42,700	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	170,650	337,065
FDE.14.17	Evidence-based prebiotic and probiotic solutions for improving gut health and feed efficiency in cattle	81,725	554,500
<b>Forage Productivity and Environmental Sustainability</b>			
FRG.01.17	Development of native and tame forage varieties and mixtures for improved forage and environmental productivity and resilience	272,675	1,497,174
FRG.02.17	Novel sainfoin cultivars for enhancing production efficiency of pasture and beef cattle and building capacity in forage breeding	110,150	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	73,810	311,575
FRG.09.17	Sustaining the legume component of grazed pasture mixtures for summer grazing and stockpiling complex mixtures in Eastern Canada	215,900	1,096,090
FRG.11.17	Increasing fall productivity in winter-hardy alfalfa by selecting for reduced fall dormancy	90,448	618,145
FRG.14.17	Optimizing the order of winter pasture types to increase pasture days, reduce cost and land requirement for wintering beef cows	137,470	899,165
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)	59,800	308,200
ENV.07.17	A regionalized life cycle impact assessment model for the quantification of Canadian Beef production impacts on biodiversity	23,690	241,397
ENV.09.17	Assessment of occurrence of synthetic hormones [melengestrol acetate & trenbolone acetate) and the beta-agonist (ractopamine) in cattle operations and associated environments	109,325	400,300
ENV.15.17	Economic and environmental impacts associated with removal of growth-enhancing technologies in the Canadian beef cattle industry	84,755	531,278
<b>Knowledge and Technology Transfer</b>			
TEC.01.17	Enhancing Technology Transfer in the Canadian Beef Industry	308,028	1,447,580
<b>Science Coordination</b>			
SCI.01.17	Science Coordination	162,000	860,080

## Total

2018/19 total funding for Cluster III projects = \$4,274,684

2018/19 funding directed to AAFC researchers and managed by BCRC = \$1,848,024

2018/19 funding directed to non-AAFC researchers and managed by BCRC = \$2,426,660

**2018/19 industry funding to Cluster III projects = \$1,363,907** (included in \$4,274,684 total)

**2018/19 AAFC funding to Cluster III projects = \$2,910,777** (included in \$4,274,684 total)

### 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	2018/19 budget
Canadian Global Food Animal Residue Avoidance Database-CgFarad	7,500

**BCRC funding to special projects = \$7,500**

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

Project description	2018/19 budget
MISC.02.17 Assessing the potential implications of heat resistant E.coli	7,900
MISC.03.17 Enhancing the efficiency of CVS grading data capture and reporting	46,575

**Partner funding to special projects = \$54,475 (offset with special project revenue)**

**BCRC and partner investments for special projects = \$61,975**

#### b) Priority Research Projects

Over the last ten years, the BCRC's primary means of funding research projects was through the 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 was proposed through Canada's *National Beef Strategy* to be allocated to priority research programming outside of the Cluster and is budgeted for in the BCRC's 2018/19 business plan. These funds will be made available to researchers through an open call for proposals directed to achieving specific priority outcomes in identified program areas. The intent is that successful applicants will 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.

Two key program areas - Beef Quality & Food Safety and Feed & Forage Productivity - will be the focus for 2018/19 call for proposals to address priority outcomes outlined in the *Canadian Beef Research and Technology Transfer Strategy* not currently addressed in the Beef Science Cluster III. 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 utilizations, and improved feed efficiency at both the cow-calf and feedlot level.

All proposals will be evaluated through BCRC's existing robust internal and external independent peer review processes, with evaluation focusing on alignment with priorities, benefit to industry, funding leveragability, and scientific integrity.

**Beef quality & food safety = \$400,000**

**Feed & forage productivity = \$400,000**

**Priority research projects investment = \$800,000**

### **c) Research Capacity**

Through the development of the *Canadian Beef Research & Technology Transfer Strategy*, the industry has identified that one of the areas where there is a significant gap is research capacity to conduct priority research in the areas of meat science, beef production, and forage, breeding, agronomy, and utilization. It is also noted that many provincial and federal government funding agencies are limited in their ability to fund new research positions, while the BCRC has the flexibility to fund this type of initiative. This represents a significant departure for the BCRC funding, which has historically focused on funding research projects, not research positions.

Typically, new capacity is funded through the creation of Research Chair positions. Research Chairs take time to establish, as Research Institutions must be brought onside, and matching industry and government funds must be applied for. The BCRC has agreed that gaps in research capacity are a high priority and consequently is focused on exploring options to establish Research Chairs in a few key areas and invest Canadian Beef Cattle Check-Off funding in partnership with other funders such as Natural Sciences and Engineering Research Council of Canada (NSERC) and provincial governments.

To attract University investment, other matching investments, and procure the strongest opportunities for capacity development, research chair concepts will be considered through an open call for proposals directed to research institutions and key departments within. Evaluation of Research Chair concepts will consider proposed institutional investments, program support, and capacity priorities that have been identified by industry.

Strengthening meat science programming in Canadian universities with an emphasis on research in carcass quality and profiling, new product and cut development, enhancements in food processing and packaging, and ongoing food safety monitoring and improvements is one of the key areas industry has identified as a priority for investment in research capacity. Positioning capacity in this area will not only ensure meat scientists are in place to conduct priority research, but also support the education of students for employment within industry, government, and research.

Significant declines in research expertise to conduct feed and forage breeding, management, and utilization, as well as expertise to support beef production, have occurred over the last several decades. As global food demand grows and agricultural based resources continue to face competition and pressure, the beef industry is challenged to produce more with fewer resources. With a renewed focus on research and extension in the areas of feed and forage production, utilization, and overall beef production, significant opportunities are evident to increase productivity but it will require an investment in research capacity to ensure this work is done.

**Research capacity investment = \$500,000**

#### **d) Knowledge & Technology Transfer**

The transfer of technology and innovations to industry via various means is essential to driving the timely adoption and uptake of research. Industry has been tasked with taking a leadership role in technology transfer, as governments have largely moved away from agricultural extension in recent decades. Over the last five years the BCRC has developed and implemented a Technology Transfer Strategy. Current BCRC technology transfer activities are limited in scope to the Beef Science Cluster.

In 2018/19 through the third Beef Science Cluster, the BCRC intends to continue to advance the implementation of its Technology Transfer Strategy. Regular communication to industry is primarily initiated through the BCRC website, [www.beefresearch.ca](http://www.beefresearch.ca). Articles that provide overviews and summaries of various research results, advice on adopting technology and innovation into production practices, cost analysis tools to help producers estimate the impacts of production changes, and commentaries that address misconceptions about modern beef production 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, including the BCRC Blog, and Facebook and Twitter accounts 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.

With the conclusion of the second Beef Science Cluster on March 31, 2018, significant focus in 2018/19 will be placed on disseminating the final results of Cluster II, including developing and updating extension tools with new applied research information.

Through the development process for the *Canadian Beef Research & Technology Transfer Strategy* it is evident that further resources are necessary to extend the reach of BCRC's extension initiatives. Extension efforts are underway throughout Canada, but they are often limited to a regional level, underfunded, and very fragmented. This has contributed to shortfalls in industry adoption of beneficial knowledge and technologies. Two key areas of expansion are intended to be focused on in alignment with the *Strategy* to increase technology transfer and adoption over the next five years.

Supporting the delivery of knowledge dissemination initiatives through national and/or regional producer networks will encourage broader and more rapid uptake of new technologies. The BCRC activities will focus on content development and delivery via regional networks. Focus will also be placed on supporting progressive regional initiatives that encourage adoption and facilitating the expansion of their reach beyond a regional level.

To further support regional technology transfer efforts, further investments will also be made in economic decision-making tools and resources to help producers evaluate the relevance of new innovations and technologies to their operations. A significant gap in the technology adoption process, is supporting producers through the process of weighing the costs and benefits of adopting new technologies or management practices and the impact on their operation in terms of capital outlays, labor, and other factors.

Emphasis will also be placed on working with appropriate research expertise to complete technology scans to identify relevant research and technologies from other sectors and/or countries that can be adapted and/or adopted to address priority outcomes identified by the Canadian beef industry. Annual call for proposals will be solicited to determine program areas of focus for technology scans with the first call for proposals intended to occur in 2018/19 with funding to cover a technology scan in one program area.

**Canadian beef technology transfer network = \$200,000**

**Canadian beef technology scan & adaption = \$150,000**

**Knowledge & technology transfer investment = \$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. It has been recognized that industry needs to take 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.

In the 2018/19 BCRC annual business plan, minimal investments in the establishment of surveillance research networks are planned. Although this area is a clear priority and future investment is required, current work proposed under the Beef Science Cluster III to establish a surveillance network and also ongoing discussions with the Public Health Agency of Canada and other government entities require further time to define where near-term industry investments in this area are most effective.

### **Surveillance network program development investment = \$150,000**

#### **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. VBP+ has grown from its original focus of On-Farm Food Safety and concentrating on identifying practical industry-sanctioned practices to managing food safety risks at the farm level and enhance confidence in Canadian beef. With the addition of animal care, biosecurity and environmental stewardship modules, the program offers the complete package to validate sustainable beef production practices at the farm, ranch and feedlot levels across Canada.



Moving into 2018/19 the primary focus is to continue to encourage increased numbers of producers to become trained and registered in the new VBP+ program, which is important given the growing expectation from end-users and the public around sustainable beef production practices and the verification of those practices. To support this effort national infrastructure has been put in place. The national data management system, CORS, is in place to manage all data on trained and registered producers nationally, streamlining operational data management and enabling improved administrative efficiencies. CORS also facilitates downstream chain of custody reporting of trained and registered operations to meet end-user supply chain requirements as they emerge.

This is important as end-users are increasingly looking for means to verify production practices related to sustainability and in some cases specific production practices and how they relate to animal care and the environment. With this in mind, VBP+ is focused on ensuring management systems are in place to meet these growing verification demands. Furthermore, with the addition of the new modules VBP+ has learned that the content of those modules meets the indicators established under the Canadian Roundtable for Sustainable Beef (CRSB). To be complete in our goal of aligning with CRSB and being able to provide a credible, cost effective, producer-led option for verifying responsible production practices through training, simple record keeping and on-farm validation audits, VBP+ will undergo an assurance process review that should be final in early 2018/19. VBP+ has also joined Cargill and the Beef InfoXchange System to execute the Canadian Beef Sustainability Acceleration (CBSA) pilot, a pilot designed to help build supply and the infrastructure needed to deliver certified sustainable beef once the CRSB processes are complete.

As the VBP+ program grows in importance, it is essential to ensure the long-term consistent delivery of the program to meet end-user and producer needs. This has historically been a challenge as current provincial delivery of training and the management of registration and audit processes is heavily reliant on provincial government program funding. This funding is highly uncertain and has continued to diminish as government moves away from funding ongoing operations.

In recognition of reduced federal/provincial government funding and increased demand for VBP+, a management committee was formed for VBP+. This committee led the development of a new business plan and operational strategy in 2015/16 that sets out a long-term sustainable funding and delivery model for VBP+. The new business plan is focused on ensuring that VBP+ is appropriately structured and resourced to meet the expectations of end-users and has the capacity to train and audit a large volume of producers. The VBP+ Management Committee has agreed that the ideal funding structure would be focused on a combination of check-off (given the strong linkage of VBP+ to promotion and research), producer audit and training, and end-user fees.

While the plan has been developed and some progress has occurred, including the development of national communication and data management resources to support provincial delivery, transformation to address key challenges has been limited given plan implementation is dependent upon an increase in national industry investment. There is also large uncertainty as to what funding will be available under the new federal and provincial Canadian Agricultural Partnership (CAP) program. The proposed increase in national check-off funding for VBP+ through the BCRC is based upon the project business plan modelling, which lays out an expected continued decline in provincial government funding and the expected growth in producer enrollment as end-user engagement increases. This will require additional support at a national and provincial level to manage administration, training, and ongoing auditing. It is important to note there are plans for greater consolidation of administration and program delivery functions at a national level to increase efficiencies, while maintaining provincial delivery to ensure strong linkages with producers.

In 2018/19, depending on the BCRC budget and provincial allocations of an increased national check-off, transition to the new VBP+ business plan and strategy will occur on a graduated basis accounting for current capacity and delivery needs at a national and provincial level, as well as trying to identify what is available at a provincial level to support delivery through CAP funding. Given the levels of both industry and government money are uncertain in 2018/19 and likely will be so for a period of time, the primary goals will be to maintain current delivery capacity provincially and nationally, consolidate administrative and communication tasks nationally to improve efficiencies, advance training and training support to reduce provincial burden and meet higher end-user demands, and support increased end-user engagement and program oversight. Once CAP funding and the level of check-off funding available for VBP+ delivery is known, the BCRC will work with provincial delivery agents to build a model that will allow VBP+ to continue to be delivered across the country.

It is important to note that the long-term goal for VBP+ is to reduce reliance on national check-off and government funding, while increasing end-user engagement. In the near term, over the next five to ten years, stable industry-based funding is critical to ensure VBP+ has the infrastructure that can drive increased producer enrollment and demonstrate its ability to deliver a credible verification program that end-users can align with.

**Verified Beef Production Plus operations & delivery investment = \$353,600**

**Verified Beef Production Plus training development investment = \$125,000**

## V. Research Program Implementation

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### **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 which proportionally represent 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 (the 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**

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 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*.

To support current resources and manage the scope of projects undertaken within the Beef Cattle Industry Science Clusters, the BCRC staff includes a Science Director. Responsibilities include oversight of program development and administration, facilitating call 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.

To support the Technology Transfer & Knowledge Dissemination Strategy, the BCRC employs an Extension and Communications Director and a Science and Extension Coordinator. 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.

A Science Advisory Body supports the research program development process within the Clusters to ensure the delivery of research plans that are directed towards industry's research objectives and achieve the outcomes desired by industry. The Body 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 Body also assists with the technology transfer and knowledge dissemination process and identification of commercialization opportunities.

## VI. Research Performance Reporting and Evaluation

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In order to demonstrate the value of Canadian Beef Cattle Check-Off investments in research, as well as to encourage government to enhance their own investments in research, industry has taken a leadership role in communicating the value of investments made in beef, cattle and forage research. Due to the limited number of research dollars and a large number of research priorities, industry must also consider the short, medium-and long-term returns to various investment options during its priority and research program planning process.

The BCRC has partnered with Canfax Research Services to develop and monitor a series of research indicators that aid in assessing the economic returns to beef research in Canada, developing the BCRC research priorities, and tracking the economic benefit of the BCRC funded research over the long term. An inaugural results report was developed and released in February 2014. The report outlines how dollars were invested between 2009 and 2013, and how that research is contributing to advancements in production efficiencies, quality and demand for Canadian beef. In many cases the financial impacts of deliverables to the industry were calculated; some impacts may not be fully apparent for several years. The next comprehensive research results report will be released in 2018 upon the completion of the second Beef Cattle Industry Science Cluster.

The BCRC has also committed to completing a series of Priority Area Reviews. These take an in depth look at the different areas of research within each priority area and assess progress, availability of research and technology transfer resources domestically and internationally, and identify gaps and emerging issues that need to be addressed moving forward. The inclusion of cost-benefit analysis also helps industry determine the most appropriate areas for future investment. To date reviews have been completed for (1) Beef Quality & Food Safety; (2) Forage & Grassland Productivity; (3) Animal Health & Welfare; and (4) Feed Grains and Feed Efficiency.

These reports helped to inform the priority setting process for the *Canadian Beef Research and Technology Transfer Strategy 2018 – 2023*. Moving forward they will assist in identifying future funding priorities for the BCRC programs outside of the Science Cluster to maximize producer and industry returns on research investments.

## VII. Budget

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The BCRC has been challenged to implement a comprehensive research strategy which addresses multiple industry priorities while remaining fiscally prudent. 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 is set to increase in several provinces in 2018/19 from \$1.00 to \$2.50 per head to support the implementation of activities proposed under Canada's National Beef Strategy. While implementation processes are still underway in many provinces and proposed allocations are not final, the BCRC has outlined in Section IV how additional check-off directed to the BCRC will be allocated to proposed programming based on preliminary indications of allocations provided by provinces. Advanced planning is necessary as many of the proposed programs will take significant time to develop and implement given the need to engage multiple stakeholders and technical review processes involved, as well as the need to engage other funding agencies to maximize the leveraging of industry funds.

Section IV describes the proposed program areas in greater detail and includes funding for the third Beef Science Cluster; priority research programming outside of the cluster with a particular focus on beef quality, food safety, and nutrition in 2018/19; priority research capacity; enhanced knowledge and technology transfer; advancing research surveillance networks for production limiting diseases and antimicrobial resistance and use; 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*.

Until the collection of an increased Canadian Beef Cattle Check-Off occurs and provincial allocations to research are fully confirmed, the BCRC will continue in its planning for 2018/19, but final program priorities and budget decisions will be subject to change. Furthermore 2018/19 is a transition year for both the Science Cluster and VBP+ program delivery. Growing Forward II funding will wrap up March 31, 2018 and funding available through the Canadian Agricultural Partnership (CAP) is currently not finalized for the third Beef Science Cluster. In the case of VBP+, CAP AgriAssurance program funding is still to be announced and final details on program eligibility are not yet available. In recognition of all of these variables and that 2018/19 is truly a transition year, the BCRC envisions that the 2018/19 business plan will be refined and/or revised as various funding and program dynamics are finalized. This will be done through a process that engages the BCRC producer council, the Science Advisory Body, and in consultation with the Canadian Beef Cattle Research, Market Development, and Promotion Agency.

The following budget includes the operating expenses and revenues for BCRC's fiscal year July 1, 2018 to June 30, 2019. The revenue for 2018/19 is projected at \$4,097,895 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 special projects revenue offsets the partner funded portion of special project expenses for a \$0 balance.

The 2018/19 expenses include operating expenses and direct expenses for research projects managed and funded through the BCRC and its industry partners. Expenses for 2018/19 are projected at \$4,095,392 for a net revenue of \$2,503.

As noted in the Beef Science Cluster III Projects section and budget following, it is proposed industry will contribute \$1,363,907 to fund Cluster III projects in 2018/19. This industry investment is leveraging an additional \$2,910,777 from AAFC (not reported in the budget following), for a total Cluster III project investment of \$4,274,684 in 2018/19.

### **BCRC Reserve**

The BCRC maintains a restricted reserve of \$1.5 million to cover off management costs and contracted research commitments in the event the BCRC ceased operations. The reserve is projected to be \$2,749,540 as of June 30, 2018. The majority of the current reserve in excess of the restricted reserve is unallocated and is a result of increased provincial funding allocations received by the BCRC over the last two years. It was decided to maintain a larger reserve until an increased Canadian Beef Cattle Check-Off was confirmed, as a contingency to support the Beef Science Cluster III if need be. The reserve level will be reviewed as part of the 2018/19 funding plan, as other funding variables are determined.

## Beef Cattle Research Council 2018 - 2019 Budget

<b>Net Assets, beginning of year - July 1, 2017</b>		<b>3,171,172</b>
<b>Excess (deficiency) of revenue over expenditure - June 30, 2018</b>		<b><u>(421,632)</u></b>
<b>Net Assets, June 30, 2018</b>		<b>2,749,540</b>
<b>Projected 2018 - 2019 Revenue</b>		
National Check Off	3,800,000	
Industry Cluster Grants	97,000	
Interest Earned	30,000	
Special Project Revenues	54,475	
Beef Science Cluster Grant	116,420	
VBP+ CAP Program Funds	-	
Misc Rev	-	
<b>Total Revenue</b>	<b>4,097,895</b>	
<b>Projected 2018 - 2019 Expenses</b>		
BCRC Management Expenses	390,910	
Cluster Industry Contributions	1,363,907	
Special Projects	61,975	
Priority Research Projects	800,000	
Research Capacity	500,000	
Knowledge & Technology Transfer	350,000	
Surveillance Research Networks	150,000	
VBP+ Operations & Delivery	353,600	
VBP+ Training Development	125,000	
<b>Total Expenses</b>	<b>4,095,392</b>	
<b>Excess (deficiency) of revenue over expenditure</b>	<b>2,503</b>	
<b>Projected Net Assets, June 30, 2019</b>		<b>2,752,043</b>