Executive Summary

The Alberta Beef Forage and Grazing Centre (ABFGC or the Centre), while still a fairly new initiative, has garnered a large amount of industry support, as well as engagement from key stakeholders including federal and provincial governments, academic institutions and applied research associations. While challenges remain on how best to integrate activities taking place outside of the main hub at the Lacombe Research and Development Centre under the umbrella of the ABFGC, many of these activities are captured through current collaborations by research scientists or funding awarded by the three signatory organizations.

The momentum of the Centre is growing, with word of mouth awareness, key research and knowledge translation and transfer (KTT) activities, an engaged industry advisory board and management committee, and strong commitment from all stakeholders.

It is important that the activities of the Centre reflect the strategic plan and goal development, recognizing the long-term nature of those goals. Granted, it can be difficult to assess progress against goals with a substantial time horizon (in this case 15-20 years), however; the research and KTT activities both in progress and completed demonstrate the commitment of personnel and organizations involved with the Centre towards achieving those long-term goals.

The Centre has six strategic, long-term goals as follows:

1. Reduce winter feeding costs by 50%
   - Supported by eighteen research and extension projects, investigations into best management practices for low-cost extended grazing systems, higher energy forages, and variety evaluation will assist in decreasing winter feeding costs for producers. Success stories include the development of sainfoin and alfalfa germplasm with higher oil (energy content) in vegetative tissues, confirmation that bale grazing improves forage production in subsequent years, and that forage quality during winter and differences in resistance to weathering loss are important factors affecting cow weight and BCS during winter that are influenced by variety choice.

2. Reduce the environmental footprint of the cowherd by 15%
   - Supported by ten research and extension projects, determining the factors related to decreased methane production and improving nutrient management practices will help beef producers decrease their environmental footprint. A success story quantified the mitigation potential of low-RFI cattle under conditions representative of the Alberta beef herd, and concluded that genetic selection for low RFI\textsubscript{fat} will result in cattle with lower feed intake at the same level of production, and reduced daily CH\textsubscript{4} and CO\textsubscript{2} emissions compared with high RFI\textsubscript{fat} cattle.

3. Improve cow efficiency by 15%
Supported by eleven research and extension projects, elucidating the factors contributing to differences between animals in feed efficiency, the interactions between feed efficiency and feed stuffs, as well as ways to improve the feed efficiency of the mature cow herd will not only improve producers’ bottom lines, but also contribute to reducing the environmental footprint of beef production. Success stories include: Predicted breed composition of crossbred cattle using genomics being used to help quantify the value of retained heterozygosity (RH) of commercial crossbred cattle, and a foundational paper in genomic based heterosis and cow lifetime productivity.

4. Reduce backgrounding costs by 50%
   Supported by eighteen research and extension projects, incorporation of new or better adapted forage varieties, higher energy feedstuffs, and better grazing management will improve the performance of backgrounded cattle while decreasing costs. A preliminary success story involving early results indicates genomic prediction of RFI is imprecise, that there was no interaction between observed cattle efficiency type and diet quality, and that a 30-40% improvement can be made in feed conversion (vs. the ABFGC benchmark of 11:1 for a forage based diet) through silage variety selection and least cost of gain optimized diet formulation.

5. Improve late summer/fall pasture productivity by 30%
   Supported by fifteen research and extension projects, developing forage varieties and management practices to improve to mitigate the decline in forage yield and quality in late summer and fall will reduce overall cost of production and help to ensure the nutritional requirements of cows are met year-round. A preliminary success story has identified alfalfa material thorough physiological testing that has less dormancy and is higher yielding in the fall than the falcata type alfalfa that may survive in northern prairie conditions.

6. Build and maintain research and extension capacity
   Supported by all of the activities and projects of the Centre, this key goal underpins all of the other goals. Without adequate research and extension capacity, this entire initiative, the strategic goals, and the progress made to date is lost, and unlikely to be recovered. The activities of the Rancher Researcher Pilot are progressing very well, and the new “Advancing knowledge translation and transfer to support sustainable livestock and forage production systems” (KTT project) workplan is evolving with some very exciting ideas for activities, resources and opportunities for collaboration across multiple institutions.
Background

The concept for the Alberta Beef, Forage and Grazing Centre arose from concerns expressed to the Alberta Minister of Agriculture and Rural Development by individual beef producers and forage/beef interest groups about a lack of essential applied forage research and extension available to beef producers in Alberta. A research-extension group called the Western Forage Beef Group had operated as a federal-provincial organization out of the Lacombe Research Station, from 1995 to 2005, and had a focused approach to these issues. The concerns and inquiries expressed the necessity for a similar group to address current industry issues. Subsequently, focus groups were organized and carried out by a third party, which confirmed the interest and the need for a renewed research and extension effort in the forage-beef area. This led to the formation of a steering committee in the summer of 2011, with representatives from ARD, AAFC, University of Alberta (U of A), Alberta Beef Producers (ABP), Beef Cattle Research Council (BCRC), Agricultural Research and Extension Council of Alberta (ARECA), Alberta Forage Industry Network (AFIN) and the Canadian Forage and Grasslands Association (CFGA). Support for the concept was recognized throughout all levels of industry and government.

In April of 2015, The Alberta Beef, Forage and Grazing Centre became a reality, with a tripartite agreement between Alberta Beef Producers (ABP), Agriculture and Agri-Food Canada (AAFC), and Alberta Agriculture and Forestry (AF). It has the mission of developing and transferring knowledge, innovative processes and tools to improve the forage/beef industry.

The Centre utilizes existing AAFC and AF facilities and staff, with a small cash infusion from ABP to assist with core funding and KTT initiatives.

General Centre Activities

- Continued website development
- Industry Advisory Committee membership currently consists of:
  - Arno Doerksen, Gem, AB (cow/calf; finishing)
  - Sean McGrath, Vermilion, AB (cow/calf)
  - Ron Buchanan, Fort St. John, BC (cow/calf)
  - Matthew Gould, Consort, AB (cow/calf, backgrounding, finishing)
  - Stacey Meunier, Barrhead, AB (cow/calf, custom grazing)
  - Assar Grinde, Rimbey, AB (Alberta Beef Producers representative)
  - Christine Fulkerth, Olds, AB (Alberta Forage Industry Network representative)
  - Ken Ziegler (Agricultural Research and Extension Council of Alberta representative)
- The second annual meeting of the Centre was held on February 7, 2018 in Lacombe, with attendance limited to the Industry Advisory Committee and the Management Committee.
Once again, the day included presentations on research and KTT activities supporting the strategic goals with discussion after each section. This was an excellent opportunity for all governance bodies involved with the Centre to engage with each other, and for the Centre to receive strategic direction from industry and management. (Appendix 1 contains those presentations and the minutes from the meeting).

Research Activities

- **“Innovative Swath Grazing/ increasing forage research capacity.”** (PI: Vern Baron); in progress
  - The project supports Goal 1 by investigating management and variety choice options that may reduce the daily cost of overwintering beef cows. The project runs from 2013 to 2018 by the Beef Cluster (BCRC, ABP and AAFC). AAFC, AAF and Grey Wooded Forage Association are the major collaborators.
  - Weathering project: A weathering project, where varieties of several forage species were sampled either standing or in the swath indicated that there was a general trend for loss in forage quality throughout the winter by varieties of oats, barley and triticale. By winter’s end, the forage quality fell below the minimum requirements for beef cows near calving. By contrast corn, either standing or swathed, lost very little nutritive value from fall through winter and forage quality near calving would come close to meeting requirements at late stages of pregnancy. Spring planted winter cereals remained green most of the winter under snow, had the highest fiber digestibility, and could be considered intermediate between the spring cereals and corn. The winter cereals yielded about half that of the spring cereals so the cost per grazing day would be relatively high.
  - Best line: Two barley and two triticale lines were chosen for their common use or potential by using a forage evaluation spreadsheet. Common or forage types were CDC Maverick (smooth awned version of Cowboy) and Bunker triticale. Varieties chosen based on yield and quality attributes were Canmore barley and 94L043057 (94L) triticale. Cow weight and body condition score (BCS) were significantly greater for Canmore than Maverick and for 94L compared to Bunker. During winter weathering, fiber levels increased more per month for Maverick and Bunker than Canmore and 94L. Regression analyses indicated that mean forage quality over winter and change in forage quality explained 69%. 48%, 64%, 69% and 62% of the variability in cow weight off pasture, average daily gain, intake, BCS and backfat thickness, respectively. Prominent factors were percentage forage fiber, fiber digestibility and change in fiber digestibility over winter. Forage quality during winter and differences in resistance to weathering loss are important factors affecting cow weight and BCS during winter and are influenced by variety choice.
- **“Identification of forage potential using a forage evaluation spreadsheet of current and recently registered cereal varieties selected for other purposes.”** (PI Vern Baron and Co-PI Pat Juskiw, 2016-2019); in progress
○ The project supports Goals 1 and 4 by evaluating and ranking potential and new barley, oat and triticale varieties compared to older checks. Initial indications are that some varieties sold as forage types such as CDC Cowboy are inferior for forage quality attributes compared to cultivars such as Champion. Results from the agronomic trial and spreadsheet are verified in swath-grazing trials at Lacombe where cows swath grazing a genetically similar cultivar Maverick have consistently lost more weight than the food-type Canmore.

○ In two years of research, Canmore, FB 473, Gadsby, FB 472, and Champion have ranked highest for swath grazing; Austenson, ACC Synergy, Amisk, FB 021, and FB 022 have ranked lowest for swath grazing. FB 472, FB 476, CDC Austenson, FB 473, and Canmore have ranked highest for backgrounding; FB 021, CDC Cowboy, Lowe, AC Ranger, and TR 13606 have ranked lowest for backgrounding. The entries were also evaluated for milk production using the Milk 2006 spreadsheet to verify or refute the forage evaluation spreadsheet results; FB 472, Champion, FB 476, FB 473, and Canmore ranked highest, while CDC Cowboy, CDC Austenson, ACC Synergy, Gadsby, and FB 022 were lowest. Thus, the evaluation methods were able to identify promising forage varieties, and with an occasional exception the promising ones were recurring. The methods are used in the data provided to the Prairie Recommending Committee for oats and barley and the Western Barley Forage Coop trial.

- “Integration of Forage Quality for Ruminant Nutrition into Western Canadian Cereal Forage Breeding Programs.” (PI: Pat Juskiw); in progress
  ○ This project supports Goals 1 and 4 by evaluating and ranking promising varieties at an early stage of selection during the breeding process for quality. It has been approved for funding, but funds have not yet started to flow. The goal is to integrate the forage nutritional spreadsheet (see above project) developed by Dr. Baron et al. into selection practices for forage oat, barley, wheat and triticale. The spreadsheet allows evaluation to meet the nutritional needs of different classes of beef and dairy cattle.

- “Two-row barley variety development.” (PI: Pat Juskiw); in progress
  ○ The project supports Goals 1 and 4 by development of new forage varieties of two-row barley. The goals are high yields and good agronomic adaptation; good feed and malting quality characteristics desired by the market place and to enhance overall economic returns; good disease resistance to the diseases as set out in the overall FCDC breeding objectives; good tolerance to abiotic stresses such as low nitrogen, water stress, cold stress, and other environmental stresses. Core breeding project at FCDC.

- “Six-row barley variety development.” (PI: Joseph Nyachiw); in progress
  ○ The project supports Goals 1 and 4 by development of six-row hulled feed and forage barley varieties. The objectives of the program are to develop strong strawed, lodging resistant, high performing feed and forage barley types over the whole maturity range, based on our high yielding, semi-dwarf cultivar Vivar,
and early maturing cultivar Kasota, as well as other new sources of improved parental materials; higher forage yield and forage quality equal to or better than AC Ranger; feed and forage barley with higher levels of digestible energy and percent protein digestibility, with a uniform seed size and high percent plump kernels; cultivars, as close as possible to the leading edge of yield-maturity advance, improved stripe rust, scald and net blotch resistance, immunity to loose smut (Run8 gene), resistance to the surface-borne smuts, excellent agronomic sprouting resistance and seed characteristics, and drought tolerance; and maturity as early as Kasota or earlier, and yield equal to or higher than Amisk, Vivar, Sundre, Chigwell and Manny. Core breeding project at FCDC.

- “The Development of Improved Spring Triticale Cultivars.” (PI: M. Aljarrah); in progress
  - The project supports Goals 1 and 4 by developing new varieties of forage spring triticale. The objectives of the program are to develop spring triticale with improved sprouting resistance, lodging resistance, disease resistance, early maturity and seed development via a conventional modified bulk breeding system; with high silage yields; and with high yielding grain. Core breeding project at FCDC.

- “The Development of Improved Cultivars of Winter Triticale (PI: M. Aljarrah); in progress.”
  - The project supports Goals 1, 4 and 5 by development of new varieties of forage winter triticale for fall pasture and silage. The objectives of the program are to develop cultivars with winter hardiness similar to Norstar; disease resistance genes (snow mold, powdery mildew and leaf diseases); short stature; enhanced sprouting resistance; reduced-awn trait; early maturity; and high forage yield. Core breeding project at FCDC.

- “Germplasm and variety development of barley and triticale for animal feed with a focus on feed quality, yield and disease resistance of both grain and annual forage production.” (PI: Flavio Capettini); Completed March 2018
  - The project supports Goals 1, 4 and 5. Over the course of the funding the two-row barley Canmore and the six-row barleys, Amisk and AB Cattilelac, were released plus just supported for registration were a new six-row barley and a new spring triticale. Canmore was the sixth most popular feed variety grown in Alberta in 2017 (Alberta Ag Financial Services Corp), due to in part to its excellent forage qualities and lodging resistance. The project also allowed us to have continued appraisal of FHB resistance at AAFC nurseries, and with the release of Lowe, malting barley, we have shown we are able to select for moderate resistance to the disease with low DON in the grain.

- “Development of a rapid screening method to assess grain processing responses of barley as a trait for the selection of feed varieties for cattle.” (PI: Nyachiro/McAllister, 2017-2020); in progress
The project supports Goals 1,2,4. By incorporating grain processing responses of barley into the selection of feed varieties, there is an opportunity to reduce costs and environmental impacts through improved efficiency. This project complements the recently completed Beef Cluster project led by Flavio Capettini that was focusing on germplasm and variety development of barley and triticale with improved feed quality, yield and disease resistance for both forage and grain production.

- “Determining the critical traits associated with lodging in a set of elite breeding lines and Canadian barley varieties.” (PI: Nyachiro/Capo-chichi, 2018-2021); in progress
  - The project supports Goals 1,4. Higher yielding varieties with good lodging resistance can maintain high grain and forage quality while remaining easy to harvest. Lodging results in crop losses, decreasing yield and is a primary concern for barley producers.

- “Methane emissions from beef cattle bred for low residual feed intake.” (PI: Basarab); Completed in 2017
  - The project supports Goal 2. **Project objectives are to i)** assess the GreenFeed Emissions Monitoring (GEM) system and open-path concentration sensors (e.g., Fourier-transform infrared spectroscopy, FTIR) for their ability to accurately measure enteric methane (CH₄) emissions under on farm grazing and wintering conditions; ii) compare feed intake, CH₄ and carbon dioxide (CO₂) emissions from high and low RFI (residual feed intake) beef heifers and cows under grazing and winter drylot conditions using GEM and respiration chambers; iii) quantify enteric methane emissions, feed intake, RFI and various biometrics in yearling beef heifers and cows during winter in drylot; and iv) quantify enteric methane emissions, feed intake, RFI and various biometrics in pregnant yearling beef heifers during summer grazing

**Key Results:**
- The GEM system functioned well in outdoor drylot environments through four Alberta winters where night time temperature often dropped below -30 °C. It was determined that averaging over 7 to 14 d with minimum of 20 spot samples was needed to produce repeatable and reliable averaged CH₄ and CO₂ emissions (Manafiazar et al. 2016, Can. J. Animal. Sci. 97: 118–126).
- The GEM and respiratory chambers were compared at the Lethbridge Research Centre. It was concluded that, when intake of animals is known, GEM offers a robust and accurate means of measuring CH₄ emissions from animals under field conditions (Aleme et al. 2017, J. Anim. Sci., 95(8):3727-3737).
- The FTIR laser combined with inverse-dispersion micrometeorological techniques and using a narrow paddock design and a robotic motor to aim and rotate the FTIR provided a flexible and accurate method for measuring CH₄ emissions from grazing cattle (Flesch et al. 2017, Agricultural and Forest Meteorology, http://dx.doi.org/10.1016/j.agrformet.2017.10.012).
- Enteric CH₄ emissions from high (inefficient) and low (efficient) RFIₐtₙₜₜₜₜ pregnant heifers were measured using FTIR in six summer grazing trials. In five of six trials,
Conclusions:

- Low RFI\textsubscript{fat} heifers emitted 4-13\% less methane per day as compared with their high RFI\textsubscript{fat} pasture mates. In addition, in two fall swath grazing trials, low RFI\textsubscript{fat} cows emitted 6-9\% less methane per day than high RFI\textsubscript{fat} cows. Low RFI\textsubscript{fat} heifers and cows consumed 7.0\% and 5.2\%, respectively, less forage DM/day as compared with their high RFI\textsubscript{fat} cohorts, and had similar methane yields (g/kg DMI).

- Enteric CH\textsubscript{4} and CO\textsubscript{2} emissions from high and low RFI\textsubscript{fat} heifers and cows were measured in 13 trials using the GEM system. Low RFI\textsubscript{fat} cattle emitted 1.9\% to 9.7\% less methane per day compared with high RFI\textsubscript{fat} cattle in 7 of 8 trials where forage diets (barley or triticale silage) were fed and five of five grazing trials. Low RFI\textsubscript{fat} cattle also emitted 0.6\% to 5.1\% less CO\textsubscript{2} per day compared with high RFI\textsubscript{fat} cattle in 7 of 8 drylot trials and 5 of 5 grazing trials. These results are due to lower feed intake, lower CO\textsubscript{2} from feed fermentation and higher metabolic efficiency in low compared with high RFI\textsubscript{fat} cattle.

- Whole body weight, as measured by a manual weigh scale, was highly related to high frequency (HF) body weight as measured by GrowSafe Beef\textsuperscript{®}, such that HF body weight accounted for 95\% of the variation in manual scale body weight for pregnant heifers and 3-year old cows. A similar strong (R\textsuperscript{2} = 0.971) linear relationship was observed between manual scale body weight and GrowSafe Beef\textsuperscript{®} HF body weight for yearling heifers and mature cows in drylot during their winter feed intake test. An advantage of HF partial body weight is that a weighing episode could occur 3-4 times per day in a non-stressed environment, while manual weights are associated with moving animal to a central processing area several times during a grazing period, usually in the morning. We conclude that HF partial body weight, as measured by GrowSafe Beef\textsuperscript{®}, has great potential as a non-invasive, low stress, low labor method for measuring daily body weight under grazing and drylot conditions and may also be an indirect indicator of other important traits in beef cattle.

- GrowSafe Beef\textsuperscript{®} biometrics such as daily HF partial body weight, water intake, and drinking and feeding behaviours combined with climatic observations and forage quality data (25 variables) had moderate (R\textsuperscript{2} = 0.45-0.46) predictive accuracy for daily grazed forage intake and CH\textsubscript{4} emissions from individual animals on pasture. In addition, daily HF partial body weight combined with other climatic observations and diet quality data had strong relationships (R\textsuperscript{2} = 0.885 and 0.823) to animal average daily feed intake and CH\textsubscript{4} emissions under drylot feeding conditions.

Conclusions:

- This project quantified the mitigation potential of low-RFI cattle under conditions representative of the Alberta beef herd. In terms of the volume of measurements, the conditions in which the measurements were made, the number of techniques used, and the scientific standards that were applied, this was a world-class effort. Genetic selection for low RFI\textsubscript{fat} will result in cattle with
lower feed intake at the same level of production, and reduced daily CH₄ and CO₂ emissions compared with high RFIₙₐₙ cattle. Selection emphasis should be placed on production efficiency traits rather than CH₄ emissions per se as combining nutritional intervention, management, breeding strategies (e.g., maintain high herd heterosis) and genetic/genomic selection are more effective in reducing enteric methane emissions and carbon footprint (30-50% reduction).

- The GEM system and the FTIR laser technique for measuring CH₄ and CO₂ emissions from cattle were evaluated. This resulted in the development of cutting edge FTIR methodology and rigorous scientific protocols for the GEM system. These are two less invasive, less expensive, less labor intensive and accurate methods for measuring CH₄ emission from beef cattle under on-farm conditions compared with respiratory chambers and FSₖ tracer methodology.

- A world-class team was assembled that has the expertise and techniques to measure the GHG footprint of beef cattle production. This team includes two newly trained Masters of Science students and three post-doctorate fellows, which will help to advance Alberta’s leadership role in GHG mitigation.

- This project team also trained scientists from the University of Alberta that are using the GEM system to measure methane emissions in dairy cattle as part of Genome Canada’s Large Scale Applied Research Program on RFI and methane emissions in dairy cattle (PI, Filippo Miglior).

- Five peer reviewed papers have already been published in the Canadian Journal of Animal Science (1), American Journal of Animal Science (1), and Agricultural and Forest Meteorology (3). Two more manuscripts are in preparation.

- Forty presentations were made by team members at conferences (17), universities to undergraduate students (6), and to industry at field day and workshops (17). In addition, four YouTube videos were produced, along with two newsletter articles, seven radio interviews (e.g., Canadian Geographic, CBC radio, CBC TV) and two presentations at the Five Country Fall Forum on Climate Change, and Sustainability as related to plants and livestock genomics (CAN, NZ, USA, Ireland, Northern Ireland).

- The Beef Cattle Methane Emissions data base is operational and contains more than 23,000 individual animal daily enteric CH₄ and CO₂ emissions, with daily feed intake and feeding behaviours, HF partial body weight, water intake and drinking behaviours, climatic observations and diet quality information. All cattle (~700) in this data base have 50K or LD genotypes which are being used to identify SNPs, indels (genetic mutation; insertions and deletions) and functional genomic variants associated with CH₄ emissions and yield.

- Results provide validation for the carbon footprint of a feed efficient beef herd simulated with HOLOS by Beauchemin, Little and Basarab (2013). The simulation assumed a comprehensive genetic selection program, an annual rate of genetic progress in RFI of 0.8%, a multi-trait selection index approach and 25 year of selection. After full selection of a beef cattle herd for RFI, the estimated GHG
intensity from beef production were 14.0% lower than for the non-selected baseline herd. Due to the lower feed intake of the RFI herd, the farm area required for grazing and feed production was 13.2% lower than for the baseline herd.

- **“gGreenBeefCow: Identifying and evaluating genomic and fecal microbiome markers for low methane emissions in beef cattle.” (2016R033R; PI=Fitzsimmons and Basarab; April 2016 to March 2019); in progress**
  - The research supports Goal 2. The overall objective is to evaluate genomic and microbiome markers for animals which produce lower methane emission (g/d) and/or methane yield (g methane/ kg DMI).

- **“Measuring and assessing Canadian rangeland and other agricultural best management practices with the enhanced whole-farm model Holos (Whole-farm BMP evaluation using Holos).” (Roland Kroebel, PI); in progress**
  - This project supports Goal 2. Several modeling methods using Tier 2 IPCC methods are used to estimate greenhouse gas emission on a systems basis. Data from grazing systems is supplied from Swift Current and Lacombe. An LCA conducted by Dr. Baron showed swath grazing reduced the amount of energy used in the winter feeding process by 50% and reduced the greenhouse gas emission per kg of feed fed compared to a traditional feeding system. The carbon footprint for wintering beef cows was reduced by 18.3 kg C per cow grazed for 100 days.

- **“Development and deployment of MBVs/gEPDs for feed efficiency and carcass traits that perform in commercial beef cattle.” (PI=Basarab, co-PI=Berry and Crowley; October 2015 to September 2019); in progress**
  - The project supports Goal 3. It aims to develop and deploy genomic tools to commercial cow-calf producers and has three major deliverables: 1) 30 million variants screened for functional impact on traits of interest; 2) gEPDs for 10 traits with > 35% accuracy in crossbred cattle; and 3) two multi-trait value indices for commercial producers.

**Project Highlights:**
- As a result of this Genome Alberta project, commercial beef producers now have a new tool for optimizing production value on-ranch. First year results are proving to be critical for industry profitability with predicted breed composition of crossbred cattle using genomics being used to help quantify the value of retained heterozygosity (RH) of commercial crossbred cattle. The idea behind these initial results is that as RH increases the economic value of the animal increases. That is, for increases in RH, a replacement heifer becomes more valuable over her breeding lifetime on the ranch in terms of improved longevity, lifetime productivity, and carbon footprint; an extra value of more than $800 per heifer over five calvings or an average of $161 per heifer per year, at a cost of less than $50/heifer. Edmonton-based genomics service provider Delta Genomics has picked up on this new technology and is now offering the service to commercial beef producers under their
new service, EnVigour HX™. This offering now allows producers to assist in the decision of keeping or replacing a bull, maintaining or altering the breed composition of their herd based on production goals, and to potentially consider implementing matched mating systems to improve RH, cow lifetime productivity, farm profitability and Greenhouse Gas emissions. This program will help producers manage on-farm risk and improve future profitability.

- Foundation paper in genomic based heterosis and cow lifetime productivity: Dr. John Basarab along with project co-lead Dr. John Crowley and project members Dr. Mohammed Abo-Ismail and Dr. Graham Plastow, with additional colleagues from the University of Alberta have recently completed a manuscript to the Canadian Journal of Animal Science on the topic of the relationship of genomic based heterosis to cow lifetime performance and productivity. A concerning trend of diminishing crossbred vigour is presenting itself in Canada and Alberta, according to Alberta Cow-Calf surveys in the 1980s and 1990s, with a consistent trend reporting in surveys in the United States, as recently as 2010. More specifically, approximately 65% of producers were implementing two- or more-way crosses on farm in 1980, compared with less than 40% by the 1990s. Since the 1960s it’s been known that increasing breed crossing past the F1 generation improves hybrid vigour within the herd, resulting in numerous benefits from improved calf wean weight per cow exposed to improved lifetime productivity of the cow. Unsurprisingly, when we now look at the genetic make-up of the Canadian herd, on average, there is a declining trend of retained heterozygosity among crossbred animals. Part of the trend is due to producers de-risking their production by increasing uniformity of their herd, which is in reality, a reduction in hybrid vigour. The need to communicate validated results that indicate increased retained heterozygosity leads in improved cow productivity and profitability is great. It is expected that this paper will be the flagship in validated genomic prediction in commercial beef.

- In year one, molecular breeding values (MBVs) were generated for nine growth and carcass traits on 2400 genotyped animals. The MBVs were moderately related to the actual phenotype (r=0.32 to 0.48) for marbling, grade fat, rib eye area, lean meat yield, yield grade, and dry matter intake. However, the MBVs were only lowly related for carcass weight, average daily gain (ADG), and residual feed intake (RFI) (r < 0.10 for these traits). As a result, rigorous re-evaluation of the statistical procedures (e.g., definition of contemporary groups; high forage vs. high grain diets; calf-fed vs. yearling-fed) and models have been conducted, with particular attention on the latter three variables. In year two, new genome wide association studies (GWAS) analyses along with additional year two data, conducted by Dr. Mohammed Abo-Ismail, has resulted in improved accuracy of MBVs for carcass weight, ADG and RFI to r=0.25-0.30. Work continues to incorporate structural variant annotation analyses from Dr. Paul Stoithard’s team, improving the predictive power of the models.
• “Evaluating a new tool (GGP-F250) for improving accuracy of gEPDs for production efficiency in commercial beef cattle.” (2017R034R; Plastow and Basarab; April 2017 to March 2019).
  o The project supports Goal 3. The project will run approximately 1200 genotypes of genetically diverse cattle using the GGP-F250K and impute approximately 4000 crossbreds genotyped with GGP-LD (~30K SNPs). The results will provide important information on utility and cost of different genotyping strategies to help increase adoption of genomic tools in commercial cattle.

• “Optimize heterozygosity in composite multi-breed and cross breed beef populations using genetic and genomic tools.” (2017F103R; Plastow and Basarab; March 2017 to February 2019).
  o The project supports Goal 3. This project proposes to 1) determine how many SNPs are required for determining the optimum panel (cost/information content) to accurately predict genome-wide retained heterozygosity (RH); 2) test the relationship between genomic RH and cow reproductive (e.g., fertility, lifetime productivity) performance; 3) develop a strategy to monitor, maintain, and optimize RH in herds for improved performance and increased profitability.

• “Genetic analyses of feed intake, feed efficiency, female fertility, and cow lifetime productivity in beef cattle raised under two environments.” (John Basarab and Changxi Li, April 2018 – March 2023).
  o The project supports Goal 3. Objectives are to: i) Estimate genetic and phenotypic correlations of dry matter intake (DMI as a heifer) and feed efficiency with heifer fertility, longevity and lifetime productivity (LTP) of cows reared under two winter feeding systems (higher vs. lower inputs); ii) Determine relationships of mature cow DMI per weight of calf weaned over 3 and 6 calvings with heifer performance; iii) Predict heifer fertility and cow LTP using additive, non-additive and environmental effects; iv) Quantify the economic value differences among heifers using feed intake, fertility, LTP and longevity; v) Phenotype 2000 commercial heifers for feed intake and efficiency using Growsafe's marketing approach and create value indices for these heifers.

• “Extending late season pasture with alfalfa for beef production.” (PI: A. Claessens, Quebec City); in progress
  o The project supports Goal 5. Winter hardy populations of alfalfa collected from Northern Alberta farmers and seed producers, falcata and standard alfalfa populations for a range of fall dormancies were genotyped. New populations with reduced dormancy were developed (recurrent selection) from the cultivars Yellowhead and Peace by screening for growth under reduced day lengths in growth chambers. The less dormant populations grew significantly taller in the fall of 2016 than their normal counterparts at four locations. The project runs from 2015 to 2018 and is funded by the Beef Cluster (BCRC, ABP and AAFC).
• “Evaluation of alfalfa lines and populations for reduced dormancy, higher yield and winter hardiness across Canada.” (PI: Vern Baron); in progress
  o This project supports Goals 4 and 5, by producing alfalfa that can last later in the growing season but still survive the winter. The project funds the evaluation of 23 populations in a standard dormancy vs. winter hardiness evaluation at AAFC Lacombe and Swift Current. The controls in the test range from fall dormancy rating (FD) = 6 to FD =1. The study includes the collected populations, falcata genotype, standard alfalfa cultivars and those selected for reduced dormancy from Yellowhead and Peace described above. In association, a demonstration is run in cooperation with Grey Wooded Forage Association at Caroline, AB. The study runs from 2016 until 2018 and is funded by ALMA and ABP.
  o The winter of 2017-18 experienced cold periods during late December and early January where soil temperatures at Lacombe reached -15 C. This caused loss of plants in populations not considered hardy as in FD 3 and above. The selection for low dormancy from Yellowhead survived at the same level as Yellowhead; the sativa population, Rhizoma, originating from Ft. Vermillion, AB had a winter kill rating of 6.6%, compared to control variety Beaver at 10%. The population Caribou TF3, selected for freezing tolerance had winter kill of <10%. Caribou was the highest yielding cultivar in the Lacombe test in 2017 and would have been considered to have a fall dormancy equal to or greater than 3. Thus, we have identified alfalfa material thorough physiological testing that has less dormancy and is higher yielding in the fall than the falcata type alfalfa that may survive in northern prairie conditions.

• “Selection of annual forage wheat lines for yield and quality.” (PI: Pierre Hucl); in progress
  o This project supports Goals 1 and 4 by exploring the potential of forage wheat in feeding programs, and is funded by ABP.

• “Production of oil in vegetative tissues to increase the nutritive value of forage legumes.” (PI: Surya Acharya); completed
  o This project supports Goals 1, 3, 4, and 5 by improving the energy content of legumes in order to improve animal performance, and is funded by ABP. Traditional breeding methods were able to introduce successful mutations in germplasm conferring ~5% oil content (from a negligible starting amount) in the vegetative tissues of sainfoin and alfalfa. Future work is required to determine if these mutations are stable during subsequent breeding and selection cycles, and if there are any detrimental effects on yield and quality from the introduced mutations. This project also explored the opportunity to use new genomic methods (primarily CRISPR-Cas9) to improve alfalfa populations.

• “Evaluating the potential interaction between efficiency types for backgrounding weaned cattle and silage varieties differing in feed quality.” (PI: Hushton Block); in progress
This project focuses on supporting Goals 3 and 4, but builds off activities for Goals 1 and 3 and contributes to Goal 2. Steers ranked into quartiles by genomic predicted molecular breeding values for residual feed intake were randomized into pens and backgrounded using one of two silage based diets. Performance data collected is used to evaluate accuracy of genomic predictions, compare silages for use in backgrounding (varieties used were selected using a forage evaluation spreadsheet), and test for potential interaction between cattle efficiency type and diet quality. Preliminary results indicate genomic prediction of RFI is imprecise, that there was no interaction between observed cattle efficiency type and diet quality, and that a 30-40% improvement can be made in feed conversion (vs. the ABFGC benchmark of 11:1 for a forage based diet) through silage variety selection and least cost of gain optimized diet formulation. This improvement in feed conversion will contribute substantially to the objective of Goals 2 and 4 and should not be limited to backgrounding steers. This project runs from 2016 to 2019 and is funded by AAFC.

“Use of BioChar to reduce methane emissions from cattle. (Team member: Barry Yaremcio); in progress

The project supports Goals 1, 2, 3, and 5 by investigating the reduction in GHG emissions, improve feed use efficiency, animal performance and improved forage production. The project runs from 2017 to 2021 by the BioChar team based out of Lethbridge which involves AAFC, Universities of Lethbridge, Alberta, Manitoba, Alberta Innovates (Vegreville), and Alberta Agriculture. An article providing an overview of the project was published in the Canadian Cattlemen’s Magazine June 2017.

“Economic viability of increased field use frequency for in-field winter feeding” (PI: Darren Bruhjell); completed

This applied research project supports Goal 1 by: determining the effect of a two-in-three year bale grazing rotation on nutrient loading, forage yield and forage quality of two ‘on-farm” Alberta pastures. The project is run at Caroline and Vermillion, Alberta, and runs from 2015 until 2018, funded by AAFC.

Conclusions:

With the exception of a site that was subjected to overgrazing in years three and four, forage productivity and quality increased on all sites where bale grazing occurred in all years.

Forage production at the Vermilion site was more than two times greater on the areas directly influenced by the bales in the first two growing seasons following bale grazing when compared to areas between the bales. When excluded from grazing this trend continued in years two and three. When heavily grazed, there was no discernible difference in years three and four. The effect on forage production at the Caroline site although less pronounced was still 20 to 40 percent greater on bale affected areas during all years.
In Vermilion, crude protein (CP) levels were consistently higher (30 to 40 percent) in areas influenced by the bales when compared to areas between bales. There are some discrepancies in Relative Feed Vale (RFV) and Relative Forage Quality (RFQ) that warrant further investigation. These discrepancies can be attributed to the heavy grazing experienced on one experimental site and the other one being excluded from grazing since 2013.

The effect of the bales on CP at the Caroline sites was less significant than the Vermillion site in the second growing season being only 20 percent greater in years 12 following bale grazing and ten percent greater in years three and four. While bale grazing increased soil nitrogen and phosphorus, both study areas remained deficient in N and P according to Alberta Agriculture and Forestry’s Fertilizing Grass for Hay and Pasture fact sheet. The levels of potassium at both sites were high and while Vermillion values were declining by 2017 the same was not true at the Caroline site, and in neither case, were levels back to baseline.

While it is a positive result that total carbon increased from 2016 to 2017 at both sites, the reaction of soil carbon to winter bale grazing still requires further investigation at the field level to determine if there are significant and long lasting effects.

Bale residue remaining following bale grazing reduced soil temperature for at least 3 years after grazing. While research shows that this is disadvantageous for the microbes that break down litter and allow nutrients to enter the soil, our study indicates that litter was broken down effectively in 3 years.

Soil moisture was variable in its response to residue cover producing wetter soils in some cases and drier soils in others, as compared to the unaffected control. In other cases, there were large moisture differences between soils at bale centre, 8 feet and 15 feet from bale centre. In other instances, there was very little difference.

Despite the variability seen especially in soil moisture and the early season negative effects of residue on forage, forage growth was greater by mid-summer in 2015, the first year following bale grazing for the area affected by grazing. This growth continued to be greater for at least 3 years as is evident in the greener circles of growth associated with bale placement.

Additional study is required to better understand the relationship between bale grazing, residue and soil temperature and moisture.

The correlation between forage yield and NDVI was low. As such, we found that it was not feasible to use NDVI data obtained by the GreenSeeker® or low altitude, high resolution NIR (near infrared) imagery to estimate forage production for the perennial pastures used in this project. While clipping remains the most accurate way to measure production, it is cost and labor intensive. Future research is needed to find a faster, more efficient method of determining pasture productivity.

No correlation between yield and sonar derived plant height was found. Therefore, we concluded that the Pasture Reader system used in this project could not be used to provide a rapid, accurate prediction of forage production for the perennial
pastures used in this project. Despite promising findings in single species studies, sonar may be impractical when dealing with multispecies pastures.

- Soil analyses from fall 2016 and 2017 were compared to 2016 and 2017 mid-summer GreenSeeker® NDVI values. A significant correlation was not found. Based on these findings, the NDVI data obtained by the GreenSeeker® could not be used to predict soil carbon for the perennial pastures used in this project.

- “Development of hybrid bromegrass cultivars with enhanced NDF Digestibility.” (PI: Penner); in progress
  - This breeding supports goals 3, 4 and 5 and is funded by ABP. The project will eventually result in a new variety of hybrid bromgrass that is more digestible, improving rates of gain and efficiency.

### Proposals Written

- Yadeta Kabeta, PI. Improving forage quality of barley through targeted early generation selection.
- Flavio Capettini/Pat Juskiw, Co-PI. Increasing the yield threshold and enhancing the ideotype and quality of barley cultivars for malting and feed in western Canada.
- Michael Holtz/Pat Juskiw, Co-PI. Silage microbiome: Integration of Genomic tools in evaluation of barley silage microbiome as influenced by location and genotype.
- Pat Juskiw, PI. Barley Forage Coop at Melfort.
- Vern Baron, PI. Optimizing the order (sequence) of winter pasture types to increase pasture days, reduce cost and land requirement for wintering beef cows.
- Hushton Block, PI. Evaluation of management options to improve retention of young cows and cow herd returns.
- Carolyn Fitzsimmons, PI. Longer-term Genomic Selection for Feed Efficiency in Beef Cattle: A platform to measure impacts on important production traits.

### General Extension Activities & Articles

- **Cow-Forage Gentec Field Day (August 22, 2017; Lacombe, AB)**
  - Joint field day organized by the Centre, the Grey Wooded Forage Association and Livestock Gentec, this event had almost 200 people in attendance. The field day’s multitude of learning opportunities included a legume tour in the morning exploring alfalfa cultivars and winter hardiness, forage establishment, milkvetch establishment, a sainfoin demonstration and grazing management. The pasture stations at the Lacombe Research Centre featured swath and bale grazing, forage varieties for extended grazing and backgrounding, cow herd management, measuring greenhouse gases on pasture, carbon sequestration, measuring pasture yield, and rotational grazing. Yet another group of stations explored genomic breed composition and heterorsis with a heifer showcase, a demonstration of the GreenFeed methane monitoring system, how genomically-enhanced EPDs are
created, and a showcase of the barley and triticale breeding program at the Field Crop Development Centre. The keynote speaker for the day was Dr. Charlie Brummer from UC Davis, who is an alfalfa breeder and Director of the Centre for Plant Breeding. His research program investigates ways to improve biomass yield of alfalfa using both traditional and genomic methods, including research into breaking the link between dormancy and winter hardiness, and heat, drought and salinity tolerance.

- **Tools to Build Your Cow Herd (October/November 2017; 10 locations across Alberta)**
  
  - Topics included: How genetic tools can help identify superior animals to develop productive and profitable herds. The importance of feeding vitamins. The relationship between nutrition, animal health and productivity especially with feed shortages in parts of the province. Local animal health issues presented by a local veterinarian. [https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/aet16241](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/aet16241)


### Extension Projects

“Advancing knowledge translation and transfer to support sustainable livestock and forage production systems.” (PI: Alberta Beef Producers, supported by Susan Markus, Andrea Hanson, Linda Hunt (AF), Darren Bruhjell (AAFC), Dianne Westerlund (CARA), Field Crop Development Centre, and others yet to be identified); in progress

- Funded by AF, this project intends to review, gather, re-package or create (as necessary) resources related to the following three themes: managing grazing in average and extreme weather conditions, perennial and annual forage variety selection for regional applicability, critical elements of animal nutrition and feed quality. This project supports all of the Strategic Goals of the Centre.
"The Rancher Researcher Pilot." (PI: Alberta Beef Producers, supported by Susan Markus and Andrea Hanson (AF), Darren Bruhjell (AAFC), Dianne Westerlund (CARA); Kathy Larson (U of S), Kristine Dahl (Consultant)); in progress

- This project is funded by AF’s Industry and Market Development program. It is designed as a pilot extension project that will link researchers directly with producers to examine new management practices or innovations that are applicable to their production systems, and why or why not producers adopt certain technologies. This project supports all of the Strategic Goals of the Centre.
- Interviews with eight ranchers (locations: Wardlow, Gem, Hanna, Didsbury, Consort, Innisfail, Vermilion, Fort MacLeod) have been completed to get an in-depth understanding of their operation, production practices and current technology adoption level
- Herd size on these ranches ranges from 170 to nearly 1100 cows
- The innovations that each rancher has indicated they would like to pursue are (note: some chose the same innovations to implement): DNA parentage testing, precision ranching (use of drones), soil testing, pasture rejuvenation with legumes, dugout improvements, cost of production analysis, improving access to water, herd information management, low-stress weaning, BlueTooth technology (scale), pasture health/utilization/animal movements software, and DNA hybrid vigour testing
- Two innovations have already been implemented on one operation

- “Fall or spring management options for pastures: renovate or rejuvenate?” (PI: Akim Omokanye); in progress
  - This project supports Goals 5 and 6 by demonstrating which methods of pasture rejuvenation are most effective and economical. This project is funded by ABP.

- “Perennial forage variety evaluation and demonstration at multiple sites in Alberta” (PI: Dianne Westerlund); in progress
  - This project supports Goals 4, 5, and 6 by demonstrating the regional adaptability of various forage species and varieties alone and in mixed stands. This project is funded by ABP.

- “Regional Silage Trials” (PI: ARECA groups across the province); in progress
  - The trials support goals 4,5 and 6 by demonstrating the regional adaptability of various species, varieties and mixes of annual crops for forage at points across the province.
  - Nine applied research and extension associations participate in the project, and results are summarized and included in Alberta’s Seed Guide
  - Currently funded internally

- “Best management practices for the re-introduction of sainfoin into existing alfalfa and grass pastures for western Canada” (PI: Alan Iwassa); in progress
  - This project supports Goals 4, 5, and 6 by determining cost-effective best management practices to rejuvenate existing alfalfa/sainfoin and crested wheatgrass stands. This project is funded by ABP.
• “Understanding risk of nutrient movement from winter bale grazing” (PI: Darren Bruhjell); completed
  o The project supports Goals 1, 2, and 6 by determining the long term nature of soil nutrient, moisture, and temperature dynamics on bale grazed sites; the effects of bale density on nutrient accumulation; carries out testing and developing technology/tools to manage bale grazed sites for nutrient and forage management. The project is being run from 2013 to 2017 in Alberta, funded by AAFC.

Conclusions:
  o Nutrient concentrations in wetlands were elevated in the spring of the years immediately following winter bale grazing. Export of nutrients from the bale grazing fields to the wetlands ranged from 7-25 kg N/ha and 1-4 kg P/ha and were up to 20 times higher than the export from non-bale grazed areas. These loading rates were similar to other studies of winter grazing practices in Saskatchewan and Manitoba.

  o The monitoring results showed a clear difference between the two sites in the potential for nutrient movement into shallow groundwater. The data indicated that at the more coarsely textured soils of the Caroline site there was evidence of inorganic nitrogen leaching whereas there was limited evidence of downward nitrogen movement under the finer textured soils at the Vermilion site. Elevated phosphorus concentrations were also evident in the top meter of soil at the Caroline site, and contributed to higher dissolved phosphorus in the shallow groundwater.

  o Siting to reduce the risk of runoff reaching other water bodies is important when implementing winter bale grazing. Sites where runoff is captured in temporary depressions and allowed to infiltrate are ideal; however nutrient buildup in those depressions could lead to increased soil phosphorus if the sites are used frequently. At sites with coarser grained soils, shallow groundwater can be impacted by rapid leaching of nitrogen and slow downward movement of phosphorus. The risk to groundwater can be mitigated by reducing the frequency with which bale grazing occurs at the same sites. Within a pasture, bale placement should be considered for subsequent treatments in different areas of the same pasture to ensure runoff from those treatments does not influence the same runoff collection / groundwater recharge area of previously bale-grazed tracts.

• Nutrient patterns in swath grazed fields (PI: Darren Bruhjell); in progress
  o The project supports Goal 2 and 6. This work will lead to improved nutrient loading/loss estimates for the Nutrient Loading Calculator because the data can be used to validate and modify the estimates in the AAFC calculator, which currently are based only on theoretical nutrient balances. The work will also lead to improved swath grazing management guidelines that will benefit producers
because it will lead to better recommendations on the amount and formula of additional synthetic fertilizer required for the next year's forage crop growth

- **AC Saltlander (PI Bill Houston); in progress.**
  - The project supports Goal 5 and 6. This development/technology transfer project will demonstrate the usefulness of AC Saltlander on saline areas. Darren Bruhjell is the collaborator.

### Communications

- Updates were provided to the AFIN and ARECA annual meetings, as well as a written update to the Grey Wooded Forage Association. Regular updates are provided to ABP’s research committee.
- There has been interest from the Livestock and Forage Centre of Excellence and Manitoba Beef and Forage Initiatives to hold a joint meeting to discuss progress, areas of collaboration, etc.
- Website development continues, and should be ready for public launch soon.

### Appendix 1 – ABFGC 2017 Annual Meeting Minutes

- Presentations from the annual meeting have previously been circulated to the Management Committee, the Research and Extension Advisory Committee and the Industry Advisory Committee, and are available upon request.

**Minutes of**

**Alberta Beef Forage and Grazing Center Annual Meeting**

**February 7, 2018 – 9:00 a.m.**

**Conference Room, Lacombe Research Center**

In attendance: Joseph Nyachiro, Wes Johnson, Mueen Aslam, Arno Doerksen, Mark McNaughton, Holly Mayer, Ken Ziegler, Susan Markus, Dianne Westerlund, Andrea Hanson, Barry Yaremcio, Karin Lindquist, Rich Smith, Doug Wray, Hushton Block, John Basarab, Kristine Dahl, Darren Bruhjell, Matthew Gould, Charlie Christie, Karin Schmid, Linda Hunt, Assar Grinde, Flavio Capettini, Ron Buchanan, Vern Baron, Susan Novak, Jim Calpas, Clint Dobson

Note taker: Cathy Bryant

**Meeting Objectives:** Updates for Goals and Activities and Identification of Future Opportunities and Gaps

**Welcome and Introduction, Meeting Objectives**

- Wes Johnson welcomed group
• Reviewed agenda items and identified speakers
• Introductions were done around the table

Minutes from August 22/17 Industry Advisory Committee and Management Meetings:
• Arno Doerksen spoke on highlights from Industry Advisory Committee Meeting
• Management Committee Meeting discussed organizational update and sense of direction and where things were at

Financial Report: Karin Schmid
• Item of business first regarding one industry advisory committee member not attending meetings or answering emails; a replacement should be found, let Karin know of any suggestions
• Budget: Carried forward $44,973.71 from last year, received another injection of $25,000
• Total Budget for 2017-18 is $69,973.71
• Expenses: admin support services, August Advisory Committee, and Rancher Researcher Pilot project for a total of $21,131,15
• Balance to date: $48,842.56

Goal 6 - Build and Maintain Research and Extension Capacity
What is Happening in Beef Farming in Alberta: Barry Yaremcio
• Ag-Info Centre Many received many calls from producers, industry, and vets from across Alberta
• Huge calls on plant fire at BASF in Germany; result is world wide shortage of vitamin precursors, critical times to supplement with shortage of vitamins
• Feed shortage happening especially from southern province and Barrhead/Westlock area
• Have received many calls on swath grazing, bale grazing, and reducing cost of diesel fuel and machinery
• Producers disappointed in corn in 2017, looking for cheaper alternatives
• Problems with wildlife and grazing reserves
• Assisting in the promotion of Western Canadian Cow Calf Survey

Rancher Research Pilot Project: Susan Markus
• Process: project has been funded, interest and commitment from producers with 8 different ranchers from different locations participating
• Consultant, Kristine Dahl, has been hired to contact ranchers, conduct on farm visits and talk about expectations
• Priorities need to be established with ranchers, what innovations to be adopted
• Data will be collected and interpreted
• Kathy Larson will be working on economic standpoint
• Scientists and specialists expectations, practical adoption
• Current success indicators more than auction market price
• Conversations will happen with scientists/specialists on priority areas once established
• Ranch scenarios will be looked at the end of February and will have conversation with specialists
• Innovation and technology – 20 different innovations put together, circulated to specialists
• Data interpretation for practical on farm ranch use will be key in this project
• Being aware of balance of economic and management decisions
• Looking at this project linking with sustainability initiatives
• Involvement with this project: Student learning and engagement opportunities with U of A, Olds College Applied Research class, and Lakeland College demonstration research herd
• Timelines have been identified and extension plan will be completed in December
• Project completion date: 2019

**ARECA Report**: Dianne Westerlund, CARA

- CARA is one of 9 members of ARECA umbrella group
- Diane represents Forage Livestock Team on Beef Forage and Grazing working group
- ARECA activities: highlighting pasture project, looking at sainfoin and alfalfa; field size demos from seeding to monitoring growth and extension activities
- CARA is coordinator for Perennial forage trial, 2018 final year of funding, 8 sites thru out province and 1 demo
- Tools to Build Cow Herd series was very successful seminar and received good feedback
- Regional silage trials for feed evaluation and yield
  - future of project unsure, there is no specific funding for trial
  - managed through county funding
  - looking at alternative funding to keep trials going
- ARECA groups worked with Jim Gerrish from Idaho with class room and field sessions
- Pasture Rejuvenation trial, rejuvenating older hay stands
- Carbon Pasture Management trial, process is to help monitor carbon under various pasture regimes, each association will have a site in their area
- ARECA involved in working with producers on the Rancher Research Project
• Key roles of applied research and forage associations: connection with producers, conduit between research and producers, looking forward to more partnerships, can do small plot work and extension role, i.e. field days and events

**Western Canadian Research & Extension:** Karin Schmid

• Overview of various initiatives relating to our strategic goals
  o Rangeland Research Institute – advance knowledge and understanding of rangeland ecology, encompasses central parkland, foothills fescue grassland, and dry mixed grass prairie, research themes: forage production and use, biodiversity and habitat, pollinations, industrial recovery/mitigation
  o Lethbridge Research Station - feed additives to reduce methane production, high energy forages in feedlot production, defining environmental footprint of beef production, HOLOS modeling, and other areas
  o Livestock and Forage Centre of Excellence in Saskatchewan - bring together livestock and forage research into one entity, joint government/industry funding, still getting underway, broad based research, teaching and extension platform, broad focus areas at this point; i.e. cow calf production, intensive beef cattle production, forage production grazing and pasture management, building new facilities
  o Manitoba Beef and Forage Initiative - engaging in science based research to benefit valuable ecosystems, improve producer profitability and build social awareness around beef and forage industry, fixed priorities are economics and profitability, knowledge transfer, environmental sustainability, etc. Do applied and academic projects

• A lot of opportunities with common themes to engage and work with these various initiatives

**National Tech Transfer Strategy:** Karin Schmid

• Industry Advisory Committee reviewed this strategy, excellent place to start in tech transfer, knowledge down to grass roots
• Opportunities to look for linkages meeting on February 15

**Extension Funding Opportunity:** Karin Schmid

• 3 year duration, $250,000—500,000
• Short timelines, looking for direction from group in what kind of elements to look at for this application
• One element is kick starting money into a coordinator for the Centre
• Initiative is unknown right now, but additional workload could be an issue
Comment made to use caution on hiring coordinators, CEO or staff on soft money; it is unsustainable

Better spent money on extension rather than on manpower

Project will develop but should not dismiss coordinator role

ARECA could be this step instead

Do good extension and prove the value

Lots of potential in ARECA and forage associations, collaboration between government and industry

Opportunity in 2019 of expansion of Rancher Research pilot project?

Proposal development volunteers: Karin Schmid, Susan Markus, Darren Brujhell, Linda Hunt, Dianne Westerlund and Andrea Hanson

Meeting conference call to be arranged, Karin Schmid will coordinate

Call for extension type proposals - extension within a research project, extension first to be cut if funding is cut, extension is still a limiting factor

Provincial and Federal Updates

**Update from Alberta Agriculture and Forestry:** Susan Novak

- Sharing Research Review update under direction of Jeff Stewart
- **AF Science and Innovation Framework**
  - Research review initiated because of new government priorities; strategic planning undergoing with a new business plan
  - Increased transparency and accountability, under budget restrictions
  - Ensure focus in research activities
  - Changes to research delivery and spending mechanisms
  - Research review was internal examining research capacity
  - Developed a science and innovation framework to better link research, extension, funding and policy
  - Being able to build and implement governance model
  - Establish performance metrics
  - Ensure external stakeholders are consulted
  - Engage AF staff and empower to implement framework effectively
- In-depth research review has been completed to date, and recommendations (strengthening AF’s internal governance model, strengthen our collaboration with stakeholders, develop process filter tools to put in place to ensure we are effective, making efforts to minimize internal barriers) were accepted
- Need to drive transformation with clarity, focus and vision
• Outcomes – a key piece as government departments have a role in ensuring regulations and supporting appropriate policy
• Future vision:
  o Ensure research capacity is focused on public good
  o Multi-disciplinary teams to address priority policy issues and risk management
  o Develop and nurture strong partnerships in industry growth and competitiveness,
  o Connect extension staff to better advance knowledge transfer
  o External research funding through new clean agriculture partnership and new program for research funding
• Determine clarity on role of government in research and funding, what are we able to do as government researcher and funder?
• What do we do at Agriculture and Forestry – research capacity in crop and fiber area, livestock, food, environment and forestry
• Big research and extension community in Alberta, how do we better build collaboration across facilities and through research community
• Still working on review, framework will be done by end of March, looking at engaging with stakeholders on framework
• Looking for opportunities, how do we better work with you
• Big challenge is sustainability, social, economic and environment, and how to best put three together

Update from AAFC: Holly Mayer
• At department level focusing on agriculture partnership up and running
• Transitioning from Growing Forward 2 to CAP, effective April 1
• CAP – five year framework, $3 billion, science, research and innovation one of 6 priority areas
• Two buckets under CAP:
  o programs funded only by government
  o one shared funding between governments
• Every province has own agreement with CAP
• Business risk management programs
• Federal funding are: Agri-science program; other programs fall under other pillars
• Science and innovation priorities are:
  o invest in discovery and applied science for major commodities
  o improve support for minor commodities
  o enhance efforts in clean growth, environment and climate change
accelerate growth of food and beverage processing sector
strengthen knowledge transfer and adoption

- **Agri science program under Innovation Bucket**
  - 2 components: clusters (collection of projects national in scope) and projects (smaller projects less comprehensive than cluster)

- **Beef cluster making their way through approvals, early submitted ones approved and ready to go April 1st**

- Average cluster is $20 million

- Under CAP with clusters: beef, dairy and canola - focus is on climate change and environment and increased knowledge transfer

- Overall principles of clusters: build science collaborations, activities should be aligned with program priorities, leverage increased industry contributions, identify expected results in terms of industry benefits and growth

- **Forage and Beef update:**
  - Beef cluster applications being reviewed
  - New scientists – undergoing revitalization in terms of scientists, many retirements occurring, concern internally about replacements, internal goal to keep at 400 scientists
  - People relevant to group: scientist hire in Lethbridge; meat microbiology hire in Lacombe, and meat quality research scientist; Swift Current forage and soil physiology hires; St. Johns, forage pathologist hire; Kemptville, forage agronomy hire and molecular position hire in Sainte-Foy; Beaverlodge forage agronomy seed industry hire
  - These hirings are the result of Forage industry lobbying the importance of forage

**Goals 1 to 5 Updates**

- **Goal 1: Reducing Winter Feeding Costs**: Vern Baron/Darren Bruhjell
- **Goal 2: Reducing Environmental Footprint**: John Basarab/Barry Yaremcio
- **Goal 3: Improving Cow Efficiency**: John Basarab
- **Goal 4: Reducing Backgrounding Costs**: Hushton Block/Vern Baron/Joseph Nyachiro
- **Goal 5: Improving Late Season Forage Productivity**: Vern Baron/Darren Bruhjell

  - Presentations were made on the above goals

**Next Steps:**

- Funding proposal around Knowledge and Tech Transfer team: Darrin Bruhjell, Dianne Westerlund, Susan Markus, Karin Schmid, Andrea Hanson and Linda Hunt
- This proposal has good strong goals lined out for the Centre
- Feedback:
Time of annual meeting? Field day last summer?
- Annual meeting timing good; Summer meeting could be earlier

Are there Gaps or areas not presently working in or shouldn’t be working in, any ideas of things coming up that are important, areas we may be wasting our time in and diverting dollars elsewhere, need strategic direction from advisory and management board
- Is there interest in group working on Polyculture (multi species) annual crops? Other people are working on this, most limiting factor is season you are working with and number of growing days
- Valuable to have critical nutritional target for different classes of calves
- Work has to be focused on weather patterns, number of growing days, best variety
- Fine tuning or developing calculators, data mining and open place markers

Meeting adjourned at 4:15 p.m.