NATIONAL BEEF SUSTAINABILITY STRATEGY

Identifying focus areas and strategies for the CRSB and their membership to continually advance the sustainability of the Canadian beef industry

September 2016

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1.0 Introduction

The Canadian Roundtable for Sustainable Beef (CRSB) is a multi-stakeholder initiative developed to advance sustainability efforts within the Canadian beef industry. Through leadership, science, multi-stakeholder engagement and collaboration, the CRSB works towards continuous improvement of the Canadian beef value chain's sustainability.

With funding from its membership and provincial governments, the CRSB commissioned the National Beef Sustainability Assessment (NBSA) and Strategy, a comprehensive assessment of the social, environmental, and economic impacts of the beef industry. The NBSA was conducted by Deloitte and Canfax Research Services.

The NBSA provides a benchmark for the Canadian beef industry and a starting point to begin measuring continuous improvement and sustainability. It highlights where industry is doing well as well as opportunities for improvement.

Building on the NBSA, the Sustainability Strategy identifies goals, focus areas for improvement and baseline key performance indicators. While the Strategy identifies focus areas for improvement, the actionable activities will be developed through future work of the CRSB. Specifically, initiatives to advance sustainability in the 'action items' identified in this report will be delivered under CRSB's third pillar of work, Sustainability Projects. In addition, the sustainability assessment and strategy will be used to inform the development of the verification framework for sustainable beef.

The CRSB will review the NBSA and Strategy approximately every five years, both to evaluate industry's progress over time as well as re-set and further refine the goals based on newly available data and methods.

Figure 1: CRSB's core areas of work

1.1 Development Process

In April 2016, the CRSB held their semi-annual meeting with over 85 participants across CRSB membership categories. The focus of the semi-annual was to utilize the results of the NBSA to undertake a comprehensive SWOT (strengths, weaknesses, opportunities, threats) analysis, Key Performance Indicator (KPI) selection and identification of targeted focus areas for continuous improvement. The following report is based on discussions with CRSB members during facilitated group sessions at the semi-annual meeting. CRSB membership input was consolidated and structured to build this strategy report. The process leading to the development of this strategy is summarized in Figure 2.
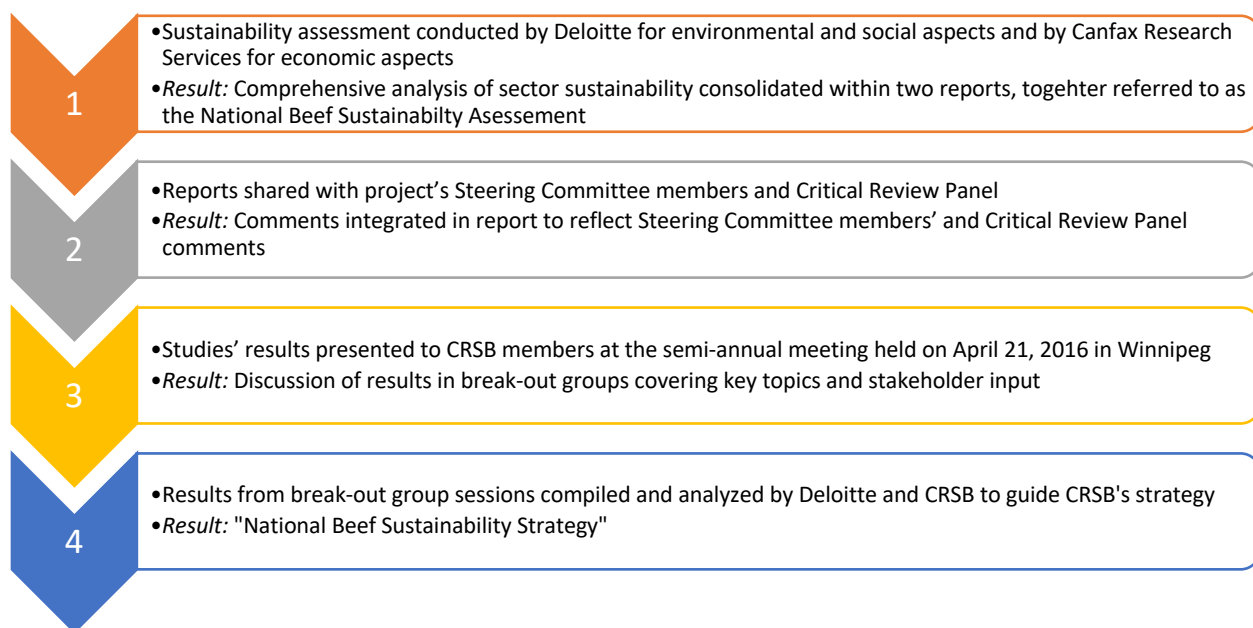
1 • Sustainability assessment conducted by Deloitte for environmental and social aspects and by Canfax Research Services for economic aspects
• *Result:* Comprehensive analysis of sector sustainability consolidated within two reports, togehter referred to as the National Beef Sustainabilty Asessement

2 • Reports shared with project's Steering Committee members and Critical Review Panel
• *Result:* Comments integrated in report to reflect Steering Committee members' and Critical Review Panel comments

3 • Studies' results presented to CRSB members at the semi-annual meeting held on April 21, 2016 in Winnipeg
• *Result:* Discussion of results in break-out groups covering key topics and stakeholder input

4 • Results from break-out group sessions compiled and analyzed by Deloitte and CRSB to guide CRSB's strategy
• *Result:* "National Beef Sustainability Strategy"

Figure 2: Strategy development process

1.2 Scope

This report highlights nine focus areas for continual improvement under each pillar of sustainability (Figure 3). Focus areas were selected based on hotspots identified in the baseline assessment as well as through membership priority setting.

Figure 3: Key sustainability focus areas for continuous improvement

For each of these focus areas, goals, performance indicators and actions have been identified to enable future improvement. The CRSB membership also identified one common overarching goal, as a cross-sectional objective.

1.3 Overarching Goal

A common thread identified in all focus areas was the need for communication, collaboration, and engagement across the beef value chain. The Canadian beef industry relies on an expanded and complex network, including 68,500 farms and ranches across Canada. The successful and continued advancement of sustainability within the Canadian beef industry requires participation from all stakeholders. Reaching out and engaging with individuals from these organizations as well as other stakeholders of the Canadian beef value chain is crucial to advance sustainability efforts.

Another common discussion across all focus areas was the balance of setting targeted specific goals versus setting broader more general goals (e.g. reduce the GHG footprint by XX% versus reduce the GHG footprint). The consensus during the facilitated sessions was to set broader goals at this time, however that the CRSB should carefully consider this option when further developing the strategy work.

Goal #1. Build a stronger and more united Canadian beef sustainability community	
Key Performance Indicator(s)	**Baseline**
Number of CRSB Members & Observers	As of June 30th, 2016 the CRSB had 53 members and 40 observers
Diversity of CRSB membership	• Retail & Food Service = 10 • Producer/Processor Organizations = 17 • Processors = 2 • NGO = 13 • Food & Agriculture Business = 11 • Government Observers = 12 • Producer Observers = 17 • Academic Observers = 9 • Youth Observers = 2
Performance Indicator(s)	**Baseline**
Participation in CRSB Annual and Semi-Annual Meetings	There were 80 participants in the 2015 AGM There were 83 participants in the 2016 Semi-Annual
Communication indicators; website traffic and Twitter followers	An average of 592 users visited the CRSB website each month in 2016 As of June 30, 2016 the CRSB had 670 Twitter followers
Producer participation in the sustainability assessment survey and verified sustainable beef frameworks	For the 2013 NBSA 77 producers filled in the survey A total of 180 producers plus 3 processors participated in the McDonald's Sustainable Beef Pilot Project

Action Items – Building a strong and united Canadian beef sustainability community
1. Build a trusted go-to forum on sustainable beef in Canada through diversity in membership, leading scientific information and robust frameworks to measure and advance sustainability   2. Enable the further engagement of the scientific community in the CRSB's work and membership   3. Through communications activities, engage, inform and enable information sharing that assists the Canada beef industry in advancing sustainability practices

2.0 Environment

Beef production requires the use of water, land, and feed, which generate environmental pressures through the consumption of resources and the release of substances in water, air, and/or soil. Cattle, as a ruminant species, are also characterized by the release of greenhouse gas (GHG emissions, mostly due to enteric fermentation, manure excretion, and feed production. However, the beef industry also supplies many ecosystem services such as maintaining a significant reservoir of stored carbon in grassland soils, providing natural habitat for biodiversity, and maintaining wetlands on the landscape. Additionally, the crop and livestock sectors have an important symbiotic relationship. For example, the livestock industry provides habitat for pollinators; utilizes by-products of cropping systems; supplies manure fertilizer; and forage and hay crops have an important function in crop rotations via the management of disease and nutrient content of the soil.

Target areas for improvement have been identified to advance the environmental performance of the entire industry, from farming to food wastage. Canada is an advanced and efficient beef producing country; ongoing support for the identification of innovative solutions and their dissemination to the whole industry is necessary to continually improve the environmental performance of the Canadian beef production system.

Through discussion and assessment of hotspots identified in the NBSA four core areas of focus were chosen: climate change, food waste, land use and water management.

2.1 Climate Change

Canadian beef production contributes to GHG production through three main facets: methane (CH_4)– mostly from enteric fermentation, nitrous oxide (N_2O) – from manure application and storage and use of inorganic nitrogen (N) fertilizer for crop production, and carbon dioxide (CO_2) – from fossil fuel consumption.

It was noted that climate change is a topic of significant importance to the beef industry, as farmers and ranchers are often the first to see the impacts of severe weather changes. Furthermore, reduction in GHG emissions are often directly linked to highly efficient production systems.

Canada is efficient at producing beef with regards to GHG emissions, with a total footprint less than half the world average at 11.4 kg CO_2 eq./kg live weight at farm gate. Strategic focus areas were identified for further enhancement including: improving feed quality and feed production, increasing grassland acres and enhancing manure management. The importance of rangelands and their ability to sequester carbon was emphasized by many members and should not be overlooked for their ability to offset GHG emissions. Food waste was also identified as an area for potential GHG footprint reductions; this is covered in the food waste focus area.

Concern was raised that misinformation is being communicated to the public regarding the GHG footprint of Canadian beef production; furthermore, the complexity of the entire system, including carbon sequestration in grasslands, is being overlooked. Support to enhance the general public understanding of the Canadian beef production system was emphasized.

Goal #2. Reduce the greenhouse gas footprint of Canadian beef per unit of product produced (CO_2 eq./kg)	
Key performance indicator(s)	**Baseline**
Carbon footprint intensity of Canadian beef (CO_2 eq./kg; carbon dioxide equivalents per kilogram)	11.4 kg CO_2 eq./kg live weight (LK) at the farm gate; OR 30.8 kg CO_2 eq./kg packed boneless beef (delivered and consumed) (CRSB, 2016a)
Performance Indicators	**Baseline**
Reproductive efficiency as represented by number of calves weaned per 100 cows wintered (including survival rate) and conception rate	90% (calves under 1 year old as a percent of beef and dairy cows on July 1, 2013) (Statistics Canada, No date)

Conception rate for all females was 92.8% in 2013, compared to 95.6% in AB in 1998. (WBDC, 2014) |
| Feed efficiency (Average Daily Gain/Dry Matter Intake) | Canadian average for calf-fed and yearling-fed system 0.16 (kg LW/kg Dry Matter (DM)) (East) and 0.14 kg LW/kg DM (West) (CRSB, 2016a) |

Action Items – Climate change

1. **Optimize diets**
   a. Enhance understanding of rations, feed additives and technologies that minimize enteric and manure related emissions
   b. Encourage uptake of rations that minimize enteric and manure related emissions
2. **Improve manure management**
   a. Support the further development and uptake of manure management and handling systems which minimize nutrient emission to air and leaching during storage
3. **Increase carbon sequestration**
   a. Maintain or increase rangeland acres
   b. Enhance understanding of rangeland management practices that measure, monitor and increase carbon stock and sequestration
4. **Improve feed and forage production**
   a. Support the promotion of best management practices that reduce the GHG footprint of feed production (e.g. the 4Rs of nutrient stewardship)
5. **Support the identification and selection of cattle genetics that reduce the GHG footprint of beef production**
6. **Increase stakeholder knowledge**
   a. Support stakeholders' understanding of the beef industry's greenhouse gas footprint and sequestration

2.3 Land Use

Raising beef cattle to produce meat has a direct land use footprint in terms of land occupation, mainly linked to feed production and pasture grazing. Beef cattle production is currently using approximately one third of the Canadian agricultural land, with a significant portion of that being in Western Canada.

Lands used for grazing are often not suitable for supporting annual crop production. When considering only hay and grain feed, beef cattle production uses about 8.6% of agricultural land[1]. The area used for beef cattle production encompasses various ecosystems, which depending on management, may be positively or negatively impacted by agricultural practices in relation to three main themes: biodiversity, water risk, and carbon soil sequestration.

Goal #3: Enhance ecosystem services and biodiversity on lands managed by beef producers	
Key Performance Indicator(s)	**Baseline**
Area of native/tame grassland utilized by the beef industry	The beef industry utilizes 21.2 million hectares (Mha) or 33% of the 64.5 million hectares of agricultural land in Canada (CRSB, 2016a) • 5 Mha of tame or seeded land for pasture and 13 Mha of native grassland (CRSB, 2016a)
Estimated soil carbon stock on land used for beef production, including crop, forage and pasture (tonnes of carbon)	Land used for beef cattle production currently stores approximately 1.5 billion tonnes of carbon (CRSB, 2016a)
Performance Indicator	**Baseline**
Number of beef producers with an Environmental Farm Plan (EFP)	33% of Canadian beef farms had a formal EFP in 2011 representing 39% of total beef production (Statistics Canada, No date) • 54% of respondents in the S-LCA have an EFP that has been reviewed by a third party, 16% of respondents have an EFP that is not reviewed by a third party (ibid)

Focus area – Land Use
1. Support work that enhances habitat quality on beef operations 2. Enable enhanced collaboration between industry and conservation partners to position industry as a key conservation stakeholder 3. Support research that increases the understanding of the relationship between beef production and biodiversity 4. Support the creation of ecosystem services markets and the development and dissemination of tools that monitor and measure environmental deliverables from the beef system 5. Build further awareness and use of range and riparian health assessments by producers

2.4 Water

To produce 1 kg of packed boneless beef (delivered and consumed), it takes 631 litres of blue water (surface and groundwater). This value accounts for blue water consumption from the farming stage through to consumption. When considering just the famring stage, it takes 235 litres of blue water per kg of live weight. In comparison to global beef production the Canadian industry has a relatively low blue water footprint. This is primarily due to the limited amount of irrigation for feed, as well as the presence of highly efficient production systems. Main discussions regarding areas for improvement related to water management focused on: further dissemination and uptake of best practices around riparian health; halting the loss of wetlands on the agricultural landscape; further understanding the role

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[1] See figure 3-4 and 3-5 p93 and p94 respectively in the NBSA, Land Use

of grasslands in water cycles; and innovation that can drive further efficiencies in water use at the processing and packaging levels.

Goal #4: Enhance riparian health and reduce the water footprint of beef production	
Key Performance Indicators	**Baseline**
Blue water footprint intensity	235 litres of blue water per kg live weight; OR 631 litres of blue water per kg of packed boneless beef (delivered and consumed) (CRSB, 2016a)
Performance Indicators	**Baseline**
Yields of barley, corn and forages	Barley 1.3 tonnes/acre OR 45.9 bushels/acre (2004-2014 average) Hay 1.65 tonnes/acre (2004-2014 average) Corn 3.7 tonnes/acre OR 146.7 bushels/acre (2009-2014 average) (CRSB, 2016a)
Irrigation levels in Canada for field crops and hay	Field Crops Percentage of area dedicated to beef being irrigated: 3.1% Irrigation Intensity: 2800 m^3/ha (metres cubed per hectare) (CRSB, 2016a) Hay Percentage of area dedicated to beef being irrigated: 3.4% Irrigation intensity: 3100 m^3/ha (CRSB, 2016a)

Action Items – Water
1. Enhance producer riparian health knowledge and tools to improve riparian health
2. Encourage the enhancement and completion of the national wetland inventory and further measure the relationship between beef production and wetland conservation (to be utilized as a key performance indicator when available)
3. Support research that increases the understanding of the relationship between beef production and water, particularly in the higher risk watersheds across Canada
4. Support innovation that increases water use efficiency within the processing and packaging sectors
5. Improve feed yields/productivity, drought resistance and irrigation practices to reduce the blue water footprint of feed
6. Develop a key performance indicator for riparian health

2.5 Food Waste

Meat loss during upstream production stages (animal mortality on farm, during transportation and animal condemnations at packing plant, etc.) is minimal in Canada. However, meat waste occurring downstream has significant potential for improvement. It is estimated that avoiding post-harvest meat waste by 50% would result in savings of up to 3 kg CO_2 eq. (kilograms of carbon dioxide equivalent) and 60 litres of water per kg of raw boneless beef.

It should be noted that the data used in the NBSA regarding food waste are not representative solely of beef nor of Canada, but rather of meat from North America and Oceania. An in-depth study on the subject specific to the Canadian context would enhance understanding and identify opportunities for improvement.

Related to meat waste is carcass quality and utilization. Concern was raised regarding inefficient use of natural resources to produce the subcutaneous fat found on Yield Grade (YG) 3 carcasses versus YG 1 carcasses. Reduction in YG 3 cattle in Canada would reduce labour required for trimming and use of natural resources. Other areas identified included consumer knowledge, enhancing understanding of post-harvest waste in Canada, and improving packaging.

Goal #5: Reduce post-harvest meat waste	
Key Performance Indicator(s)	**Benchmark**
Overall meat waste (% of edible bone free meat)	Total post-harvest losses equals 19% (CRSB, 2016a) ○ 5% at processing ○ 4% at retail ○ 10% at consumer level
Sub-Goal: Improve carcass quality and utilization	
Performance Indicator(s)	**Benchmark**
Fed cattle liver categories	Human consumption 68.9%, Condemned 23.1%, Pet food 8% (NBQA, 2013)
Bruising	85.7% of non-fed and 34% of fed cattle had bruises. Of the bruises observed in fed cattle in the 2010/11 audit, 72.3% were minor, 23.9% were major and 3.8% were critical (NBQA, 2013)
Condemned carcasses	0.25% of all carcasses processed were condemned (NBQA, 2013)
Percent of Yield Grade 1	Fed cattle with A grades: Yield Grade 1 (YG1) – 51.3%; YG2 – 32.3%; and YG3 – 16.6% (Canfax, 2013)
Quantity of Specified Risk Material (SRM) removed (kg)	Under thirty months (UTM), 5.9 kg/head and over thirty months (OTM), 58 kg/head (CMC, 2009)

Action Items – Food Waste and Carcass Utilization

1. **Reduce food waste at consumer level**
   a. Support consumer education / awareness by joining trans-sectorial initiatives that target consumers, retailers, restaurants, etc.
   b. Develop consumer education material on food preparations, freezing, preservation, etc.
2. **Further enhance understanding of food waste specific to Canada and pertinent markets**
   a. Support analysis of food waste specific to Canada and the main markets where Canadian beef is being consumed
3. **Promote improved product packaging**
   a. Promote research and adoption of packaging that enhances product life and reduces food waste
   b. Enable dialogue regarding how package messaging can enable less food waste (e.g. replace 'best before' with 'use by' or 'freeze by' dates)
4. **Improve carcass quality and utilization**
   a. Support the National Beef Quality Audit and uptake of results
   b. Reduce the proportion of carcasses that are Yield Grade 3 by increasing the proportion of carcasses that are Yield Grade 1 and AAA or prime through the use of genetics and feed
   c. Support dialogue regarding Specified Risk Material (SRM) regulations in regards to reducing waste at the packing plant

3.0 Social

Along with the economic and environmental aspects, social parameters are a key component of a product's sustainability. Social sustainability aims to assess the processes and practices that promote the well-being of stakeholders, including workers and local communities, as well as animals.

The social life cycle assessment (S-LCA) conducted provides a baseline of industry hotspots[2] pertaining to working conditions, temporary foreign workers, regulations and animal welfare. In terms of animal welfare, the results show overall low risks, however it is a priority of the CRSB that animal welfare remain a high priority for the industry in order to support the continuation of good practices as well as the continual advancement of animal care excellence through the development of new protocols and/or products (e.g. pain control).

In addition, through the CRSB discussion at the semi-annual meeting, antimicrobial stewardship was identified as a high priority area of focus for the industry. Actions and KPIs (Key Performance Indicator) have been identified in order to ensure responsible use and the continued monitoring of antimicrobial use and resistance. Communication to the public was also seen as imperative to ensure responsible antimicrobial use remains a tool that supports animal health and welfare.

For the social component of the strategy, three overarching goals have been selected: the promotion of responsible working conditions throughout the industry, the continuous improvement of animal welfare, and the continued support of responsible use and robust monitoring of antimicrobials.

3.1 Working Conditions

The S-LCA has revealed four social hotspots along the Canadian beef production value chain that were directly linked to working conditions. These include the rights of temporary foreign workers at the national level, the fatality rate at the suppliers' level, the wage of workers at the distribution level, and finally, the work load at the beef producers' level. Monitoring of working conditions therefore appears as a priority for the industry. CRSB as a consortium of companies and organizations has a role to play in this process by promoting a culture of responsible practices and transparency. In the S-LCA, farm safety was not identified as a high risk area, however at the CRSB semi-annual meeting, discussion led to this area being identified as a key focus area for continuous improvement.

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[2] Hotspots: Impacts showing, after analysis, a particularly high risk for one or more of the Canadian beef industry's stakeholders.

Goal #6: Promote farm safety and responsible working conditions	
Key Performance Indicator(s)	**Baseline**
Percentage of farms reporting injuries	The agricultural fatality rate was 12.9 per 100,000 farm population (including non-workers) between 1990-2008 (CAIR, 2011) • From 1990 to 2008, there were 1,975 agricultural fatalities in Canada. An average of 104 deaths each year. The peak year for fatalities was 1994, with 140 cases (7% of the total number of cases). During the first 10 years of the surveillance period there was an average of 118 fatalities each year. During the last 9 years the average number of fatalities dropped to 89 each year (CAIR, 2011) • Agriculture ranks as Canada's third most hazardous industry. Agricultural machines were 70.9% and animal related were 6.5% of fatalities. Many of these injury incidents are preventable (CAIR, 2011)
Performance Indicators	**Baseline**
Implementation of farm safety plans	9% of farms in Canada have a written farm safety plan (CASA, 2011)
Workload for farmers and ranchers[3]	High risk category: 54% of respondents exceed a 48 hour work week for more than 13 weeks of the year (CRSB, 2016a)
Rights of migrant workers[4]. Assessment of the extent to which migrant workers' rights are respected by the state in terms of non-discrimination, human rights, employment and living/working conditions.	High risk category: Canada has not signed, nor ratified the International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families (CRSB, 2016a)
Rates of fatal and non-fatal injuries for upstream value chain actors[5]	High risk category: The sectors of the following products supplied by upstream value chain actors have a fatal injury rate above the country average, 2.7 per 100,000 employees: seeds, grains, fertilizers, feed, salt and mineral. However, their non-fatal injury rate is below the country average (non-fatal country average is 1522 per 100,000 employees) (ILO, 2008) At the downstream level, the fast-food chain sector has both fatal and non-fatal injury rates below the country average. Sectors of veterinary products and retailers both have a fatal injury rate below the country average, but a non-fatal injury rate above the country average (CRSB, 2016a)
Median income for downstream	High risk category: At the downstream level, fast-food chains

[3] Comparison of workers' practices with the ILO standard (48 hours/week) over a three month period, which was considered to be the length of a peak season for this study and which was used in the Canadian dairy study (DFC, 2012).
[4] Country status (convention signed and ratified) regarding the International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families (United Nations Human Rights, 2015).
[5] Comparison of 1) the sector rate of injuries (per 100,000 workers employed in 2008), and 2) the country average rate of injury (in 2008) (ILO, 2008).

value chain actors[6]	show the lowest score, median wages and salaries are < 50% of the national median wages and salaries. The national median wages and salaries for 2010, used as the reference point for the assessment, was $48,964. *Note: this indicator is based on sector average ranking, not on companies' specific data.* (CRSB, 2016a)

Action Items – Farm safety and responsible working conditions

1. Promote farm safety awareness and best practice implementation
   a. Support of farm safety capacity through knowledge sharing
   b. Support development of farm safety plans on beef operations
   c. Build awareness of work load implications on farm safety and support solutions-oriented dialogue
2. Support dialogues regarding safety from upstream value chain members, rights of migrant workers and adequacy of median income for downstream value chain actors
3. Promote culture of diversity, inclusion and transparency within the beef supply chain

3.2 Animal Care

Animal care is a priority for all stakeholders involved in the livestock industry. The S-LCA showed low risk for animal care indicators which is reflective of the Canadian beef industry's significant past investment in this area. Of particular note is the 2013 release of the Canadian Code of Practice for the Care and Handling of Beef Cattle. Through the development of the Code, an important step forward has been made to set the stage for continual improvement in animal welfare in Canada. Further commitment has been shown through the development of programs such as the Feedlot Animal Care Assessment Tool and the addition of an animal care module to the Verified Beef Production Plus (VBP+) program. CRSB membership emphasized the desire to continue leadership in animal care practices. Two focus areas included the support of the uptake of the Code as well as well as investment in research and innovation regarding better pain control protocols and products.

While there is a low risk within the industry, current public concern in this area would indicate there is a gap between existing practices and consumer awareness of beef production practices.

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[6] Comparison between 1) the sector median wages and salaries, and 2) the national median wages and salaries established by Statistics Canada (No date).

Goal #7: Promote excellence in animal care	
Key Performance Indicator(s)	**Baseline**
Uptake and implementation of the Code of Practice for the Care and Handling of Beef Cattle	5% of beef producers who filled in the NBSA-SLCA survey have read the Code of Practice and both basic requirements and some or all of the recommended practices are implemented on their operations. 57% of respondents have read the Code of Practice and implemented all of the basic requirements. 24% have read the Code and basic requirements are partially implemented. 14% have not read the Code of Practice (CRSB, 2016a)
Performance Indicator(s)	**Baseline**
Polled Genetics	76% (WBDC, 2014)
Disbud as early as possible, prior to the bud stage (2-3 months of age). Percentage using pain control	43% dehorn shortly after birth, 38% at spring processing, 20% who dehorn after 3 months of age (WBDC, 2014) 9% used pain control (WBDC, 2014)
Use pain control when castrating after 6-9 months of age. Percentage using pain control	64% castrate shortly after birth, 30% at spring processing, leaving 6% who castrate after 3 months of age (WBDC, 2014) 4.2% used pain control (WBDC, 2014)
Adoption of low stress weaning methods	70% used traditional weaning, leaving 30% of calves using low-stress methods, 9% preconditioned (30-60 days) (WBDC, 2014)

Action Items – Animal Care
1. Promote animal care awareness and implementation of good practices through the dissemination of the Beef Code of Practice
2. Support training for animal transportation
3. Support research and innovation regarding pain control protocols and products
4. Communicate importance of adopting pain control protocols and products
5. Investigate opportunities to alter branding requirements for older animals (CAN brand and feedlot branding)

3.3 Antimicrobials

The use of antimicrobials (whether in livestock, companion animal, or human medicine) increases the risk of antimicrobial resistance. Although the majority of antimicrobials that are used in Canadian beef production are of low importance in human health (category IV, which are not used in human medicine), the industry recognizes the importance of antimicrobial stewardship both for continued effective use and consumer concerns. Several programs and practices have been implemented to address this important societal issue, such as the Verified Beef Production Plus (VBP+) program, which focuses on appropriate and responsible use of antimicrobials as well as maintaining a veterinarian and client-patient relationship.

The National Beef Antimicrobial Research Strategy, published in May 2016 by the Beef Cattle Research Council, identifies priority research outcomes for the Canadian beef industry focused on three areas: antimicrobial resistance, antimicrobial use and antimicrobial alternatives. The CRSB will monitor the

associated research activities to inform its stakeholders of scientific advances in the field and continue building awareness around antimicrobials.

Goal #8: Support the further development, monitoring and dissemination of best practices regarding antimicrobial use	
Key Performance Indicator(s)	**Baseline**
The proportion (%) of isolates in beef cattle resistant to Category I (Very High Importance in human medicine)	The proportion (%) of isolates resistant to Ciprofloxacin equals 5%. The proportion (%) of isolates resistant to Ceftiofur equals 0% (Government of Canada, 2015)[7]
The proportion (%) of isolates in retail beef resistant to Category I (Very High Importance in human medicine)	Resistance levels of category I β-lactams (amoxicillin-clavulanic acid, ceftriaxone, and ceftiofur) remained low (< 4%) in beef *E. coli* isolates in 2013 with the exception of British Columbia where category I β-lactam resistance ranged between 6% (amoxicillin-clavulanic acid) and 9% (ceftriaxone and ceftiofur) (Government of Canada, 2015)[8]
Performance Indicator(s)	**Baseline**
Number of operations on Verified Beef Production (VBP) (Note: future benchmarking will change the PI to measure number of operations on VBP+, which was launched in 2016, in addition will add a PI the number of operations on the newly launched Feedlot Animal Care Assessment Tool)	19,636 beef operations across Canada have participated in VBP training while 1,124 have been verified (VBP, 2015)

Action Items – Antimicrobials
1. Support the development of a database for robust measuring and monitoring of antimicrobial use and resistance, aligned with the National Beef Antimicrobial Research Strategy 2. Support the further development and dissemination of best practices regarding antimicrobial use 3. Develop responsible antimicrobial use guidelines for verified sustainable beef   a. Communicate the importance of alternate production practices and treatment protocols that reduce the use of antimicrobials 4. Support consumer understanding of the importance of responsible use of antimicrobials in the beef industry to ensure animal care

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[7] Figure 15 (Government of Canada, 2015)
[8] Table 9 (Government of Canada, 2015)

4.0 Economic

If producers are unprofitable for extended periods, they will stop producing beef. In order for Canadian beef production to be economically sustainable in the long run, there must be both sustained consumer demand for the product and positive margins for producers to encourage continued production.

Continuous improvement requires the ability to constantly adapt to the market conditions in which a producer operates. Higher input costs may require not just productivity improvements, but changes in marketing practices to ensure the type of product demanded is the product supplied. Failure to respond to changing consumer preferences can result in a shrinking market share and reduced consumption.

Market prices of both inputs and outputs are outside of the control or influence of the beef producer and the CRSB membership. The CRSB has the ability to connect producers with consumers, supporting and encouraging the beef industry to respond quickly and efficiently to consumer trends.

The economic pillar is comprised of two areas of focus: producer viability and consumer resilience.

4.1 Producer Viability

Producer viability is the financial ability and incentive for a producer to continue producing a product. An economically sustainable Canadian beef operation is characterized by the ability to: at least return the cost of capital; fund all operating expenses via internal working capital; pay laborers and owners at least the average standard wage; have capacity to repay debt principle; maintain a safe level of equity (e.g., 85%); provide capacity for independent retirement of owners; survive business succession with the family structure intact; and survive and prosper in the long-term without the erosion of environmental capital.

Investment in the cattle industry is long-term; it is a small margin business with long-term profitability near breakeven. Producers face price and weather risks, and must therefore plan carefully to avoid disastrous outcomes.

Goal #9: Increase the financial viability of beef production in Canada	
Key Performance Indicator(s)	**Baseline**
Long term Cost of Production (2005-14 avg)	2013 Baseline (deflated) • Cow/calf $120/one hundred pounds (cwt) or $264/one hundred kilograms (ckg) • Feedlot $106.67/cwt or $235/ckg (CRSB, 2016b)
Long term Profitability (2005-14 avg)	2013 Baseline (deflated) • Cow/calf $93.03/cow[9] • Feedlot -$0.09/cwt (cash) or -$0.20/ckg (CRSB, 2016b)
Performance Indicator(s)	**Baseline**
% of producers with off farm income	75-84% over the last decade (2003-13) (CRSB, 2016b)

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[9] Includes opportunity cost for unpaid labour

Action Items – Producer viability

1. Increase producer financial knowledge and viability
   a. Create awareness of existing data and tools available that assist in prudent financial decision making and management
      i. Support the development and dissemination of risk management tools
      ii. Support the uptake and development of tools that enable assessment of cost of production[10]
   b. Support producer continuing education that increases knowledge regarding financial management
2. Increase production efficiency and innovation
   a. Encourage management practice changes and development that reduce per unit cost of production and increase sustainability
3. Communicate the role of technology and innovation in relation to the environmental, social and economic benefits to the beef industry

4.2 Consumer Resilience

The beef industry must be able to identify and respond to shifts in consumer preferences; adapting to changing market conditions. This includes identifying fads that have become trends and ensuring the systems are set up to respond to those consumer demands.

Long-term trends, medium-term perceptions, and short-term market impacts were assessed in determining consumer demand of Canadian beef. Long-term trends include a growing middle class and shifting consumer demographics with more urbanization. Medium-term perceptions are impacted by food awareness, including perceptions of food safety, beef quality, nutrition, and healthfulness of beef. Short-term shifts may be due to prices and availability of substitute protein options.

Goal #10: Increase demand for Canadian beef through consumer awareness of sustainable beef production	
Key Performance Indicator(s)	**Baseline**
Canadian Retail Beef Demand	2013 baseline: 104 (Index 2000=100) (CRSB, 2016b)
International Demand	2013 baseline: 82 (Index 2000=100) (CRSB, 2016b)
Performance Indicator(s)	**Baseline**
Market Share by Volume (total Canadian consumption) Market Share by Value (Canadian, deflated expenditures)	2013 baseline: beef (33.7%), pork (25.7%) and chicken (40.6%). 2013 baseline: beef (42.7%), pork (23.1%) and chicken (34.1%). Beef remains the largest according to value (deflated expenditures) and has been flat around 42% since 1996.

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[10] An example could be developing the WBDC excel tool into an online tool that has a monitoring component between years

Action Items – Consumer resilience

1. Increase the capacity of the beef supply chain to respond to market demands
   a. Support dialogue, information sharing and alignment between production, marketing and demand, particularly regarding hot topic issues (e.g. hormone use)
   b. Develop a sustainable beef verification framework/infrastructure, including chain of custody, that is economically viable for the entire beef supply chain
   c. Enable the demand for niche products to be met in a positive way that supports consumer choice and sustainable beef production
2. Support the critical examination of newly developed technologies within a sustainable beef framework
3. Support responsible communication and marketing of production practices that are of interest and concern to the consumer
   a. Build systems to respond to and engage with current membership and groups outside of the current membership
   b. Develop a code of conduct for the CRSB membership that supports positive positioning versus negative positioning of beef products

5.0 Conclusion

The NBSA identified benchmarks for the Canadian beef industry concerning numerous facets of sustainability. Through robust discussion and analysis of the NBSA, the CRSB membership set performance indicators and action items for future work as outlined in the above strategy. It should be recognized that this is the first step in developing a complete approach to advancing initiatives that will further enhance the sustainability of the Canadian beef industry. Future work for the CRSB will include the continual refinement of the goals and strategies and implementation of actions that will advance the journey of sustainability within the Canadian beef industry.

6.0 Appendix 1. Summary of Goals, Key Performance Indicators and Action Items

Summary of goals	Key Performance Indicators	Baseline	Action Items
Goal #1: Build a stronger and more united Canadian beef sustainability community	• Number of CRSB Members & Observers • Diversity of CRSB membership	As of June 30th, 2016 the CRSB had 53 members and 40 observers Retail & Food Service = 10, Producer/Processor Organizations = 17, Processors = 2, NGO = 13, Food & Agriculture Business = 11, Government Observers = 12, Producer Observers = 17, Academic Observers = 9, Youth Observers = 2	1. Build a trusted go-to forum on sustainable beef in Canada through diversity in membership, leading scientific information and robust frameworks to measure and advance sustainability 2. Enable the further engagement of the scientific community in the CRSB's work and membership 3. Through communications activities engage, inform and enable information sharing that assists the Canada beef industry in advancing sustainability practices
Goal #2: Reduce the Greenhouse Gas Footprint of Canadian Beef per unit of product produced (CO_2 eq./kg)	Carbon footprint intensity of Canadian beef (CO_2 eq./kg)	• 11.4 kg of CO_2 eq./kg live weight (LW); • 30.8 kg of CO_2 eq./kg packed boneless beef (delivered and consumed) (CRSB, 2016a)	1. Optimize diets 2. Improve manure management 3. Increase carbon sequestration 4. Improve feed and forage production 5. Support the identification and selection of cattle genetics that reduce the GHG footprint of beef production 6. Increase stakeholder knowledge
Goal #3: Enhance ecosystem services and biodiversity on lands managed by beef producers	Area of native/tame grassland utilized by the beef industry Estimated soil carbon stock on land used for beef production, including crop, forage and pasture (tonnes of carbon)	The beef industry utilizes 21.2 million hectares or 33% of the 64.5 million hectares of agricultural land in Canada. (CRSB, 2016a) • 5 Mha of tame or seeded land for pasture and 13 Mha of native grassland Land used for beef cattle production currently stores approximately 1.5 billion million tonnes of carbon (CRSB, 2016a)	1. Support work that enhances habitat quality on beef operations 2. Enable enhanced collaboration between industry and conservation partners to position industry as a key conservation stakeholder 3. Support research that increases the understanding of the relationship between beef production and biodiversity 4. Support the creation of ecosystem services markets and the development and dissemination of tools that monitor and measure environmental deliverables from the beef system 5. Build further awareness and use of range and riparian health assessments by producers

Goal #4: Enhance riparian health and reduce the water footprint of beef production	Blue water footprint intensity	• 235 litres of blue water to produce one kg of live weight; • 631 litres of blue water to produce one kg of packed boneless beef (delivered and consumed) (CRSB, 2016a)	1. Enhance producer riparian health knowledge and tools to improve riparian health 2. Encourage the enhancement and completion of the national wetland inventory and further measure the relationship between beef production and wetland conservation (to be utilized as a key performance indicator when available) 3. Support research that increases the understanding of the relationship between beef production and water, particularly in the higher risk watersheds across Canada 4. Support innovation that increases water use efficiency within the processing and packaging sectors 5. Improve feed yields/productivity, drought resistance and irrigation practices to reduce the blue water footprint of feed 6. Develop a key performance indicator for riparian health

Goal #5: Reduce post-harvest meat waste	Overall meat waste (% of edible bone free meat)	Total post-harvest losses equals 19% (CRSB, 2016a)
		   o 5% at processing
		   o 4% at retail
		   o 10% at consumer level
			1. Reduce food waste at consumer level
			2. Further enhance understanding of food waste specific to Canada and pertinent markets
			3. Promote improved product packaging
			4. Improve carcass quality and utilization

Goal #6: Promote farm safety and responsible working conditions	Percentage of farms reporting injuries	The agricultural fatality rate was 12.9 per 100,000 farm population (including non-workers) between 1990-2008 (CAIR, 2011)	1. Promote farm safety awareness and best practice implementation 2. Support dialogues regarding safety from upstream value chain actors, rights of migrant workers and adequacy of median income for downstream value chain actors 3. Promote culture of diversity, inclusion and transparency within the beef supply chain
Goal #7: Promote excellence in animal care	Uptake and implementation of the Code of Practice for the Care and Handling of Beef Cattle	5% of beef producers who filled in the NBSA-SLCA survey have read the Code of practice and both basic requirements and some or all of the recommended practices are implemented on their operations. 57% of respondents have read the code of practice and implemented all of the basic requirements. 24% have read the Code and basic requirements are partially	1. Promote animal care awareness and implementation of good practices through the dissemination of the Beef Code of Practice 2. Support training for animal transportation 3. Support research and innovation regarding pain control protocols and products 4. Communicate importance of adopting pain control protocols and products 5. Investigate opportunities to alter branding requirements for older animals (CAN brand and feedlot branding)

		implemented, 14% have not read the Code of practice (CRSB, 2016a)	
Goal #8: Support the further development, monitoring and dissemination of best practices regarding antimicrobial use	The proportion (%) of isolates in beef cattle resistant to Category I (Very High Importance in human medicine) The proportion (%) of isolates in retail beef resistant to Category I (Very High Importance in human medicine)	The proportion (%) of isolates resistant to Ciprofloxacin equals 5%. The proportion (%) of isolates resistant to Ceftiofur equals 0% (Government of Canada, 2015) Resistance levels of category I β-lactams (amoxicillin-clavulanic acid, ceftriaxone, and ceftiofur) remained low (< 4%) in beef *E. coli* isolates in 2013 with the exception of British Columbia where category I β-lactam resistance ranged between 6% (amoxicillin-clavulanic acid) and 9% (ceftriaxone and ceftiofur) (Government of Canada, 2015)	1. Support the development of a database for robust measuring and monitoring of antimicrobial use and resistance, aligned with the National Beef Antimicrobial Research Strategy 2. Support the further development and dissemination of best practices regarding antimicrobial use 3. Develop responsible antimicrobial use guidelines for verified sustainable beef 4. Support consumer understanding of the importance of responsible use of antimicrobials in the beef industry to ensure animal care
Goal #9: Increase the financial viability of beef production in Canada	Long term Cost of Production (2005-14 avg) Long term Profitability (2005-14 avg)	2013 baseline (deflated) • Cow/calf $120/one hundred pounds (cwt) or $264/one hundred kilograms (ckg) • Feedlot $106.67/cwt or $235/ckg 2013 baseline (deflated) • Cow/calf $93.03/cow[11] • Feedlot -$0.09/cwt (cash) or -$0.20/ckg (CRSB, 2016b)	1. Increase producer financial knowledge and viability 2. Increase production efficiency and innovation 3. Communicate the role of technology and innovation in relation to the environmental, social and economic benefits to the beef industry

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[11] Includes opportunity cost for unpaid labour

Goal #10: Increase demand for Canadian beef through consumer awareness of sustainable beef production	Canadian Retail Beef Demand	2013 baseline: 104 (Index 2000=100) (CRSB, 2016b)	1. Increase the capacity of the beef supply chain to respond to market demands
			2. Support the critical examination of newly developed technologies within a sustainable beef framework
	International Demand	2013 baseline: 82 (Index 2000=100) (CRSB, 2016b)	3. Support responsible communication and marketing of production practices that are of interest and concern to the consumer

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