BCRC

BEEF CATTLE RESEARCH COUNCIL

2022/23 Results Report

Submitted to the Canadian Beef Cattle Research, Market Development and Promotion Agency

Table of Contents

I. Executive Summary

The Beef Cattle Research Council (BCRC) is the national industry-led funding agency that funds leading edge research and technology transfer activities to advance the competitiveness and sustainability of the Canadian beef cattle industry. The BCRC works closely with other industry and government funding agencies to increase coordination, reduce duplication and ensure priority research outcomes are addressed for the benefit of Canadian beef and cattle producers.

A division of the Canadian Cattle Association, the BCRC is directed by a committee of 16 beef producers from across the country. The BCRC is funded in part through a portion of a producer-paid national levy, the Canadian Beef Cattle Check-Off. In 2022/23, the BCRC received on average $0.67 (unaudited) of every $2.50 of the Canadian Beef Cattle Check-Off collected by the provinces. This funding was leveraged under the Beef Science Cluster program with Agriculture and Agri-Food Canada Canadian Agricultural Partnership funding, where industry contributed 28% ($666,494) and AAFC contributed 72% ($1.67 million) in 2022/23. In addition, the BCRC leveraged the Canadian Beef Cattle Check-Off for an additional $3.7 million in research funding and $250,000 in-kind from government and industry partners through initiatives outside of the Beef Science Cluster.

This report covers the period April 1, 2022 to March 31, 2023. Programming during this period was centered around the following areas:

- Increase producer profitability by increasing productivity or decreasing costs of production and risks.
- Develop, enhance and encourage adoption of beneficial practices and innovations that maximize the environmental benefits industry provides and continue to reduce our environmental footprint, while supporting industry competitiveness.
- Support continuous improvements in Canadian beef demand through advancements in the quality and safety of Canadian beef.
- Generate science to inform decision makers, policy and best management practices and to support consumer confidence and public trust.
- Develop, enhance and encourage adoption of leading-edge technologies that support industry competitiveness, automation and sustainability.
- Ensure the maintenance and rejuvenation of critical research capacity and infrastructure that facilitate proactive inquiry and innovation to support industry advancement.

Section III (ii) of this report covers projects managed by the BCRC and funded under the third Beef Science Cluster. There were 15 research, extension and science coordination Cluster projects reporting activities between April 1, 2022 and March 31, 2023. The final year of the five-year Cluster III program has now been completed, with preliminary findings reported and included in Section III (ii). One project assessed the prevalence and production impacts of a wide variety of health issues and management practices on commercial operations across Canada. Results from another project confirmed that heat-based carcass and equipment cleaning practices in abattoirs have not selected for heat-resistant E. coli and that current cooking recommendations are still appropriate. Another project demonstrated that conventional feedlot diet (containing growth promotants) had the lowest environmental impact and that removing growth promotants would result in increased land and water use, greenhouse gas emissions and ammonia emissions. A fourth project worked on breeding alfalfa for winter hardiness and reduced fall dormancy, key traits for withstanding

Canadian winter. A summary of Beef Science Cluster projects, including the project title, factsheet link and budget is included in Section III (ii).

Section III (v) of this report includes a list of BCRC priority research projects funded by Canadian Beef Cattle Check-Off dollars and other industry investments through the BCRC's annual call for proposals. In 2022/23, the BCRC received 38 letters of intent from research teams across Canada. Of these, 20 teams were invited to submit full proposals, 18 forwarded a proposal and funding was approved for 13 projects in March 2023. Successful applicants are required to secure funding from other sources (government and industry), matching the Canadian Beef Cattle Check-Off dollars at a minimum of 1:1.

Several projects approved in previous calls (2018 – 2021) are still underway or nearing completion. One such project studied the impact of rest-stops during long-haul transportation on the incidence of BRD. Results indicate that rest-stops might contribute to increased health and welfare risks instead of alleviating the concern. Another project found that beef's high nutrient density, particularly for vital nutrients that are most often inadequate in Canadian diets (iron, vitamin B12 and zinc), makes it an affordable source of all these nutrients for consumers. A project looking at the economic impact of the Canadian Cattle Industry found that for every worker employed in the sector, another 3.9 workers (based on indirect and induced impacts) are employed elsewhere in the economy. Another project found that converting perennial forages to annual crops results in decreases to soil organic carbon levels, highlighting the importance of having beef cattle on the landscape to conserve tame and native pasture land to maintain soil organic carbon stocks and mitigate GHG emissions. A summary of BCRC research projects, including the project title, factsheet link and budget is included in Section III (v).

Funding was approved for five Proof of Concept (POC) projects in 2022/23. These are short-term (six months to one year) projects to help inform whether it is worth pursuing as a larger, more defined research investment in that area. One such project found that bacteria associated with BRD accumulate in feedlot water bowls, potentially providing a simpler way to evaluate pen-level antimicrobial resistance in BRD pathogens. Another project looked at a new vaccine that can be delivered like an eyedrop and may be a safe and more effective way to protect beef calves against pink-eye. See section III (vi) for a complete list of the POC projects and preliminary research highlights.

The BCRC continued to support the implementation of long-term research capacity in 2022/23. Three Chairs are currently supported under this program to address industry identified gaps in research capacity: Dr. Bree Kelln, Beef Industry Integrated Forage Management and Utilization Chair (University of Saskatchewan); Dr. Cheryl Waldner, NSERC/BCRC Industrial Research Chair in One Health and Production-Limiting Diseases (Western College of Veterinary Medicine); and Dr. Gleise da Silva, BCRC-Hays Chair in Beef Production Systems (University of Alberta). See section III (vii) for additional details on research capacity investments.

In addition to the Knowledge and Technology Transfer (KTT) activities under the Beef Science Cluster such as the development and distribution of articles, decision tools, videos, blog posts and webinars, KTT continued to be advanced through the Canadian Beef Technology Transfer Network and through an annual call for proposals. Through one such project, a web-based interactive tool was created in 2022/23 to help veterinarians and beef cattle producers compare the relative costs and benefits of different Johne's disease management options. Another project included the development of a series of podcasts focused on beef cattle animal health and nutrition with topics ranging from feed testing to vaccinations, extended grazing systems, calving and calf management, disease investigations and economics. In 2022/23, the Canadian Beef Technology Transfer Network grew to a membership of more than 150 individuals, many of whom participate in an annual meeting

to further facilitate communication and collaboration. See section III (viii) for details on the KTT program and project highlights.

The BCRC also continued to support priority surveillance networks related to production limiting diseases and antimicrobial resistance and use. In 2022/23, funding continued for three surveillance projects as well as the Canadian Cow-Calf Cost of Production Network. See Sections III (ix) and (x) for details on the surveillance research network and related projects.

The BCRC continues to oversee the delivery of the Verified Beef Production Plus (VBP+) program. VBP+ has continued to advance producer training objectives and the delivery of on-farm certification services through VBP+ Delivery Services Inc. See Section IV for an update on the progression of VBP+ programming.

The fiscal year for the BCRC is July 1 to June 30, therefore the BCRC audited financial statements are not included in this report and are available upon request after August 31, 2023. The Canadian Beef Cattle Check-Off funding allocated to research programming in 2022/23 is highlighted in various sections of this report and is projected at **$3,940,107.**

II. Background

The Beef Cattle Research Council (BCRC) funds leading-edge research and technology transfer activities to advance the competitiveness and sustainability of the Canadian beef cattle industry. In 2022/23, the BCRC received on average $0.67 (unaudited) of every $2.50 of the Canadian Beef Cattle Check-Off. This funding is leveraged under various programs to maximize producer returns on their check-off investment. The BCRC leveraged the industry Check-Off dollars with Agriculture and Agri-Food Canada (AAFC) Canadian Agricultural Partnership (CAP) Science Cluster funding in 2022/23, where industry contributed 28% ($666,494) and AAFC contributed 72% ($1.67 million). In addition, the BCRC leveraged the Canadian Beef Cattle Check-Off for an additional $3.7 million in research funding and $250,000 in-kind from government and industry partners through initiatives outside of the Beef Science Cluster.

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 and maximizing the benefits of public sector investment in beef cattle research. The BCRC facilitates and encourages collaboration and coordination among researchers, other funding agencies and industry on provincial and national levels. The BCRC released the next five-year *Canadian Beef Research Strategy and Technology Transfer Strategy* in July 2021. This Research and Technology Transfer Strategy will allow the BCRC, working in partnership with other beef research funding agencies across Canada, to address key research, capacity and extension priorities as identified by producers and industry partners.

In addition to funding research, the BCRC plays a leading role in increasing industry uptake of relevant technologies through the delivery of its knowledge dissemination and technology transfer program. This information is shared across a broad audience of producers, researchers, funders, policy makers and communication networks across the country.

The BCRC is also responsible for the delivery of the Verified Beef Production Plus (VBP+) program, a program developed to educate producers and facilitate on-farm certification of practices related to food safety, animal care, biosecurity and environmental sustainability. VBP+ training and certification are important in supporting

industry's efforts to demonstrate to downstream supply chain stakeholders and consumers that Canadian beef is produced in a sustainable manner and that maintaining public trust is a priority.

This report covers the period April 1, 2022 to March 31, 2023. During this period, the BCRC's research and extension programming was funded through the Canadian Beef Cattle Check-Off, AAFC under CAP and other national and provincial industry partners. Programs were centered around the following areas:

- Increase producer profitability by increasing productivity or decreasing costs of production and risks.
- Develop, enhance and encourage adoption of beneficial practices and innovations that maximize the environmental benefits industry provides and continue to reduce our environmental footprint, while supporting industry competitiveness.
- Support continuous improvements in Canadian beef demand through advancements in the quality and safety of Canadian beef.
- Generate science to inform decision makers, policy and best management practices and to support consumer confidence and public trust.
- Develop, enhance and encourage adoption of leading-edge technologies that support industry competitiveness, automation and sustainability.
- Ensure the maintenance and rejuvenation of critical research capacity and infrastructure that facilitate proactive inquiry and innovation to support industry advancement.

III. Research Activities

i. Introduction

This report highlights the BCRC research activities supported by the Canadian Beef Cattle Check-Off and other industry and government partners for the period April 1, 2022 to March 31, 2023. During this period, the BCRC provided funding to beef research projects under the Agriculture and Agri-Food Canada (AAFC) Beef Science Cluster program and additional projects based on specific needs and opportunities identified by the beef industry.

This April 1, 2022 to March 31, 2023 reporting period marks the fifth and final year of the five-year Beef Science Cluster III program - a $21.7 million dollar program, with AAFC contributing $14.1 million and industry contributing $7.6 million over the five years. Under the Cluster III program, there are 15 research, extension and science coordination projects reporting activities between April 1, 2022 and March 31, 2023. The majority of the Cluster III projects are funded over the five-year period, wrapping up March 31, 2023, however a few projects wrapped up in 2021 and 2022.

The Science Cluster IV program was announced in 2022. The BCRC began planning for the Cluster IV program launch with a call for proposals in summer 2021. The BCRC engaged internal and external peer reviewers in the proposal selection process and met in May 2022 to select a portfolio of projects to be included in the Beef Cluster IV application. Funding approval under the Science Cluster program is a highly competitive process. With initial planning in place prior to the formal announcement, the BCRC was able to submit the Beef Cluster IV application in November 2022 as soon as the application window opened. AAFC funding decisions for the next Science Cluster are expected to be made public shortly after the time of writing of this results report.

Outside of the Cluster program, researchers were awarded funding in 2022/23 through the BCRC's annual open call for proposals. Under the 2022 open call for proposals, the BCRC received 38 letters of intent from research teams across Canada. Of these, 20 research teams were invited to submit a full proposal, with 18 forwarding a proposal for funding. All proposals addressed priority outcomes as defined by the BCRC under program areas relating to Animal Health & Welfare, Beef Quality, Food Safety, Feed Grains & Feed Efficiency, Forages & Grassland Productivity and/or Technology Transfer. The BCRC engaged internal and external peer reviewers in the proposal selection process, and $2.1 million in funding was approved for 13 projects in March 2023. For all proposals outside of the Cluster program, it was required that applicants leverage the Canadian Beef Cattle Check-Off by securing funding from other federal and provincial governments and/or industry funding programs and that Check-Off dollars be leveraged on minimum at a 1:1 ratio.

It is important to note that as BCRC's funding profile has grown, it is now the case that BCRC funding is often secured prior to applying for matching funding through other research funding agencies as it often provides a higher chance of approval through those other agencies if industry funding is in place. This does result in a gap of 6-12 months, and sometimes longer, from the time that BCRC funding is approved to when BCRC funding is granted to the researcher and the project is started. This has a large impact on our cashflows, as we are seeing a longer delay between the time when funds are committed and when funds are spent. Trying to reflect this in our budget is difficult as there is not a lot of certainty as to the timing of when all approved projects will start and we need to carefully manage funding, so we don't overcommit funds, but also don't underutilize check-off. At the date of publication, we currently have 26 projects approved that are not yet contracted for a total outstanding funding commitment of $5.0 million. These projects have been included for clarity in Sections (v) and (vi) and have been labelled as approved but with a funding agreement pending. A portion of these will be started before the end of our fiscal year, but a larger portion will be carried over and initiated in the next fiscal year. Importantly, this does not include already contracted multi-year commitments through the science cluster, research chairs, and projects. All of these commitments will heavily draw on the BCRC reserve moving forward based upon our 5-year cashflow projections.

The tables in the following Sections (ii) to (vii) summarize the BCRC funded research projects by program area. The project title, timelines, budget and link to each available project factsheet are listed. The factsheets provide background, objectives and what the researchers will do under each project. Project factsheets, which are all available on the BCRC website (BeefResearch.ca), are updated with a summary of project results upon project completion. The Research Highlights section highlights selected research results and benefits to the Canadian beef industry. More detailed results on all projects are available from the BCRC upon request.

ii. Beef Science Cluster III

Summary of Beef Science Cluster Research Projects

Project title	Factsheet	2022/23 budget ($)	2022/23 actual ($)	2022/23 NCO funds ($)
Beef Quality and Food Safety				

BQU.08.17 *Development of prediction tools to optimize carcass value*	BQU.08.17	81,508	81,508	60,375
BQU.10.17 *Canada's National Beef Quality Audit at Retail and Processing*	BQU.10.17	190,211	179,135	44,873
Animal Health, Welfare and Antimicrobial Resistance				
ANH.21.17 *The Canadian Cow-Calf Surveillance Network*	ANH.21.17	448,356	448,356	150,000
AMR.10.17 *Characterizing the microbiome of beef cattle to identify risk factors that affect respiratory health*	AMR.10.17	108,570	108,570	58,000
Feed Production and Efficiency				
FDE.01.17 *Determining the minimum fibre requirement for feedlot cattle and improving the empirical prediction of ruminal pH*	FDE.01.17	86,613	86,380	49,767
FDE.06.17 *Genetic analyses of feed intake, feed efficiency, female fertility, and cow lifetime productivity in beef cattle raised under two environments*	FDE.06.17	225,489	196,930	31,440
FDE.09.17 *Further strategies to enhance the use of wheat grain in feedlot diets*	FDE.09.17	78,877	78,877	25,000
FDE.14.17 *Evidence-based prebiotic and probiotic solutions for improving gut health and feed efficiency in cattle*	FDE.14.17	128,150	128,150	30,000
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*	FRG.01.17	193,060	193,060	10,000
FRG.09.17 *Sustaining the legume component of grazed pasture mixtures for summer grazing and stockpiling complex mixtures in Eastern Canada*	FRG.09.17	167,900	164,430	6,530
FRG.11.17 *Increasing fall productivity in winter-hardy alfalfa by selecting for reduced fall dormancy*	FRG.11.17	107,360	107,360	15,000
ENV.07.17 *A regionalized life cycle impact assessment model for the quantification of Canadian Beef production impacts on biodiversity*	ENV.07.17	4,500	4,500	0
ENV.15.17 *Economic and environmental impacts associated with removal of growth-enhancing technologies in the Canadian beef cattle industry*	ENV.15.17	92,681	92,681	50,000
Knowledge and Technology Transfer				
TEC.01.17 *Enhancing Technology Transfer in the Canadian Beef Industry (see details in Section III (viii))*	TEC.01.17	294,398	296,879	92,948
Science Coordination				

SCI.01.17 *Science Coordination*	N/A	182,332	172,374	42,561
TOTAL		**2,390,005**	**2,339,190**	**666,494**

Total funding (industry and AAFC) on Cluster III projects in 2022/23 is projected at $2,390,005*
**Includes funding provided directly to the BCRC from the following provincial organizations:*
Alberta Cattle Feeders' Association = $30,000; Beef Farmers of Ontario = $30,000; Les Producteurs de bovins du Québec = $26,000

Total 2022/23 projected National Check-Off funding for Beef Cluster III projects = $666,494

Beef Science Cluster III Budget Overview

The Cluster III research projects were all completed as scheduled on March 31, 2023 and the researchers met the overall project deliverables. The COVID-19 pandemic presented some challenges during 2021 and 2022, but the researchers were able to manage their projects and conduct the research within their respective institutional safety protocols. The total five-year funding of $21.7 million - including funding contributions from National Check-Off, other industry partners, and governments - was expended by the end of the Cluster program on March 31, 2023.

Research Highlights:

ANH.21.17: The Canadian Cow-Calf Surveillance Network - Article: Johne's Disease - Not Gone but Often Forgotten

Drs. John Campbell and Cheryl Waldner of the University of Saskatchewan's Western College of Veterinary Medicine led a team of researchers from across Canada to assess the prevalence and production impacts of a wide variety of health issues and management practices on commercial operations.

Survey and production data was collected regarding biosecurity practices, vaccine use, antimicrobial use, nutritional status, prevalence of Johne's disease, bovine leukosis virus, bovine viral diarrhea virus and leptospirosis, animal welfare practices, technology adoption and productivity.

Understanding disease prevalence and how management practices on beef operations impact animal health and welfare helps prioritize checkoff research investments, guide extension efforts, and provides objective evidence to help producers, veterinarians, industry leaders and other policymakers manage risks, reinforce public and consumer confidence and support international trade of Canadian cattle and beef products.

FOS.01.17: Is E. coli Becoming Resistant to Antimicrobial Interventions in Abattoirs? - Factsheet

Dr. Xianqin Yang led a study to determine whether E. coli is becoming resistant to the heat-based food safety treatments that packing plants commonly use to control it.

Nearly 1500 E. coli isolates collected from commercial abattoirs and transport trucks were assessed for heat resistance. The most heat resistant strains were used to inoculate hamburger to see if it could withstand recommended cooking practices.

Most E. coli strains collected from cattle and beef processing plants remain heat sensitive, indicating that heat-based carcass and equipment cleaning practices have not selected for heat-resistant E. coli. Because at-home or restaurant cooking heats beef for much longer periods of time, current recommendations to cook ground beef to at least 71C, and to cook muscle cuts (e.g. steaks and roasts) to 63C, are still appropriate.

FRG.11.17: Increasing Fall Productivity in Winter-Hardy Alfalfa by Selecting for Reduced Fall Dormancy - Article: Alfalfa for Canada's Climate

Dr. Vern Baron and team have been breeding alfalfa for winter hardiness and reduced fall dormancy.

The ability of alfalfa to withstand the winter depends on both winter hardiness and fall dormancy, and for varieties created outside of Canada these traits are not necessarily selected for.

They started with two Canadian Alfalfa varieties that are known for their ability to survive through the winter (Peace and Yellowhead). They grew these varieties in a greenhouse in a simulated winter environment and selected for plants that thrived under winter conditions, then the team tested these new varieties in field trials across Canada. The new varieties had the same or improved yield and frost tolerance as the previous generations. These plants will need to undergo at least 4 more generations before they can be released to producers, but this project showed that there is an ability to select for improved winter survivability in alfalfa.

ENV.15.17: Economic and Environmental Impacts Associated With Removal of Productivity-Enhancing Technologies in the Canadian Beef Cattle Industry - Article: Can we Replace Growth Promotants?

Drs. Kim Ominski and Tim McAllister led a study to determine the effects of removing technologies such as implants and feed additives from feedlot cattle diets.

This team compared data from steers and heifers fed either a control diet (no feed additives), a conventional feedlot diet (containing feed additives), and other diets containing various other feed additive alternatives such as spices and essential oils. They also looked at implanted and non-implanted cattle on each of these diets. They found that the conventional diet had the lowest environmental impact and that removing growth promotants increased land and water use, greenhouse gas emissions and ammonia emissions.

iii. Beef Science Cluster IV

The Science Cluster IV program was announced in 2022. The BCRC began planning for the Cluster IV program launch with a call for proposals in summer 2021. The BCRC engaged internal and external peer reviewers in the proposal selection process and met in May 2022 to select a portfolio of projects to be included in the Beef Cluster application. Funding approval under the Science Cluster program is a highly competitive process. In 2023, BCRC staff worked closely with researchers to finalize project budgets and pull together all of the information required for a Cluster application. With initial planning in place prior to the formal announcement, the BCRC was able to submit the Beef Cluster application in November 2022, as soon as the application window opened. Beef Cluster IV, titled 'Canada's Beef and Forage Cluster: Driving environmental, economic, and social sustainability,' focuses on driving the growth of Canada's beef industry and the overall economy by sustainably advancing Canadian beef and forage production while reducing the industry's environmental footprint. The application included 27 projects for a total Cluster size of $26.1 million ($11.1 million from industry and $15 million requested from AAFC). AAFC funding decisions for the next Science Cluster are expected to be made public, shortly after the time of writing this results report.

iv. Special Projects

The BCRC is managing the following project in recognition of its priority to industry.

MISC.01.18: Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) Beef Feedlot Antimicrobial Use/Antimicrobial Resistance (AMU/AMR) Surveillance Framework Development, is funded by industry partners and other funding organizations, with the BCRC's primary role being project management and technology transfer upon project completion. The program provides farm-collected AMU and AMR data which helps inform veterinarians and participants on the appropriate selection of antimicrobials, thereby promoting prudent antimicrobial use and stewardship. These data are also utilized by CIPARS surveillance analysts to better understand AMR across the food chain.

BCRC Special Projects			
Project title	**Project end date**	**Total NCO funding ($)**	**2022/23 NCO funding ($)**
MISC.01.18 - CIPARS Beef Feedlot Antimicrobial Use/Antimicrobial Resistance Surveillance Framework Development	Mar 2023	Managed by BCRC and funded externally by partners (no NCO funding)	

v. Priority Research Projects

The BCRC is funding the following projects with funding made available to researchers through an annual open call for proposals directed to achieve specific priority outcomes in identified program areas. All projects are funded jointly by Canadian Beef Cattle Check-Off dollars leveraged with at least 50% funding from government and/or industry partners. The project title, National Check-Off funding and fact sheet link for each project is listed below.

BCRC Priority Research Projects					
Project #	**Project title**	**Project end date**	**Total NCO funding ($)**	**2022/23 NCO funding ($)**	**Factsheet**
AMR.02.18	Use of bacteriophage-derived lysins in combatting multi-drug resistant (MDR) pathogens that cause bovine respiratory disease (BRD)	May 2025	97,565	40,000	Factsheet
ANH.04.18	Comparison of immune response and respiratory disease-sparing effect of homologous and heterologous prime-boost vaccine programs in beef calves	Jul 2023	47,350	0	Factsheet
ANH.07.18	Effect of feeding ergot alkaloids on ruminal metabolism, growth performance, health and welfare of beef cattle: How much is too much?	Mar 2023	185,500	18,655	Factsheet
ANH.19.18	Characterization and optimization of visual pen checking criteria to improve BRD treatment outcomes in feedlot cattle	May 2024	86,496	8,650	Factsheet
ANH.01.19	A screen for drugs that reveal *Mycoplasma bovis* to the bovine immune system: a novel approach to vaccine development	Sep 2024	71,250	8,625	Factsheet

ANH.02.19	Application of a multi-omics strategy to investigate liver abscess development in beef cattle	Mar 2025	419,250	43,425	Factsheet
ANH.10.19	Antimicrobial use and resistance in cow-calf herds: Will anything change after the switch to prescription only sales of medically important antimicrobials?	Aug 2023	143,070	16,307	Factsheet
ANH.11.19	Surveillance of antimicrobial use and antimicrobial resistance in Canadian feedlot cattle; expansion of bovine respiratory disease pathogen susceptibility testing	Sep 2022	45,800	0	Factsheet
ANH.18.19	Development of multiplex recombinase polymerase amplification (RPA) assays for the detection of antimicrobial-resistant (AMR) bacterial pathogens causing bovine respiratory disease (BRD).	Jul 2023	64,023	7,902	Factsheet
ANH.23.19	Stocking density and feed bunk space as a risk factor for liver abscesses	Mar 2024	56,215	5,621	Factsheet
ANH.03.20	Scratching the surface: Investigating the Prevalence, Nature, and Potential Causes of Itchy Cattle	Mar 2024	280,000	30,000	Factsheet
ANH.08.20	Infectious causes of calf diarrhea (scours) and efficacy of current vaccination strategies to prevent scours in beef calves in Western Canada (phase 1)	Apr 2024	108,738	0	Factsheet
ANH.12.20	Investigating foot rot and its microbiological relation to digital dermatitis	Dec 2023	97,394	9,739	Factsheet
ANH.17.20	Assessment of animal condition and welfare outcomes to improve timely euthanasia in feedlot cattle	Jan 2026	105,625	79,219	Factsheet
ANH.19.20	Enhancing respiratory health of beef cattle through modulation of innate immunity, analysis of the resistome, and identification of culturable bacteria	Jun 2025	300,000	0	Factsheet
ANH.20.20	Rapid characterization of the viral microbiome in arriving feedlot calves to inform vaccine gaps and risk assessment for bovine respiratory disease	Apr 2024	227,010	0	Factsheet
ANH.25.20	Comprehensive evaluation of the effect of extended-term delivery of local anesthetic on mitigating the pain caused by castration	May 2024	79,055	0	Factsheet
ANH.29.20	Insights into environmental transmission of Escherichia coli in beef production	Dec 2024	84,000	0	Factsheet
ANH.30.20	Antimicrobial use and resistance in eastern Canadian cow-calf herds - establishing a baseline for antimicrobial stewardship	Sep 2024	155,745	15,574	Factsheet
ANH.01.21	Understanding the modes of action of yeast as a direct fed microbial for feedlot cattle	Apr 2023	159,000	15,900	Factsheet
ANH.02.21	Understanding contagious transmission informs best management practices for respiratory disease in feedlot calves by leveraging whole genome sequencing of a unique isolate collection	Dec 2023	98,606	9,861	Factsheet
ANH.04.21	Effect of avermectin and tetracycline on the rumen microbiome and resistome of Beef cattle	Jan 2024	65,000	0	Factsheet
ANH.22.21[1]	Identification of markers of BVDV immunity and vaccination status based on metabolic profiling of plasma from vaccinated and challenged calves.	Mar 2025	114,138[2]	0	To be developed
ANH.23.21[1]	Development of a bacterial community to enhance the respiratory health of cattle	Mar 2028	255,725[2]	0	To be developed
ANH.01.22[1]	Known unknowns: macrolide resistance at beef cattle feedlots	Mar 2026	224,772	0	To be developed

ANH.08.22[1]	Maternal nutrition, winter feeding, and calf immune fitness in beef cattle	Mar 2026	190,476	0	To be developed
ANH.10.22	A Microbiome-supported Bovine Reproductive Sequencing Panel (BovReproSeq) for detecting, preventing and mitigating reproductive diseases in beef cattle	Oct 2026	260,700	151,800	Factsheet
ANH.11.22[1]	Development of an enhanced early life program (EELP) to improve health and productivity of beef cattle	Mar 2027	202,884	0	To be developed
BQU.09.18	Developing a Canadian Total Quality Management System for Beef Processing	Jun 2022	79,460	11,919	Factsheet
BQU.03.19	Validation of rapid evaporative ionization mass spectrometry (REIMS) for tenderness prediction	Jan 2024	154,735	0	Factsheet
BQU.02.22[1]	Up-cycling of low valued cattle hides into alternative protein food products	Mar 2026	77,050	0	To be developed
ENV.03.18	Performance, Environmental and Economic Benefits of BioChar Supplementation in Beef Cattle Grazing Systems	Dec 2022	121,018	18,153	Factsheet
ENV.03.19	Prairie Ecosystem Services Project: Quantifying the contribution of wetlands in livestock production landscapes	Mar 2024	190,555	19,056	Factsheet
ENV.07.19	Watershed-scale assessment of water and nutrient dynamics of pastures utilized by beef cattle	Dec 2023	134,389	13,439	Factsheet
ENV.07.20	Quantifying the effects of adaptive multi-paddock grazing on soil carbon sequestration and soil organic matter quality	Apr 2024	108,162	10,816	Factsheet
ENV.07.21[1]	Estimating the cost of providing ecosystem goods and services on prairie grasslands	Mar 2027	93,777[2]	0	To be developed
ENV.01.22	Impact of Feed Additives on 33% GHG Reduction Goal	Mar 2023	13,000	13,000	To be developed
FDE.03.18	Use of high-moisture corn products for finishing cattle and corn stover to extend the grazing season for pregnant beef cattle	Sep 2023	142,146	14,215	Factsheet
FDE.01.19	Canola supplementation of cows in late gestation leads to increased calf growth and modification of epigenetic, gene expression, and blood metabolite profiles	Jul 2026	137,074	0	Factsheet
FDE.03.19	Improving feed efficiency in the cow herd: Individual cow variability in fibre digestibility, feed efficiency, and methane emissions.	Dec 2024	7,500	5,000	Factsheet
FDE.06.19	Evaluating new next-generation strategies to boost breeding efficiency for Feed and Forage Production in Barley and Triticale	Feb 2024	265,500	41,264	Factsheet
FDE.04.20	Level of fat from canola seed supplementation in pregnant beef cow diets - Effects on cow and calf performance	Aug 2026	139,214	20,910	Factsheet
FDE.05.20	Development and demonstration of a genomics-enhanced whole herd genetic management platform to improve beef production efficiency and quality	Aug 2024	318,900	31,890	Factsheet
FDE.07.20	Examining the microbial basis of forage digestion efficiency in beef cattle	Mar 2025	214,434	19,800	Factsheet
FDE.01.21	Further exploration of calcium oxide to improve the quality of indigestible feeds	Mar 2024	59,956	14,989	Factsheet
FDE.02.21[1]	Developing strategies to reduce the toxicity of ergot alkaloids in the diet of feedlot cattle.	Mar 2028	358,660[2]	0	To be developed

FDE.14.21[1]	Improving evaluation of cereal grain processing and starch digestibility	Mar 2028	776,714[2]	0	To be developed
FDE.19.21[1]	Novel microbiome manipulation strategies for reducing methane emission and foodborne pathogen colonization	Mar 2027	150,429[2]	0	To be developed
FDE.03.22[1]	Evaluation of malate potential in beef cattle production	Mar 2026	109,164	0	To be developed
FDE.05.22[1]	The impact of early life nutritional management of purebred and crossbred cattle on lifetime feed efficiency and methane production	Mar 2026	193,500	0	To be developed
FOS.01.18	Persistence of Shiga toxin-producing Escherichia coli (STEC) in Cattle and Association with Clinical Infections in the Same Geographic Region	Mar 2023	97,875	5,279	Factsheet
FOS.04.18	Shiga-toxigenic E. coli persistence mechanisms and surface biofilm detection using near-infrared spectroscopy on beef processing facilities	Mar 2023	130,725	5,209	Factsheet
FOS.01.20	In-Plant Validation of Harvest Processing Equipment Sanitization Best Practices	Nov 2024	71,489	0	Factsheet
FOS.01.21	To explore conditions for improving the efficiency of water usage during sanitation	Mar 2026	172,050	98,288	Factsheet
FOS.02.21	SRM Risk Analysis - Problem Formulation & Risk Analysis	Mar 2023	90,000	60,000	To be developed
FOS.03.21[1]	Assessment of the population structure of E. coli O157 from cattle and associated food safety risks	Dec 2026	170,097[2]	0	To be developed
FRG.03.18	Improving vegetative biomass yield and digestibility in alfalfa for enhanced livestock production.	Aug 2024	159,300	14,780	Factsheet
FRG.08.18	Assessing the impact of grazing annual forage cover crops in an integrated crop-livestock system	May 2023	195,350	14,902	Factsheet
FRG.09.18	Enhancement of total lipid content/composition in non-GMO alfalfa and sainfoin for improved energy density and reduced methane emissions	May 2025	182,188	0	Factsheet
FRG.08.19	Forage Potential of Hybrid Fall Rye (HR) in Alberta and Saskatchewan	Mar 2024	87,692	0	Factsheet
FRG.09.19	Corn intercropping strategies for extended winter grazing of beef cattle	Mar 2025	91,066	45,000	Factsheet
FRG.01.20	Collaborative testing and development of forage barley varieties for western Canada	Mar 2024	44,425	9,642	Factsheet
FRG.12.20	Quantifying the economic benefits and carbon capture efficiency of including forages in cropping systems: A test using long-term data from the Breton plots	Mar 2024	62,662	15,522	Factsheet
FRG.14.20	Identification of genetic factors contributing to abiotic stress tolerance in intermediate wheatgrass	Mar 2024	21,500	3,225	Factsheet
FRG.11.20[1]	Complex forage blends: reducing supplementation costs through strategic forage selection	Mar 2025	89,190	0	To be developed
FRG.02.21	Low-cost forage management (hay and pasture systems, legume seeding) impacts on productivity and soil health of old grassland	Mar 2026	235,492	0	Factsheet
FRG.04.21	Evaluation of polycrop mixtures for swath grazing, soil health and economics	Aug 2027	190,178	0	Factsheet
FRG.11.21	Virtual Fencing	Feb 2023	150,000	150,000	Factsheet
FRG.13.21[1]	Generating Climate Smart Alfalfa through an Integrated Approach Targeting Beneficial Root and Carbon Assimilation Traits	Mar 2028	216,158[2]	0	To be developed

FRG.16.21[1]	Effect of Stocking Rate During Early Gestation on Subsequent Performance of Beef Females	Mar 2028	287,177[2]	0	To be developed
FRG.04.22[1]	Evaluating the use of prescribed fire to rejuvenate degraded forage pastures and its impact on soil health	Mar 2026	208,955	0	To be developed
FRG.06.22[1]	Sod-seeded legumes to improve forage production, forage quality and soil benefits	Mar 2026	162,622	0	To be developed
FRG.08.22[1]	Evaluation of Stocking Rate, Grazing Duration and Recovery Times on Native Grassland: Impact on Forage Production, Livestock Production, and Economics	Mar 2026	71,745	0	To be developed
FRG.09.22[1]	Evaluation of new perennial forages for pasture production selected for improved yield, environment resilience, nutritional value, and carbon hoofprint	Mar 2026	115,202	0	To be developed
FRG.13.22[1]	Evaluation of perennial forages under grazing for enhanced environmental sustainability and animal health	Mar 2028	220,338	0	To be developed
MISC.03.20	Remote Inspection & Grading Pilot Project	Jul 2023	200,520	43,817	To be developed
LL.01.22	Integrating beef, forage and cropping systems to improve soil carbon sequestration and reduce greenhouse gas emissions' Alberta Living Lab	Mar 2027	200,000	40,000	N/A
LL.02.22	SODCAP Living Lab	Mar 2027	200,000	50,000	N/A
LL.03.22[1]	BC Living Labs: Extended Grazing Season and Winter-Feeding Strategies	Mar 2026	60,000	0	N/A

[1]Project has been approved but the funding agreement is pending

[2]Project is approved but reported Total NCO Funding Amount yet to be finalized. Project was removed from the Cluster; resulting in required adjustments to project duration and budget that will be confirmed by summer 2023.

Total 2022/23 projected National Check-Off funding for ongoing Priority Research projects = $1,251,393.

Manitoba Beef Producers priority research project investment in 2022/23 contracted through the BCRC = $2,000

Project Highlights:

ANH.22.18: Determining the Effect of Stress on the Respiratory Microbiome of Cattle During Transportation - Factsheet

Dr. Trevor Alexander (AAFC Lethbridge) and team studied the impact rest-stops during long-haul transportation had on the incidence of Bovine Respiratory Disease (BRD).

Transportation is stressful, but so is loading and un-loading. Research continues to determine whether mandatory rest-stops will reduce or increase stress in cattle. We know that increased stress can increase the risk of diseases like BRD. This project examined how transportation rests stops affect the respiratory microbiome of cattle.

Nasopharyngeal swaps were collected from either single-source ranch or auction mart calves that had been transported and rested for various times. These swabs were collected at multiple times (loading, unloading,

rest stops and arrival to feedlot) and were examined for changes in the microbial populations of the upper respiratory tract.

They found that calves that were given an 8-hour rest during long-haul transport had higher numbers of BRD-causing bacteria in the respiratory tract than calves that were not rested during transport. This indicates that rest-stops might contribute to increased health and welfare risks instead of alleviating the concern.

BQU.02.18: Nutrient Density and Nutritional Value of Canadian Beef Products - Factsheet

Dr. Benjamin Boher (University of Guelph) investigated the role beef plays in the diets of Canadians.

"Superfood" marketing continues to be popular in mainstream media. Meat, and particularly red meat, is often portrayed as nutritionally optional or even unhealthy and even equated equally to plant-based protein sources in the Canadian Food Guide. With a large proportion of Canadians deficient in vitamin B12, zinc and iron, beef is actually a healthy choice to alleviate and prevent these common gaps in the nutrition of Canadians.

In investigating the nutrient density of beef, Dr. Boher found that beef's high nutrient density, particularly for vital nutrients that are most often inadequate in Canadian diets (iron, vitamin B12 and zinc), makes it an affordable source of all these nutrients for consumers.

ECON.01.20: Estimation of Economic Impact of the Canadian Cattle Industry - Factsheet

Brenna Grant (Canfax Research Services) and team estimated the impact Canada's cattle and beef industry has on the economy.

The cattle and beef sector is an important driver of the Canadian economy, though that is not always obvious simply looking at farm cash receipts (FCR) alone. The industry's contribution is significantly undervalued when only direct sales, as presented by FCRs, are considered.

By creating an economic model that quantifies the complexities of the Canadian cattle and beef industry, researchers were able constitute the real economic impact of the cattle production cycle.

They found that between 2018 and 2020, the cattle sector contributed $3.35 to the Canadian GDP for every $1 of farm cash receipts. For every worker employed in the sector, another 3.9 workers (based on indirect and induced impacts) are employed elsewhere in the economy; with an employment multiplier of 4.9 person-years on a full-time equivalent basis. For every $1 of income received by workers and farm owners, another $6.22 are created elsewhere, resulting in an income multiplier of 7.22 (up from 5.63 in 2012).

ENV.02.18: The Impact of Agricultural Land Conversion on Carbon Stocks Across Canada, With a Focus on Grazing Lands - Factsheet

Drs. Tim McAllister and Roland Kroebel (AAFC Lethbridge) studied how land conversion (from grassland to annual crops) impacts soil's carbon stocks and its ability to store carbon.

Grazing lands and soil resources that support the Canadian beef industry play an important role in regional and global climate regulation due to carbon storage. Unfortunately, we are losing these lands due to irreversible conversion to other agricultural and non-agricultural uses. The loss and degradation of these lands can have negative impacts on the landscape's ability to capture carbon and mitigate GHG emissions from multiple sectors, not just agriculture.

The team used satellite imaging to determine the changes in land from tame pasture and forages and native grasslands to annual crops at three different time points (1995, 2011 and 2016) and estimated the change in

soil organic carbon (SOC) using a database that predicted stocks based on precipitation, temperature, soil characteristics, tillage and land use. Model beef farms representative of each different beef producing region in Canada and characteristic environmental and management conditions were created using Holos V4 to simulate annual changes in SOC stocks on farmland.

They found that converting perennial forages to annual crops results in decreases to soil organic carbon levels. This shines light on the importance of having beef cattle on the landscape to conserve tame and native pasture land to maintain SOC stocks and mitigate GHG emissions.

vi. Proof of Concept & Validation Trials

The BCRC funded the proof of concept (POC) projects listed below, including five new projects approved for funding in 2022. This funding supports short-term (six months to one year) proof of concept-based research to help inform whether it is worth pursuing as a larger, more defined research investment in a particular area where there is greater uncertainty. It is also intended to support clinical trials to validate certain practices or technologies discovered through research projects and/or to facilitate the adoption of technologies that have been utilized in other sectors, commodities or countries. The POC projects are funded jointly by Canadian Beef Cattle Check-Off dollars leveraged with provincial and federal government and/or industry partner funding.

BCRC's Proof of Concept & Validation Trial program has been very successful since its launch in 2018/19. Projects funded to date have achieved what was intended under this program. Some projects supported under the POC program have provided preliminary data to demonstrate value in further investment in research in an area. Likewise, some projects have found that further research should not be pursued at a larger scale, saving money and encouraging the redirection of research to more promising concepts.

BCRC Proof of Concept Projects

Project #	Project title	Project end date	Total NCO funding ($)	2022/23 NCO funding ($)	Factsheet
POC.06.19[1]	Evaluation of a Remote Early Disease Identification (REDI) system to identify feedlot cattle with bovine respiratory disease (BRD)	Mar 2024	50,000	0	To be developed
POC.02.20	Safety and Immunogenicity of an Ocular Vaccine Delivery Vehicle	Jul 2022	49,680	7,452	Factsheet
POC.14.20	Effects of maternal supplementation of vitamin A during late gestation on intramuscular fat deposition in the offspring	Jun 2023	48,530	0	Factsheet
POC.15.20	Development and Evaluation of a Novel Optical Sensor Thermometer for the Measurement of Core Body Temperature in Cattle	Jun 2022	50,000	7,500	Factsheet
POC.16.20	Broad-spectrum immunity to enteric pathogens by training innate intestinal immunity in young calves	Aug 2022	49,450	7,417	Factsheet
POC.08.21	Assessing the viability of real-time pathologist assisted field necropsies to improve diagnostic outcomes of beef cattle cases submitted to UCVM's Diagnostics Services Unit (DSU)	May 2023	35,075	0	Factsheet

POC.11.21	Bacterial metabolites as natural antimicrobials for controlling biofilm formation by pathogens	Sep 2023	49,910	0	Factsheet
POC.16.21	Antimicrobial Peptides that specifically inhibit the BRD pathogen *Mannheimia haemolytica*	Apr 2023	48,875	0	Factsheet
POC.17.21	Identifying alfalfa varieties best suited to pasture rejuvenation	Feb 2023	49,013	7,352	Factsheet
POC.21.21	Modulating nitrogen responses in forage grasses for improved nitrogen use efficiency, yield, and grazing tolerance.	Mar 2024	39,930	5,989	Factsheet
POC.23.21	Can we "super charge" colostrum using pre-partum supplementation?	Nov 2022	46,625	6,994	Factsheet
POC.07.22	Use of multiple mitigation strategies to reduce greenhouse gas emissions in beef cattle production systems	Mar 2024	50,000	42,500	Factsheet
POC.11.22	Impact of good vaccine practices (GVP) at field on vaccine effectiveness	Mar 2024	50,000	50,000	Factsheet
POC.14.22	Using a bovine Lactobacillus mixture as a strategy to minimize beef calf stress	Mar 2024	50,000	42,500	Factsheet
POC.19.22	Towards the identification of agents associated with infectious bovine keratoconjunctivitis (IBK, pink eye)	Apr 2024	47,000	39,950	Factsheet
POC.08.22[1]	Verification that guanidinoacetic acid supplementation enhances growth and feed efficiency of beef steers without compromising carcass and meat quality	Mar 2025	50,000	0	Factsheet

[1]Project has been approved but the funding agreement is pending

Total 2022/23 projected National Check-Off funding for Proof of Concept projects = $217,654.

Project Highlights:

POC.05.19: Evaluation of Feedlot Water Bowls for Pen-Level Surveillance of Antimicrobial-Resistant Bovine Respiratory Pathogens - Factsheet

Dr. Trevor Alexander (AAFC Lethbridge) and Dr. Murray Jelinski (WCVM) studied whether or not water bowls in feedlot pens could be used for antimicrobial resistance (AMR) monitoring. This preliminary study found that bacteria associated with BRD do accumulate in feedlot water bowls. Water bowls may provide a simpler way to evaluate pen-level antimicrobial resistance in BRD pathogens.

POC.02.20: Safety and Immunogenicity of an Ocular Vaccine Delivery Vehicle - Factsheet

Dr. Philip Griebel (University of Saskatchewan and VIDO-Intervac) and team investigated whether it was possible to develop a more effective pink-eye vaccine.

While typically only occurring sporadically, pink-eye outbreaks can be very difficult, time consuming and labor intensive to treat on pasture. Currently available pink-eye vaccines are not effective in preventing the disease. This team went back to the drawing board to see if changing the method of vaccine delivery could be the key to a better immune response and more-effective prevention. They used a syringe to administer the experimental vaccine directly onto the eyes of one-month-old calves.

This preliminary trial found that a new vaccine that can be delivered like an eyedrop may be a safe and more effective way to protect beef calves against pink-eye.

vii. Research Capacity

The BCRC began the process of developing Research Chairs in partnership with key research institutions in 2018/19. This program addresses industry identified gaps in research capacity. The evaluation of Research Chair concepts by the BCRC considers the incremental nature of the proposed research capacity, institutional investments, program support and capacity priorities identified by industry.

The BCRC has held two successful Research Chair calls for proposals with the first two Research Chairs approved by the Council in 2019 and a third approved in December 2020. The Chairs include:

- **Beef Production Systems Chair** "*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*", University of Alberta. Dr. Gleise da Silva was hired in April 2021 to fill this position.
- **Chair in One Health and Production-Limiting Diseases** 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*", Western College of Veterinary Medicine, University of Saskatchewan. Dr. Cheryl Waldner was hired in January 2021 to fill this position.
- **Beef Industry Forage Management and Utilization Chair** with the goal "*to develop and evaluate agronomic strategies to optimize forage establishment, yield, quality and stand longevity and identify feeding and grazing strategies that optimize animal performance while contributing to improved soil health and environmental sustainability*", University of Saskatchewan. Dr. Bree Kelln was hired in April 2022 to fill this position.

BCRC Research Capacity Projects

Project #	Project title	Project end date	Total NCO funding ($)	2022/23 NCO funding ($)
CHAIR.01.18	Beef Cattle Research Council Industrial Research Chair in One Health and Production-Limiting Diseases (the "NSERC Chair")	Dec 2024	750,000	150,000
CHAIR.02.18	BCRC - Hays Chair in Beef Production Systems	Mar 2030	1,500,000	150,000
CHAIR.01.20	Beef Industry Forage Management and Utilization Chair	Mar 2030	2,500,000	250,000

Total 2022/23 National Check-Off funding for Research Capacity projects = $550,000.

viii. Knowledge & Technology Transfer

The BCRC funds Knowledge and Technology Transfer (KTT) activities and projects under the Cluster III program and also external to the Cluster program. All projects are funded jointly by Canadian Beef Cattle Check-Off dollars leveraged with at least 50% funding from government and/or industry partners.

Cluster III program

Under the Cluster III program, activities completed in 2022/23 include regular communication with industry and production of extension resources. This includes both development and distribution of new resources along with maintenance and promotion of existing extension resources including videos, decision tools, infographics, articles and webinars.

New resources developed include 68 blog posts, 107 research results summary fact sheets, 12 monthly e-newsletters, 12 articles for Canadian Cattlemen - The Beef Magazine, three production-focused topic webpages, an interactive decision-making tool, 11 infographics, five videos and seven webinars.

Production-focused topic pages were developed covering topics related to heifer development, bull management and calving seasons. All three of these added resources build upon and link to existing content under the general area of reproduction and calving.

A decision-making tool was designed to compare potential benefits of different testing options for Johne's disease in cow-calf herds. The model was built using surveillance and research data primarily from western Canadian cow-calf herds. The tool helps producers, vets and other stakeholders simplify the complex task of managing and monitoring Johne's disease.

Creation of infographics provides a means to extend information through various formats and platforms. Infographics developed during the 2022/23 year ranged from a focus on biosecurity to a series on calving and calf management, record-keeping GOLD standards, low stress handling, preconditioning and vaccination.

Videos produced this year included promotion of the newly revitalized BeefResearch.ca and celebrating BCRC's 25 years of beef industry research. Producer resources highlighted through videos included calculating carrying capacity on pastures, intervention during difficult calving events and using One Health strategies to navigate disease outbreaks. Views of video resources continue to be strong with a combined viewing of these new resources of more than 5,300.

Seven webinars were held featuring producers, agrologists, researchers, veterinarians, and other beef and forage industry experts. Nearly 800 individuals were in attendance during the live presentations, the majority of which identified as being cattle producers. Webinar registrations and recording views continue to remain high, with ongoing viewership of past webinars posted on BeefResearch.ca.

The BCRC's technology transfer efforts consistently receive positive feedback from producers and other stakeholders. The newly redesigned and revitalized BeefResearch.ca continues to experience high traffic, receiving 434,298 pageviews in 2022/23. Analytics indicate that the audience is interested in a variety of topics, particularly those that are most practical and related to seasonal activities for the sector. Articles and other resources developed are frequently and increasingly redistributed by industry groups, trade magazines and other media, as well as by producers on social media.

Social media networks continue to grow, and the number of direct email subscribers also continues to increase. Currently, more than 6,200 individuals are subscribed to receive our regularly published articles/posts, an increase of 67% since last year, and more than 2,600 receive our monthly e-newsletter, The Wire, up 800+ subscribers from 2021/22.

In addition to the production and distribution of extension resources, five scientists participated in the Beef Researcher Mentorship program, which engages researchers who study cattle, beef, genetics, feed or forage production with producers and other Canadian beef cattle industry stakeholders. Each was paired with two mentors who helped them develop their knowledge, skills and network through discussions and by initiating

various introductions, tours and meetings. Mentees identify goals and plans to achieve them and are provided with a small travel budget to attend relevant industry events.

Since the inception of the mentorship program, 35 researchers have participated across a wide range of specialty areas. Two thirds of the participants have come to work in Canada, originally from over 14 different countries. The mentorship program has encouraged the development of strong relationships between industry and researchers. Researchers have increased confidence and knowledge of industry issues, while industry has benefited from the diverse backgrounds and technical skills new researchers can bring to address priorities.

Activities internal to BCRC

Over the last several years the BCRC has invested in internal activities to develop content, decision making tools, and resources that are aligned with key extension priorities identified by industry. During 2022/23, the BCRC continued to focus on two internal activities. Our ongoing initiative of ***Eastern content expansion*** improves the visibility and uptake of BCRC content by beef producers in Ontario, Quebec, and Atlantic provinces through a focus on:

- Resource modification and/or development to ensure relevance to eastern Canadian producers
- Decision making tool modification and/or development including data gap assessment and scenario development
- Webinar and other modular resource development to support regional extension program delivery
- Eastern extension network expansion to grow awareness of BCRC resources

As a result of this initiative, a targeted focus on inclusion of eastern focused content has become a consistent occurrence when developing BCRC extension resources. This work also continues to expand relationships with extension specialists in Central and Eastern Canada, leading to greater collaboration and promotion of BCRC extension resources applicable in those regions.

The second internal activity that continues to see tremendous uptake is the ***Enhancing extension through veterinary collaboration project***. This project identifies opportunities where veterinarians can further inform and persuade producers to adopt practices or technologies that benefit them and the industry - creating awareness of existing BCRC resources and developing new resources where appropriate. In 2022/23, the ongoing #Calf911 initiative included development of a series of printable calf management graphics, checklists and a decision tree. In addition, a calving intervention video was produced, receiving more than 3,500 views since its release in mid-February 2023. A newsletter for Canadian veterinary teams who work with beef clients is published quarterly with a current direct subscriber list of more than 1,200 individuals. This is an increase of more than 700 subscribers over the past year. Open rates are over 50% (industry standard open rate is 23.3%).

Through the work undertaken for both initiatives since their inception, awareness was identified as a priority. Familiarity and knowledge of BCRC extension resources was recognized as lacking across the animal veterinary community and for Canadian beef and cattle producers and industry stakeholders across the country, particularly with eastern producers. In 2022/23, an awareness campaign included working with an experienced marketing firm to deliver industry-targeted digital and print media advertising. Analytics will be analyzed following completion of the current campaign to inform potential modified continuation of these efforts.

Activities external to BCRC

The ***Canadian Beef Technology Transfer Network*** continued to gain momentum in 2022/23, bringing together groups and individuals actively involved in knowledge and technology transfer that support Canadian beef producers and advance the Canadian beef industry. By facilitating greater communication and collaboration through the Network, resources and expertise are shared, undue duplication is avoided, and collaborative groups are empowered to develop effective resources and strategies that are applicable long-term across regions and in line with the Canadian Beef Research and Technology Transfer Strategy.

Initiatives undertaken through the Network during the past year include formation of a small advisory committee to help guide direction of the group, improved and expanded communication through use of the MS Teams platform, and creation and distribution of a quarterly e-newsletter to encourage sharing of extension-related resources and learnings. The Network membership, currently at over 150 individuals, convenes once per year for their annual online meeting to further facilitate communication and collaboration.

BCRC Knowledge and Technology Transfer Projects

Project #	Project title	Project end date	Total NCO funding ($)	2022/23 NCO funding ($)	Factsheet
KTT.01.18	Early Calf Health and Survival Management Risk Assessment Tool	Dec 2024	36,656	0	Factsheet
KTT.01.19	The Value of Record Keeping for Decision-Making on Canadian Cow-Calf Farms and Ranches	Jul 2022	40,950	6,000	Factsheet
KTT.01.21	Motivations, barriers and alternatives to feed testing for cow-calf producers	Dec 2023	40,950	10,237	Factsheet
KTT.02.20	The Big Beef Podcast	Mar 2023	14,556	2,183	Factsheet
KTT.04.20	Leveraging the Canadian Beef Improvement Network's (CBIN's) Collaboration and Resources to Advance Genetic Improvement Across the Canadian Beef Industry	Mar 2023	49,864	7,480	Factsheet
KTT.05.20	Canadian Forage U-Pick: Expanding the Western Canadian Forage U-Pick tool to include Eastern Canada	Aug 2023	43,450	0	Factsheet
KTT.05.21	Nova Scotia On-Farm Cattle Preconditioning Pilot Project	Oct 2022	28,324	4,249	To be developed
KTT.06.21	Improving vaccine usage and efficacy in western Canadian beef herds to reduce disease risks.	Jun 2023	50,000	0	Factsheet
KTT.08.21	Development and Production of a Beef Cattle Animal Health Podcast	Aug 2023	15,807	3,739	Factsheet

Total 2022/23 projected National Check-Off funding for Knowledge & Technology Transfer projects = $33,888

Project Highlights:

KTT.05.18: An Interactive Tool to Inform Johne's Disease Control in Beef Herds - Factsheet

Dr. Cheryl Waldner (University of Saskatchewan) led this project to develop a web-based interactive tool to inform Johne's disease testing options in individual cow-calf herds. The tool will help veterinarians and beef cattle producers compare the relative costs and benefits of different disease management options in the face of uncertainty, using research from Canadian beef herds integrated into an applied learning tool for disease management. The project was completed in 2022 with the tool, along with a user guide and short how-to videos, available on BeefResearch.ca.

KTT.08.21: Beef Cattle Animal Health and Nutrition Podcast - Factsheet

A trial series of podcasts focused on beef cattle animal health and nutrition are being developed. Dr. John Campbell hosts weekly episodes including conversations with producers, veterinarians, nutritionists and researchers. To date, more than 25 podcasts have been produced with topics ranging from feed testing to vaccinations, extended grazing systems, calving and calf management, disease investigations and economics. Podcast episodes have been publicized through social and print media as well as industry communications and websites. A total of approximately 50 episodes are planned before the project end date of August 2023. The Beef Cattle Health and Nutrition Podcast is available across a range of podcasting sites.

ix. Surveillance Research Networks

A key priority identified in the *Canadian Beef Research & Technology Transfer Strategy* is ensuring the continuation and enhancement of priority surveillance networks related to production limiting diseases and antimicrobial resistance and use. The purpose of these networks is to inform industry practice, policy and regulation, public trust discussions, and future research and extension priorities. Funding for surveillance was allocated in the BCRC's 10-year plan but has thus far not been activated to any significant level due to investments in Science Cluster III and proposed under Science Cluster IV, as well as investments recently made by the Public Health Agency of Canada (PHAC) to provide funding to beef cattle surveillance through the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) as is done for other livestock sectors.

Moving forward, the Council has decided this program will be formally discontinued. Surveillance will remain a priority and will be considered in identifying priorities for future calls for research proposals, with funding advanced through that mechanism as appropriate.

The first year that specific projects were invested in through the BCRC's surveillance research network and outside of the Science Cluster was 2020/21. The BCRC provided continued funding for three projects in 2022/23 as listed in the table below. The projects include 1) a Western Canadian Animal Health Network beef network which connects farmers, specialists and information systems to improve cattle health in western Canada; 2) continuation of bovine respiratory disease pathogen isolation and susceptibility testing; and 3) a pilot sentinel surveillance project evaluating AMR risk for calves prior to feedlot entry. Additional programs will be evaluated in coming years and selected based on key priorities where it is viewed that industry funding will assist in ensuring surveillance is advanced within government and industry frameworks.

BCRC Surveillance Projects					
Project #	**Project title**	**Project end date**	**Total NCO funding ($)**	**2022/23 NCO funding ($)**	**Factsheet**

SURV.01.20	The Western Canadian Animal Health Network (WeCAHN) beef network: connecting farmers, specialists and information systems to improve cattle health in western Canada	Mar 2024	86,238	9,374	Factsheet
SURV.02.20	Surveillance of antimicrobial use (AMU) and antimicrobial resistance (AMR) in Canadian feedlot cattle; continuation of bovine respiratory disease pathogen isolation and susceptibility testing	Dec 2025	360,434	0	Factsheet
SURV.03.20	Respiratory pathogens in calves at weaning: A pilot sentinel surveillance project evaluating AMR risk for calves prior to feedlot entry	Nov 2023	62,137	6,214	Factsheet

Total 2022/23 projected National Check-Off funding for Surveillance Research Network = $15,588.

x. Cost of Production Network

As part of surveillance programming in 2022/23, the BCRC continued to support the Canadian Cost of Production (COP) Network with work overseen by Canfax Research Services. Through its development of economic baseline data and analysis, the COP Network supports industry competitiveness with a goal to have Canadian beef cattle cost of production data in every province/ecoregion to guide technology transfer and research priorities. In 2022/23, the COP Network was expanded to over 220 producers contributing to over 56 cow-calf benchmark farms (three dairy-beef benchmarks). A results presentation was recorded in January 2023 and distributed to participating producers and provincial coordinators as well as posting to the Canfax website. A recording of the presentation along with other resources such as case studies and fact sheets can be found at Canfax.ca/COPAnalysis. Future farm scenarios were developed for the year 2 benchmark farms and are in progress for the year 3 benchmark farms. Reports have been received from the following graduate students:

1. Dalhousie University, on success factors for small operations in eastern Canada;
2. University of Manitoba, evaluating scenarios that reduced cost of production and net GHG emissions; and
3. University of Saskatchewan, culling strategies (ETA August 2023)

Total 2022/23 projected National Check-Off funding for Cost of Production Network = $20,500

IV. Verified Beef Production Plus

In addition to sponsoring research and technology development in support of the Canadian beef industry, the BCRC oversees the delivery of the Verified Beef Production Plus (VBP+) program. 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+ provides producer training in all areas of certification and sustainability and maintains the VBP+ standard. On behalf of the CCA (BCRC), VBP+ maintains Provincial Delivery Agent agreements with all provinces to deliver training through provincial coordinators. VBP+ Delivery Services Inc. (VBP+ Inc.) is a stand-alone organization of which CCA (BCRC) is the sole member to deliver certification and renewal services across all sectors and in all provinces.

Statistics as of April 2023	
Number of Active Operations	**1,360**
Per Head by Sector	
Backgrounder	292,283
Cow/Calf	362,203
Feedlot	1,110,827
Total # Head (one time capacity)	**1,765,313**
Acres Per Production Type	
Dry land acres for feed production	567,066
Irrigated acres for feed production	104,600
Native grazing acres	4,287,708
Tame grazing acres	773,158
Total Acres	**5,732,532**

As of March 31, 2023, VBP+ has concluded the final year of the five-year Agri-Assurance/BCRC funded project, CAP-AAPN-010 titled *VBP+ Industry and Market Alignment Project*. The project had seven activities:

- Activity 1 – Establish equivalency of VBP+ with US Beef Quality Assurance (BQA) program
- Activity 2 – Alignment of VBP+ with the CSB Framework
- Activity 3 – Enhance VBP+ training to meet growing end-user and public expectations
- Activity 4 – Develop and implement a reporting system to measure the industry wide impacts of VBP+
- Activity 5 – Create a web portal for producers to enable renewals and training
- Activity 6 – Assess the feasibility of remote audits
- Activity 7 – Support accreditation for European GEP-free markets and explore alternative pathways

Outcomes from this project, which include a robust metrics and monitoring system, were used to inform the next application to the Agri-Assurance stream of the Sustainable Canadian Agriculture Partnership which opened in April of 2023. The application, titled *Enhancing VBP+ to drive sustainability & market growth in Canadian beef*, has been submitted and is currently under review.

Certification services under VBP+ Inc. saw a decline in applications for certification and increased withdrawal during the audit cycle in 2022/23. While a portion of the decline can be attributed to drought conditions across Western Canada and producers exiting the industry at the cow/calf level, much of the feedback received indicated an increase in producer apathy due to lack of anticipated return on investment. VBP+ and VBP+ Inc. advocated strongly and provided background data throughout the latter part of 2022 and early part of 2023 towards re-thinking incentivization models, particularly at the cow/calf level. The introduction of new incentives linked to the Canadian Roundtable for Sustainable Beef Framework and new provincial incentives through the new provincial Sustainable Canadian Agriculture Partnerships in Saskatchewan have contributed to a slightly renewed producer interest in certification and reduced withdrawals from the program.

Total 2022/23 projected National Check-Off funding for VBP+ = $450,590

V. BCRC Administration and Management

The BCRC is overseen by an operating committee of 16 cattle producers (including two ex-officio), who are appointed by the provincial producer organizations and proportionally represent the provincial allocation of the Canadian Beef Cattle Check-Off to research. The BCRC is led by an Executive Director who oversees research and extension programming development and implementation, playing a key role in establishing and refining industry research priorities in consultation with other stakeholders. The Executive Director acts as a liaison and facilitation link among the BCRC committee and the BCRC staff, CCA, the Canadian Beef Advisors, the Canadian Beef Cattle Research, Market Development and Promotion Agency, 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*.

Supporting the Executive Director, the BCRC Science Director and Research and Innovation Coordinators manage priority research projects as well as projects undertaken within the Beef Cattle Industry Science Cluster. The Operations Manager supports the development and implementation of BCRC's business planning, budget management and reporting processes. The Extension and Communications Director and Extension Coordinator support the Technology Transfer & Knowledge Dissemination Strategy. The Technical Director supports the development and advancement of research and technical analysis related to beef quality, food safety, animal health and technical barriers to trade on a part-time basis. In addition to these positions, administrative, financial and technical expertise support the BCRC operations.

The BCRC Executive Director also oversees the VBP+ Business Manager who works with the VBP+ Technical Manager and various contractors and is directly responsible for delivering the national VBP+ program and overseeing VBP+ Delivery Services Inc. the wholly owned non-profit responsible for delivery of VBP+ audit delivery.

A Science Advisory Panel comprised of industry, academic and governmental scientific expertise, continues to support the BCRC's research program. This expertise helps to ensure the delivery of research plans that are directed towards industry's research objectives and achieve the outcomes desired by industry.

National Check-Off funding directed to the BCRC general administration and management expenses for 2022/23 is projected at $734,000.

VI. Financial Notes

The fiscal year for the BCRC is July 1 to June 30 and therefore the BCRC audited financial statements are not included in this report. In many instances, the projected expenditures in this report reflect the year-to-date expenditures, as of publication date, and do not reflect BCRC's entire fiscal year. Due to the nature of the BCRC's funding cycle, this will result in a variance between this report and the close of BCRC's year end on June 30th, as a large volume of contracting new projects occurs between May and June of each year.

The BCRC 2022/23 financial summary and CCA audited financial statements will be available to the Agency after August 2023.

Projected Canadian Beef Cattle Check-Off funding allocated to research programming in 2022/23 is outlined in various sections of this report and includes the following:

Beef Science Cluster research projects = **$666,494**

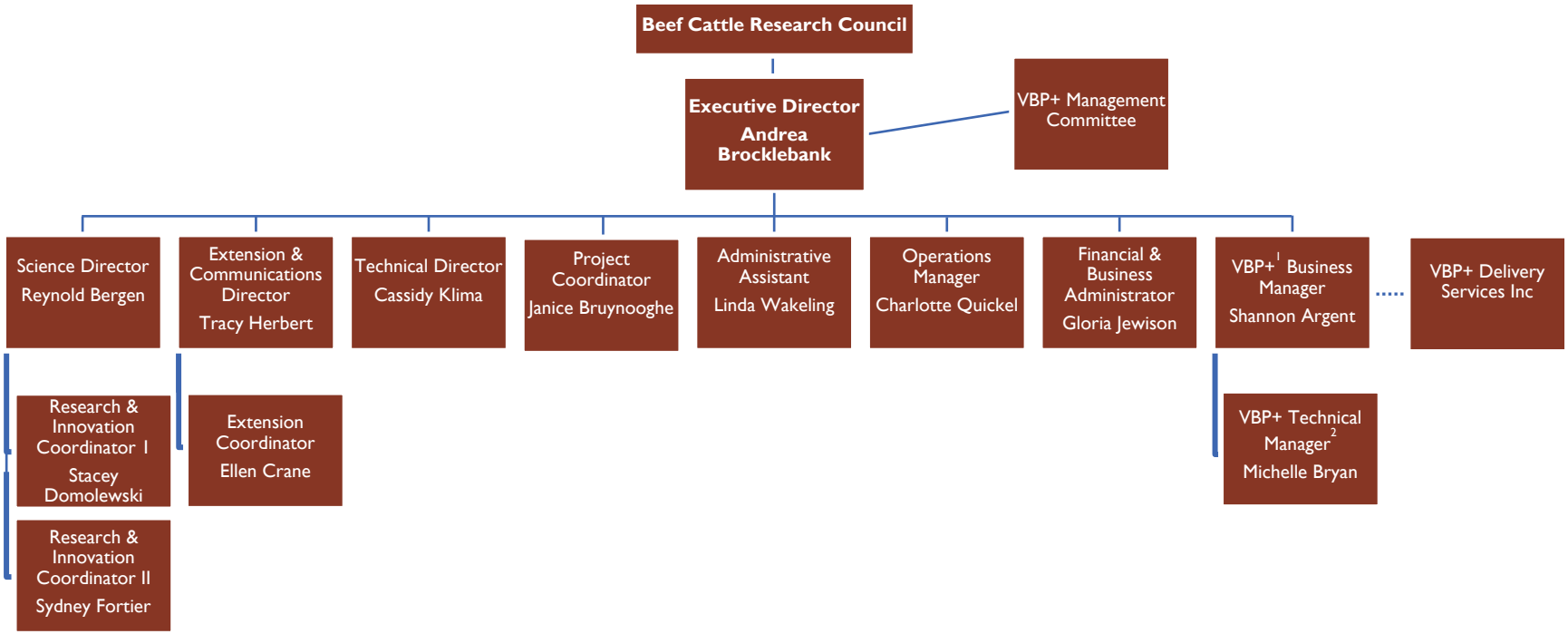
Other BCRC research projects = **$2,089,023**

Verified Beef Production Plus = **$450,590**

BCRC general program management and administration = **$734,000**

Total Beef Cattle Check-Off funding - **$3,940,107**

VII. Appendix – BCRC Organization Chart



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