2023

Land and Food Systems

Graduate Student Conference

Conference Program

Tuesday, March 2, 2023

GSS LOFT

gsc.landfood.ubc.ca

UBC
Faculty of
Land and Food
Systems

Time	Event
8:00–8:45	Registration
8:45–9:00	A message from LFS Dean and Associate Dean Graduate
9:00–9:15	Opening remarks
9:15–10:00	Keynote speaker: Zayda Morales Moreira
10:00–11:15	Oral Presentations 1
11:15–11:20	Break
11:20–11:45	Poster Presentations 1
11:45–11:50	Break
11:50–12:50	Oral Presentations 2
12:50–1:10	Snack break
1:10–1:25	Poster Presentations 2
1:25–1:30	Break
1:30–2:00	Oral Presentations 3
2:00–2:30	Lunch
2:30–3:00	Oral Presentation 3 (continued)
3:00–3:05	Break
3:05–3:25	Poster Presentations 3
3:25–3:30	Break
3:30–4:15	Oral Presentations 4
4:15–4:30	Break and tally scores
4:30–5:00	Awards ceremony and closing remarks

Conference Schedule

UBC
Faculty of
Land and Food
Systems

Table of Contents   **Page**

Table of Contents

![UBC Faculty of Land and Food Systems]

Table of Contents

Table of Contents | Page

Table of Contents

Table of Contents

Table of Contents

Table of Contents

UBC
Faculty of
Land and Food
Systems

Greetings, Conference Attendees!

Welcome to the 10th year of the Land and Food Systems Graduate Student Conference.

We are so happy to be back in-person after two years of online conferences! This year, we will hear about 28 oral and poster presentation abstracts that were submitted and accepted to the conference. We will learn about research from both graduate and undergraduate students in Applied Animal Biology, Integrated Studies in Land and Food Systems, Plant Science, Soil Science, Human Nutrition, and Food Science.

Each year, the conference has celebrated the diversity and excellence of graduate students in our faculty. This conference provides an opportunity for students to share ideas and connect with one another. As well, it allows us to see the breadth of qualitative and quantitative research that's happening throughout LFS. Ultimately, we hope that you have the chance to learn something new today!

We hope you enjoy the presentations from our excellent graduate students.

The 2023 LFS Graduate Student Conference Planning Committee

Acknowledgements

We would like to extend our gratitude to everyone who helped make the 2023 conference a success.

We thank our judges Camila Cavalli, Matt Mitchell, Katie Koralesky, Sandra Brown, JT Cornelis, Patricia Hingston, Thomas Brenner, Sasha Protopopova, and Sumeet Gulati, who are taking time out of their day to support students in our oral and poster competitions.

We also thank Sabrina Yan and Shelley Small for supporting the Grad Student Council throughout the year, but particularly with supporting the conference. As well, the team at the LFS Learning Centre, who helped us with many of our audio/visual needs today.

Finally, we would like to acknowledge the hard work of the undergraduate and graduate students who have taken time to share their research with us today. We are excited to celebrate your accomplishments today!

2023 LFS Graduate Student Council

Xiwen Wang
Lexis Ly
Jordy Kersey
Maithili Devadas
Emeline Nogues
Shelyn Wongso
Lulu Pei
Chelsea Gowton
Morgan Hamilton
Jennifer Lipka
Charlotte Shi
Xiangyu Gao

The 2023 LFS Graduate Student Conference was made possible by:

Keynote speaker: Zayda Morales Moreira

Crop microbiomes and benefits for sustainable agriculture

Zayda Morales Moreira is a Postdoctoral Research Fellow working at Cara Haney's lab in the Department of Microbiology and Immunology (UBC). She obtained her PhD in Applied Microbiology at University of Saskatchewan here in Canada, her Master's degree in Agricultural Microbiology at UFRB university in Brazil and her Bachelor of Science in Biotechnology at Army Polytechnic School in Ecuador.

Zayda's work focus on studying the role and contribution of microbial communities in plant fitness and yield. She is currently looking for sustainable solutions in agriculture to guarantee food security.

How gender plays a role in highs school athletes food habit

Alysha L Deslippe(1,2), Coralie Bergeron(1,2), Tamara R Cohen (1,2)

(1) Faculty of Land and Food Systems, The University of British Columbia, Vancouver, British Columbia, Canada
(2) Healthy Starts, BC Children's Hospital Research Institute, Vancouver, British Columbia

Competitive athletes experience performance-related pressures (e.g., body shape) that can influence their food habits. These pressures have been found to vary by gender. Most research in this area has been conducted in elite sport settings (i.e., collegiate or high-performance teams) where athletes have access to trained coaches or dietitians. This creates a gap in understanding how athletes in less resource intensive settings like high schools food habits are impacted and poses a problem as these athletes still experience performance pressures, but lack trained coaches or dietitians to navigate them. Therefore, this study aimed to explore how adolescents in high school sports perceive the role of gender, sports and body shape on their food habits. Using semi-structured interviews, we explored high school students (n=33) perspective of how gender, social influences and sport impacted their food habits. After conducting a thematic analysis (deductive/inductive), we found that adolescents emphasized the importance of a balanced diet high in protein, hydration and timing meals for performance. Within this, girls also stressed how eating was important to achieve a 'thin and fit' physique for sport whereas boys talked about wanting being 'tall and fit'. Girls further discussed how they used food to avoid judgement from coaches, teammates, or peer athletes beyond just eating for performance. Boys did not discuss this and instead, talked about performance as the sole motivator. Findings from this study suggest that programs are needed to support adolescents' understanding that all bodies belong in sport and further, should be targeted by gender.

UBC
Faculty of
Land and Food
Systems

Household food insecurity among the Indigenous San people in rural Botswana

Tebogo T Leepile(1), Eduardo Jovel(1), Crystal D Karakochuk(2)

(1) Integrated Studies in Land and Food Systems, University of British Columbia, Vancouver, Canada
(2) Food, Nutrition and Health, University of British Columbia, Vancouver, Canada

Indigenous populations worldwide are grappling with disproportionately high levels of household food insecurity and its numerous consequences. In Botswana, there is limited data on the San people, an Indigenous group that primarily resides in the Ghanzi District. We assessed household food insecurity among 367 San households in nine randomly selected locations using the Household Food Insecurity Access Scale and the Modified Household Dietary Diversity Score between March and August 2019. Related socio-demographic data were collected through a questionnaire. Only 2% of households reported being food secure, and 98% were classified as food insecure (2% mild, 10% moderate, and 86% severe). The majority of the households had poor dietary diversity, measured as monotonous consumption of low-nutrient-dense foods. Given the nearly ubiquitous rates of food insecurity, there were no statistically significant associations between food insecurity status and selected key variables (e.g., region, income, household size, household head's age, and gender) except for dietary diversity. These results underscore the need for a more robust interdisciplinary community-based investigation of the determinants of household insecurity among this population to inform future targeted and culturally responsive food and nutrition policies and interventions.

Xanthamonas translucens isolation from barley seeds complicated by ubiquitous coinfection with *Pantoea spp.*

Jonathan Beutler(1), Tiffany Li(1), Veronica Román–Reyna(2,3), Maria C Fleitas(4), Ramandeep Bamrah(1), Jonathan Jacobs(2,3), Hadley R Kutcher(4), James T Tambong(5), Gurcharn S Brar(1)

(1) Crop Pathology and Genetics Lab, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, BC, Canada
(2) Department of Plant Pathology, The Ohio State University, Columbus, OH, USA
(3) Infectious Diseases Institute, The Ohio State University, Columbus, OH, USA
(4) Department of Plant Sciences and Crop Development Centre, University of Saskatchewan, Saskatoon, SK, Canada
(5) Ottawa Research and Development Centre, Agriculture and Agri-Food Canada, Ottawa, ON, Canada

Xanthamonas translucens pv. translucens (Xtt) was isolated from diseased barley (*Hordeum vulgare*) leaf tissue symptomatic of bacterial leaf streak during 2021 field trials of a 274-accession barley diversity panel in the Totem Field Research Station at The University of British Columbia in Vancouver, BC, Canada. The species and variant (pathovar) of three isolates (UBC026, UBC028, and UBC029) were identified using multiplex PCR assays, Loop-Mediated Isothermal Amplification (LAMP), as well as targeted amplicon and whole genome sequencing followed by BLASTn alignment against the NCBI database. A causal link between the isolates and disease symptoms was confirmed by performing Koch's postulates on susceptible barley line HB522 in greenhouse conditions. Attempts to isolate Xtt from bisects of post-senescent barley seeds from the infected hill plots was complicated by ubiquitous coinfection with morphologically similar *Pantoea ananatis* and *Pantoea agglomerans*. *In vitro* colonies of these common symbionts are challenging to distinguish from Xanthomonads on Wilbrink's agar medium and may outcompete the bacterial pathogens. Furthermore, Wilbrink's – Boric Acid – Cephalexin (WBC) medium, reported as semiselective for *Xanthamonas* species, was found not to be *Pantoea spp.* exclusive.

Impact of grazing management practices on soil properties as affected by soil type, plant cover, and microbial legacy

Harini Aiyer(1,2), JT Cornelis(2), Luke D. Bainard(1)

(1) Agassiz Research and Development Centre, Agriculture and Agri-Food Canada, Agassiz, BC, Canada
(2) Faculty of Land and Food Systems, University of British Colombia, Vancouver, BC, Canada

Grazing intensity is known to impact soil biogeochemical processes including microbial diversity, organic matter decomposition, and nutrient release through dissolution of minerals and organic matter decay. Furthermore, soil type and plant community composition are known to influence the degree of impact by grazing management. To better understand the factors that affect plant–soil–microbe interactions in grassland ecosystems, soil samples were collected from two long-term grazing trials with enclosures set up approximately 20 years ago. First set was collected from an experiment conducted at Swift Current Research and Development Center (AAFC). This set included 16 paired, grazed and ungrazed sites, with treatments for continuous versus rotational grazing systems, as well as a complex versus simple plant cover mix. The second set was collected from 24 paired, grazed and ungrazed sites from an experiment comparing grazing in an elevational gradient, managed by a team in Thompson River University. Soil chemical analysis was done to measure total carbon, total nitrogen, organic carbon, microbial biomass carbon (MBC), pH, and soil moisture. Microbial diversity data was collected using qPCR and shotgun metagenomic sequencing analysis. Preliminary results indicate that continuous grazing resulted in lower MBC. Fungal abundance positively correlated with MBC, indicating that this was likely the main driver for this difference. Furthermore, fungal:bacterial (F:B) ratio in continuously grazed pastures was significantly affected by plant cover with the simple mix having significantly higher F:B. The role of microbial communities in long term carbon storage in grassland ecosystems will be further explored in this project.

Summoning the ancestors: using an *Aegilops tauschii* diversity panel to improve stripe rust resistance in Canadian wheat.

Vincent Fetterley(1), D Gilbert(2), K Gaurav(2), X Chen(3), S. Arora(2), GS Brar(1)

(1) Faculty of Land and Food Systems, The University of British Columbia, 2357 Main Mall, Vancouver, Canada
(2) John Innes Center, Norwich Research Park, Colney Ln, Norwich, United Kingdom.
(3) United States Department of Agriculture, Washington, D.C., united States

With around 25 million acres of wheat planted every year, Canada is one of the leading exporter of wheat around the world. However, the country annually loses around 15% of the crop to pests and pathogens. Wheat stripe rust, caused by the fungal pathogen *Puccinia striiformis* f. sp. *tritici* (*Pst*), can severally affect wheat crops under the right climatic conditions, which makes it one of five priority one disease of wheat in Canada. Wild goatgrass (*Aegilops tauschii*) is an ancestor of modern bread wheat and represents a great source of genetic diversity for the development of wheat cultivars. To identify sources of resistance towards *Pst*, a panel composed of 151 genetically diverse *Ae. tauschii* accessions was tested for resistance against multiple Canadian races of Pst. Whole-genome sequencing k-mer based association mapping identified one gene, *YrAS2388*, present in more than 60 % of the accessions, conferring a high level of resistance to all the *Pst* races used so far. For one additional Pst race, that gene explained 81% of the resistance observed in the panel. A further 17% of the resistance was explained by a second identified gene. Kompetitive allele specific PCR (KASP) markers were developed for both of those genes and are currently used to introgress both resistance gene in elite Canadian wheat cultivar, in the hope that they will contribute to more sustainable and resilient crops.

Is Coenzyme Q10 Effective at Improving Fertility Outcomes in Women?

Christina Liang(1), Crystal Karakochuk (1)

(1) Food, Nutrition and Health, Faculty of Land and Food Systems, UBC

Fertility, as defined as the natural ability of a woman to conceive pregnancy, declines with age. A decline in oocyte quality is caused by increased oxidative stress and mitochondrial dysfunction of oocytes in advancing age. Ubiquinone, more commonly known as Coenzyme Q10 (CoQ10), is an antioxidant that is found in almost all cells of aerobic organisms. and has been associated with improved fertility outcomes primarily in older women > 35 years old. Relevant studies in English were selected through a detailed search strategy using MEDLINE (using key terms, such as: fertility, infertility, ubiquinone, and CoQ10) with the assistance of a research librarian. The scope of the research was narrowed down to studies involving the oral supplementation of CoQ10 on select fertility outcomes (e.g., oocyte quality) in women. Of the four relevant identified studies, it was found that supplementation with 22–600 mg CoQ10 for 4-8 weeks led to increased oocyte maturation rates, increased mitochondrial function in oocytes, and delayed depletion of the ovarian reserve. Overall, there was a positive effect of oral supplementation with CoQ10 on improving fertility in women; thus, supplementation with this antioxidant appears to be justified for women trying to conceive. One limitation of note is that these studies included small sample sizes, one of which only included 15 participants. Future studies could also investigate the efficacy of CoQ10 to improve fertility outcomes in males.

Canadian dairy farmer perspectives on dairy cattle and calf welfare issues during the periparturient period

Amalia Urloiu(1), Marina von Keyserlingk(1)

(1) Applied Animal Biology, Faculty of Land and Food Systems, University of British Columbia, Vancouver, Canada

On dairy farms, the three weeks before and after a cow gives birth to a calf are known as the periparturient period. Throughout this period, dairy cows face many negative health implications, including: lowered immunity and higher disease risk, potential uterus infection while the body adapts to lactation, and decreased time spent ruminating the days before and after calving, a process crucial for gut health. Certain management practices can aggravate the distress faced by periparturient cattle. Some examples include overstocking in group pens, reduced feed which heightens risk of early lactation, and premature assisted calving, which harms the cow and introduces greater morbidity risk for the calf. Dairy farmers have the most hands-on role in ensuring dairy cow and calf welfare, therefore, it is crucial to investigate their perspectives on periparturient cattle welfare concerns and management strategies. This study invited Canadian dairy farmers to partake in four recorded focus groups, where they were asked open-ended questions related to actions taken to promote periparturient cow and calf welfare, as well as obstacles they face in doing so. Recordings were transcribed using the Otter.ai and subsequent qualitative data analysis was performed through open coding, codebook development of relevant themes, and thematic coding in NVivo. Study findings can be applied to support dairy farmers in their role of caring for dairy cows and calves during the periparturient period by identifying where knowledge gaps should be filled or resources provided for a mutually beneficial outcome of farm efficiency and cattle welfare.

Probing the Bacteriophage-*Salmonella enterica* Interaction on Alfalfa Sprouts

Catherine Wong(1), Siyun Wang(1)

(1) Department of Food Science, University of British Columbia, 2205 East Mall, Vancouver, BC, Canada.

Salmonella enterica (*S. enterica*) has caused multiple outbreaks associated with alfalfa sprouts. Prior research has shown bacteriophage to reduce *S. enterica* on growing alfalfa sprout seeds, but population resurgence after initial treatment can occur. Objectives: (1) Determine the optimal bacteriophage multiplicity of infection (MOI) against *S. enterica* and (2) assess the efficacy of repeated bacteriophage applications against *S. enterica* on sprouting alfalfa seeds. MOIs of 1, 10, 100, 1000 and 10000 plaque-forming units (PFU) per colony-forming units (CFU) of four *S. enterica* strains were tested in 96-well plates and populations were estimated on xylose lysine deoxycholate (XLD) agar from day 0 – 3. The same *S. enterica* strains were inoculated onto alfalfa seeds and treated with two bacteriophage cocktails on day 0. Half of the sprouts received water washes and the other received bacteriophage washes daily from day 1 – 7. Populations were estimated on XLD on day 0, 1, 3 and 7. MOI 1000 and 10000 were shown to have the highest efficacies at reducing *S. enterica* populations ($P<0.05$) with cocktail SE14, SE20 and SF6. MOI 1000 and 10000 with cocktail SE14, SE20 and SF6 was most effective for 2 of 4 strains ($P<0.05$). Daily bacteriophage washes further reduced *S. Enteritidis* populations by 1 – 2.5 log CFU/ml compared to a single treatment and further reduced *S. Muenchen*, *S. Newport* and *S. Typhimurium* populations by <1 log CFU/ml ($P<0.05$). Higher phage MOIs are more effective at reducing *S. enterica* populations and multiple phage treatments can further reduce populations on sprout seeds.

UBC
Faculty of
Land and Food
Systems

Sustainable Eating in Medical Nutrition Therapy for the Treatment of Type 2 Diabetes: A Study Protocol

Olivia Wu(1), Tamara Cohen(1)

(1) Human Nutrition, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada

Global food systems contribute to climate change, threaten food security, and increase the prevalence of type 2 diabetes (T2D). To address these challenges, individuals must adopt more sustainable eating patterns. Evidence shows that medical nutrition therapy (MNT) provided by registered dietitians (RDs) improves T2D-related health outcomes by facilitating dietary behaviour change. MNT stands to benefit from encouraging eating patterns with lower environmental impacts, while also considering the availability, accessibility, cultural acceptability, and health-impacts of these food choices. It is unclear how these sustainability domains can be comprehensively incorporated in diabetes nutrition care. This study will (1) determine if and how current dietary guidelines in MNT for T2D include the domains of sustainable eating, and (2) explore the barriers and facilitators of integrating sustainable eating in MNT for T2D from patient and RD perspectives. First, we will conduct a qualitative content analysis of professional and patient MNT resources obtained from an online environmental scan of grey literature. Resources will be analysed based on the *Sustainability in Food Based Dietary Guidelines Framework*. Next, we will conduct semi-structured interviews with Canadians living with T2D and RDs practicing in T2D. A thematic analysis comparing data from people living with T2D and RDs will be conducted. Results will be used to map synergies and trade-offs between domains of sustainable eating in MNT for T2D. Findings will educate health professionals working in T2D care and shed light on how MNT for T2D can address planetary health while upholding patient-centered care.

UBC
Faculty of
Land and Food
Systems

Investigating The Importance of Subclinical Ketosis in Robotic Milking Systems

Sydney M Moore(1), R Conceicao(1), J Marques(1), J Denis-Robichaud(1), R Cerri(1)

(1) Department of Land and Food Science, University of British Columbia, Vancouver, BC, Canada

The objectives of this study were to describe subclinical ketosis (SCK) in robotic milking herds, and to explore factors associated with SCK. A total of 430 cows across 2 commercial robotic milking herds in the Fraser Valley of British Columbia were enrolled in this study 1 week prior to dry off and followed until 60 days in milk (DIM) of the next lactation. Blood samples were collected from the time of dry off, weekly through the prepartum period, the day of calving till 4 DIM, then every other day until 14 DIM, and a final sample at 21 DIM. Blood was analyzed cow-side for beta-hydroxy butyrate (BHB) and glucose and sent off for analysis for non-esterified fatty acids (NEFA). SCK was defined as BHB $\geq$ 1.2 mmol/L and was diagnosed 426 times among 142 cows in both farms. Of the cows diagnosed with SCK, 63% had 2 or more SKC events. The prevalence of SCK varied across DIM, with the highest prevalence occurring at 8 DIM (21%). Additionally, cows with a body condition score of 3.5 or greater in the dry period were 1.4 times (95% CI = 0.55-1.88) more likely to experience SCK. Cows in the 7th lactation had the highest odds of experiencing SCK (1.9 times more likely than primiparous, (95% CI = 0.99-2.85). Cows with longer dry periods (>62 days) were 3.0 times (95% CI = 2.2-4.1) more likely to experience SCK compared with cows with a dry period of 51 days or less.

High-throughput Color Assessment of Red Raspberry Puree

Claudia Baldassi(1), Yuan Yuan Lee(2), Michael Dossett(3), Eric Gerbrandt(3), Simone D Castellarin(1)

(1) Wine Research Centre, The University of British Columbia, Vancouver, BC, Canada
(2) Food, Nutrition and Health, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada
(3) BC Berry Cultivar Development Inc., Abbotsford, BC, Canada

Red raspberry is a high-value crop, acclaimed for its quality characteristics. Color intensity is a critical trait in determining market acceptability: while the processing industry needs dark berries, the fresh market requires bright medium-red and non-darkening fruit. Fruit color is commonly assessed with the colorimeter, an instrument that allows to measure one sample at a time. In breeding programs large numbers of individuals are usually screened, thus making color measurement very slow. The objective of the present study was to develop a high-throughput protocol for red raspberry puree color assessment using digital imaging and digital phenotyping. Raspberry puree samples were obtained in 2020 from the fruit of 94 genotypes. A first comparison tested the correlation between puree samples contained in Petri dishes and measured (i) with a colorimenter and (ii) by collecting scans of the samples with a flatbed scanner and analyzing the images with a digital phenotyping software. Correlations were significant ($P < 0.05$) for all color parameters L*, a*, b* and strong ($R > 0.70$) for L* and a*. The second comparison tested the correlation between the same samples prepared in (i) Petri dishes and (ii) in 96-well plates, and analyzed with the flatbed scanner and the digital phenotyping software. All correlations were significant ($P < 0.05$) and strong ($R > 0.90$). These results suggest that the digital imaging and digital phenotyping method is a valid substitute of the colorimeter to measure raspberry puree color, and that the method allows high-throughput analysis with the use of 96-well plates.

Faba beans (*Vicia faba*) maintain consistent extrafloral nectar production with silicon supplementation

Chelsea M Gowton(1), Dennis Chiu(1), Isaac Peetoom Heida(1), Juli Carrillo(1)

(1) Plant Insect Ecology and Evolution Lab, Faculty of Land and Food Systems, Centre for Sustainable Food Systems, Biodiversity Research Centre, The University of British Columbia, Unceded xwməθkwəy̓əm Musqueam Territory, Vancouver, BC, Canada

Plants have evolved multiple physical and chemical defenses to protect themselves against herbivores. However, expression of defenses may come at a trade-off to other plant functions, like growth, and trade-offs may exist across different types of defenses. For example, in the Poaceae, silicon uptake reduces phenolic expression by interfering with the jasmonic acid (JA) pathway. The JA pathway is important for the induction of several plant defenses after herbivory. Extra-floral nectar (EFN) is a sugar-rich secretion that can be induced after herbivory and is linked with the JA pathway. EFN can attract predacious insects which feed on the sugar-rich reward and remove herbivores. The goal of this study was to determine if silicon uptake reduced JA-related carbon-based defenses, like EFN, in faba bean (*Vicia faba* L.). We used four genotypes of *V. faba* in a randomized complete block design. All plants were grown in growth chambers in either potting soil (Si-), or potting soil supplemented with silic acid (Si+). Once plants reached the seven-leaf stage, we treated plants with either dilute soap/ethanol solution (control) or methyl-JA (to simulate an herbivore response). We measured EFN production (volume, brix) at 24 and 48 hours. We harvested leaves to quantify silicon and phenolic content. Preliminary analysis shows that EFN production was not impacted by silicon supplementation or methyl-JA application. This research is the first to show that while silicon may impact short term phenolic content in grasses, it does not impact other carbon-based defenses such as EFN.

Historical trends in cranberry pest populations and their dependence on key climate variables

Kelly Wang(1), Juli Carrillo(1), Michelle Franklin(2), Todd Kabaluk(2)

(1) Plant Insect Ecology and Evolution Lab, Faculty of Land and Food Systems, The University of British Columbia, Unceded xʷməθkʷəy̓əm (Musqueam) Territory, Vancouver, BC, Canada
(2) Agriculture and Agri-Food Canada, Agassiz Research and Development Centre, Agassiz, BC, Canada

British Columbia (BC) produces over $35 million annually in Canadian cranberries sales and relies on integrated pest management (IPM) to support these production levels. Over 20 years, IPM services have provided control recommendations based on insect monitoring during the growing season. However, there is limited information on how weather affects long-term insect development and populations, which could help predict insect pest risks in cranberry fields. We are analyzing historical insect and weather records to understand the influence of climate on four key lepidopteran cranberry pests over time in various regions within the lower mainland of BC. We will use temporal models to determine the association between weather variables and the timing of first insect emergence, generation(s), and pest control economic thresholds for each region. Using spatial models, we will associate average insect abundance with regional key climate variables (temperature, precipitation, etc). The development of a spatial model for the lower mainland will provide visual representation of insect habitat ranges and risk level changes over time. In addition, bioclimatic models will be developed and verified to simulate the spatial-temporal effects from weather pattern changes and predict the effects on insect populations. This research will inform future pest management practices, supporting the cranberry industry to respond quickly and proactively to mitigate pest risks effectively with changing weather patterns and providing a model for other crops with similar historical data. This research will also establish metrics, based on insect development, with which to assess some of the biological effects caused by climate change.

UBC
Faculty of
Land and Food
Systems

The impact of social tie transitions, on fruit and vegetable intake among aging adults: results from a systematic review of longitudinal studies

Sanaz Mehranfar(1), Rana Madani Civi(2), Annalijn I Conklin(1,2,3)

(1) Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada
(2) Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada
(3) Centre for Health Evaluation and Outcome Sciences, Providence Healthcare Research Institute, St. Paul's Hospital, Vancouver, BC, Canada

The objective of this study was to examine the effect of social tie transitions on changes in fruit and vegetable consumption among seniors from a gender perspective. We systematically searched Medline, Embase, Scopus, CINAHL and ProQuest Dissertations for relevant longitudinal studies. We found 4957 eligible titles. Preliminary screening of Medline and Embase (3379 titles) resulted in 47 eligible full-texts but only 4 papers met inclusion criteria and focusing on marital transitions. Compared to remaining married, two sex-specific studies in the US found that people who experienced widowhood or divorce, consumed fewer vegetables, and those who remarried consumed more. The study on men reported a reduction in fruit intake among those who divorced; the study on women showed a moderate decrease in vegetables among those staying non-married. Another UK study reported a reduction in fruit variety, and in vegetable quantity and variety in men who remained single, became widowed and separated/divorced, compared to staying married. Men who became widowed had lower fruit quantity as well. However, British women who remained single and became separated/divorced only reduced their vegetable variety compared to staying married. Another study in Japan showed that becoming widowed was associated with a decrease in total and light-colored vegetables, compared to all stable marital statuses, although associations were non-significant in gender-stratified analysis. Overall, the results of this initial review suggest that marital transitions may have an impact on fruit and vegetable consumption. Other eligible titles might further elucidate the link between social ties and healthy eating in aging adults

UBC
Faculty of Land and Food Systems

Are stressed-out calves predictable? Assessing the consistency of coping ability over time in dairy calves

Alexandra Aparicio(1), Emeline Nogues(1), Marina AG von Keyserlingk(1)

(1) Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada

Every year, approximately one million Canadian dairy cows give birth to a calf. The calves are separated immediately and reared by the farmer. Many standard calf management practices are stressful, potentially compromising calf health and welfare. While current research has primarily focused on the ability of calves to cope with a specific stressful event, little attention has focused on whether they are able to consistently cope when subjected to multiple stressors over time. This aim of this study was to determine whether the coping strategies of calves are consistent across time and context when subjected to three different stressors reflecting routine management practices during the pre-weaning, weaning and post-weaning periods. We looked at three common stressors: 1) disbudding that often occurs pre-weaning, 2) weaning off of milk, and 3) regrouping with unfamiliar individuals post-weaning. Measures were specific to each stressor: in the days following disbudding we measured changes in reward intake; during weaning we monitored changes in play behaviours; and finally, we monitored changes in time spent feeding during their first regrouping. We expected that calves showing a large decrease in reward intake after disbudding, would exhibit greater decreases in play behaviour during weaning and time spent feeding when regrouped. Calves that are able to adequately cope when subjected to multiple stressors, maybe more resilient and thus able to show improved coping skills when subjected to subsequent stressors later in life. This consistency overtime may allow farmers to identify early on which individuals will be most successful in their herd.

Low Soil Biochar Application Rates in Agriculture Soils: Investigating the Effect on Crop and Soil Nutrient Dynamics

Morgan Hamilton(1), Jean-Thomas Cornelis(1), Maja Krzic(1), Jack Edgar(1)

(1) Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada

Biochar can be utilized as an agricultural soil amendment to sequester carbon, while modulating nutrient- and water-holding capacity. Common biochar application rates exceed 10 t/ha and are often not environmentally and/or economically realistic. The objective of this study is to examine the effects of a more realistic biochar application rate (3t/ha) on plant nutrient availability, wheat yield and nutrient-use efficiency on coarse textured soil at the UBC campus. In a field trial established in spring 2022 (to be repeated in 2023) at the Totem Field Station, biochar was applied in its original "pristine" state, and an "activated" state after being charged with nutrient-rich dairy slurry manure. After a first cropping season (2022), soil and wheat elemental concentrations were analyzed. While the impact of the 3 t/ha application rate on soil nutrient bioavailability was not significant during the first cropping season after application, treatments had a significant impact on wheat nutrient content. Relative to control treatments, wheat grown with activated biochar had higher nitrogen accumulation, while phosphorus accumulation decreased with both activated and pristine biochar. These results suggest that biochar activation had prolonged impact of the quantity of plant available nitrogen and nitrogen uptake, and that plant available phosphorus was potentially absorbed and held in biochar pores, reducing plant availability. These findings suggest that low application rates of activated biochar may be beneficial for nitrogen availability, but that phosphorus may need to be managed accordingly. The 2023 cropping season will allow further understanding on the persistence of treatment effects.

Emotional impact and attitudes of self-rehoming versus shelter relinquishing in pet owners

Meghan Lok(1), Lexis Ly(1), Alexandra Protopopova(1)

(1) Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada

One-third of animals that enter Canadian animal shelters are surrendered by owners. To maintain a manageable capacity in animal shelters, organizations aim to employ strategies that reduce the intake of animals. Previous studies demonstrate that relinquishing an animal to a shelter is a difficult decision, often due to a strong emotional attachment to the animal and concern for its welfare in the shelter. Alternatively, some pet owners rehome through self-rehoming methods, which can include contacting personal networks or publicly advertising on social media and services such as Craigslist or AdoptaPet.com. While reducing shelter intake is a benefit of self-rehoming, the emotional impact of self-rehoming remains unknown. Thus, the purpose of this study is to explore how the emotional impact of self-rehoming differs from relinquishing to a shelter. Our mixed-methods survey targets public members who have rehomed at least one animal in the past five years. The survey contains multiple choice and open-ended questions on the degree of emotional distress based on the Pet Bereavement Questionnaire (PBQ), as well as the rehoming decision-making process. While data collection is ongoing, we predict a stronger, negative emotional impact for relinquishing an animal to a shelter. If the findings support this hypothesis, it could encourage the implementation of accessible interventions and self-rehoming methods, which may result in reduced emotional impact for pet owners going through the rehoming process. In addition, promoting self-rehoming could divert animals away from shelters, sparing resources for animals already in the shelter system.

UBC
Faculty of
Land and Food
Systems

The Majority of Children with Sickle Cell Disease in British Columbia Meet Recommendations for Dietary Intake of B Vitamins

Brock A Williams(1,2), Lulu X Pei(1,2), Heather McCartney(3), Angela M Devlin(2,4), Ali Amid(2,4), Suzanne Vercauteren(2,5), John K Wu(2,4), Crystal D Karakochuk(1,2)

(1) Food, Nutrition and Health, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, Canada
(2) BC Children's Hospital Research Institute, Vancouver, Canada
(3) BC Children's Hospital, Vancouver, Canada
(4) Department of Pediatrics, Faculty of Medicine, The University of British Columbia, Vancouver, Canada
(5) Department of Pathology and Laboratory Medicine, Faculty of Medicine, The University of British Columbia, Vancouver, Canada

Individuals with sickle cell disease (SCD), an inherited anemia, are at increased risk of folate deficiency due to increased folate-dependent erythropoiesis. Supplementation of B vitamins, especially folate, is common practice in children with SCD. The aim of this study was to determine adequacy of folate, and vitamin B2, B6, and B12 intake from food among children with SCD in British Columbia. Dietary intake was collected and analyzed from children with SCD (aged 2-19 years) using the ASA24 Dietary Assessment Tool-Canada 2018 version. Participants were invited to complete 3 non-consecutive 24-hour recalls. A total of 23 participants with SCD (57% female; median [IQR] age: 11 [8-15] years) completed ≥2 recalls. Misreporting of daily energy intake, reported energy intake <75% or >125% of estimated energy requirements, was observed in 34% (n=23/67) of recalls. After adjustment for misreporting, median (IQR) daily intakes were: 347 (270-420) µg DFE folate, 1.2 (1.0-2.0) mg vitamin B2, 1.2 (0.9-1.6) mg vitamin B6, and 2.6 (1.4-3.7) µg vitamin B12. Based on adjusted intakes, 19% (n=4/21) of participants had folate intake below the Estimated Average Requirement (EAR) and 5% (n=1/21) had an intake of folic acid from food above the Upper Limit (UL). Intakes of vitamins B2, B6, and B12 were below the EAR in 5% (n=1/21), 14% (n=3/21), and 19% (n=4/21) of participants, respectively. In conclusion, >80% of children with SCD in this sample had adequate daily intake of essential B vitamins. Additional studies with larger, more-representative populations are required for a more comprehensive assessment of dietary adequacy.

UBC
Faculty of
Land and Food
Systems

Mapping resistance to Fusarium head blight in wheat bi-parental mapping populations

Sharandeep Singh(1), Debbie Miranda(2), Maria Antonia Henriquez(2), Zesong Ye(3), Curt McCartney(3), Gurcharn S Brar(1)

(1) Faculty of Land and Food Systems, The University of British Columbia,Vancouver, BC, Canada.
(2) Morden Research and Development Centre, Agriculture and Agri-Food Canada, Canada.
(3) Faculty of Agricultural and Food Sciences, Department of Plant Science, University of Manitoba, Winnipeg, MB, Canada.

Fusarium head blight (FHB) is an important fungal disease affecting the yield and quality of wheat. Deploying resistance in wheat cultivars is an essential component of an integrated strategy for reducing the adverse effects of FHB. Most previous studies have mapped FHB resistance from Chinese germplasm. In our study, we are utilizing a Watkin landrace, 'Wat.1190580', with a resistant reaction to FHB (Type I, II, III, and IV) as a male/donor parent to develop RIL populations. 'Paragon' a European cultivar susceptible to FHB was crossed to 'Wat.1190580' to develop the first bi-parental mapping population (n=80) for our experiment. 'Paragon/Wat.1190580' was advanced to F8 with the single seed descent (SSD) method and was screened for FHB incidence, severity, visual rating index (VRI), fusarium damaged kernels (FDK); and agronomic traits days to anthesis (DTA), and plant height (PHT) at Carman and Morden in 2021 and 2022. It was then genotyped using high density 90K SNP array. We have also developed two additional mapping populations, 'AAC Starbuck/Wat.1190580' (n=111) and 'BW1085/Wat.1190580' (n=101), each carrying the gene *Fhb1*. This study aims to map the QTL associated with FHB resistance in bi-parental mapping populations. Additionally, we also want to study the epistatic interactions among the novel resistance alleles (contributed by 'Wat.1190580') and *Fhb1* present in the two additional mapping populations.

UBC
Faculty of
Land and Food
Systems

The impact of genetically modified crops on biodiversity

Dennis Engist(1), Frederik Noack(1)

(1) Faculty of Land and Food Systems, The University of British Columbia,Vancouver, BC, Canada

Healthy and diverse ecosystems provide a variety of essential services. However, global biodiversity has been declining at an alarming rate, driven among other factors by agricultural intensification and expansion. More recently, the development and introduction of genetically modified (GM) crops in the United States marked another major transformation of agricultural production: over 90% of US corn, soybean and cotton acreage are now planted with GM varieties. While small-scale field trials have found little to no negative impacts of GM crops on biodiversity, there is a lack of research looking at country-wide biodiversity impacts. We here estimate the causal impact of GM crops on biodiversity by estimating their effect on bird populations across the contiguous United States. We use bird observations from the North American Breeding Bird Survey combined with agricultural census data and satellite-derived land use classifications to estimate the exposure of each observation to GM crops. Using a two-way fixed effects model, we then compare the development of bird populations over time on agricultural areas with high exposure to GM crops to areas with low exposure. Our results show that the introduction of GM crops had a weak negative effect on overall bird populations in the United States. This study provides new insights into the effects of GM crop varieties, as well as further policy guidance for Europe and other GM non-adopters.

Genomic characterization of terpene biosynthetic genes in seven *Vitis vinifera* L. varieties

Malin Petersen(1), Simone D Castellarin(1)

(1) Wine Research Centre, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, BC, Canada

V. vinifera (grapevine) is one of the most economically important fruit crop species in the world. One of the main determents for their market value is the aroma. Terpenes are secondary metabolites whose concentration and composition play a key role in grape aroma. The genes responsible for terpene biosynthesis termed terpene synthases (TPS), have been studied predominantly in the PN40024 reference genome and variety-based differences are largely unexplored despite the economic value. This project aims to identify and localize TPS genes in the genomes of seven commercially important wine grape varieties named Albariño, Cabernet Sauvignon, Fiano, Gewürztraminer, Pinot Noir, Riesling and Viognier. To achieve this goal, the genomes of these varieties will be sequenced and assembled. The annotation of TPS genes will be manually curated using previously characterised genes from PN40024 and other species including *Arabidopsis thaliana*. Variety-specific TPS genes will be searched and compared structurally and sequence-based. Furthermore, mutations and recent duplication events of TPS genes will be highlighted. Besides different genetic potential to biosynthesise terpenes, this study will determine which genes are transcribed during grape development (from flowering to harvest) and how the expression of TPS genes correlates with terpene levels. The results will be of great importance to breeders and scientists alike to understand the fundamentals of differences in aromas between varieties. The identification of key TPS linked to quality-related aromas will facilitate breeding programs aiming to improve grape aromas. Further research including TPS expression levels in response to climatic stress will build on this study.

A qualitative study to create and evaluate *PregnancyCards: A clinical dialogue tool for use in prenatal care settings*

Valentina Lurye(1), Tamara R Cohen(1), Angela S Alberga(2)

(1) Food, Nutrition and Health, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada
(2) Concordia University, Montreal, QC, Canada

Approximately 50% of Canadian pregnant women exceed gestational weight gain (GWG) recommendations. Pregnant individuals value guidance from their prenatal care providers (PCPs) for achieving a healthy GWG, but PCPs often avoid discussing weight-related topics due to discomfort. When pregnant individuals initiate these conversations, PCPs are more open to discussing them. Previous research has shown that dialogue cards are effective in starting sensitive conversations between patients and healthcare providers, but none has been created for pregnant individuals. The current project aims to improve communication between pregnant individuals and PCPs regarding GWG and other health-related topics through the development of "PregnancyCards", a new clinical dialogue tool that will increase pregnant individuals' confidence in discussing sensitive topics. My Master's thesis is the first phase of an extensive study and is a qualitative research that involves recruiting pregnant individuals and PCPs to participate in focus groups to determine health-related topics of interest. The results will be used to create the draft of the topic statements for "PregnancyCards" and will inform the next phase of the study. The ultimate goal is to empower pregnant individuals and improve pregnancy-related health outcomes.

Decoding Adaptive Traits in *Fusarium graminearum* Using Integrated Omics

Yishan Zhang(1), David Konkin(2), Curtis Pozniak(3), Gurcharn Singh Brar(1), Ehsan Sari(4)

(1) Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada
(2) National Research Council, Saskatoon, SK, Canada
(3) University of Saskatchewan, Crop Development Centre, Saskatoon, SK, Canada
(4) University of California Riverside, Department of Microbiology and Plant Pathology, Riverside, CA, USA

Fusarium graminearum, the predominant causal agent of Fusarium head blight (FHB) in cereal crops, impacts the North American wheat industry mainly through the contamination of infected grains with mycotoxins. Understanding the molecular mechanisms underlying adaptive traits in field populations can accelerate the improvement of durably resistant cultivars and effective fungicides. Previously, a Nested Association Mapping Population of *F. graminearum* (FgNAM) was developed via sexual crosses using Nit-5 (a Nit isolate derived from isolate PH-1) as a recurrent parent and eight other isolates from North America representing phenotypic variation in some adaptive traits, including aggressiveness toward wheat species, DON chemotypes (3ADON vs. 15ADON), and sensitivity to triazole fungicides. This project aims to identify genes associated with these adaptive traits among *F. graminearum* populations in North America. A pan-genome reflecting diversity in the populations occurring in North America was constructed using nanopore sequencing from the nine isolates as funders for FgNAM. The pan-genome analyses provided additional chromosome-scale reference genomes and annotation based on RNA-seq data obtained from FgNAM founders. Several candidate effectors co-located with hypervariable regions were detected in 3ADON isolate SK1797. Besides, two candidate fungicide insensitivity genes, *YC79* (a transcription factor) and *MFS1* (a multi-drug transporter) were identified in Metconazole insensitivity isolate 106Eb1 based on fungicide sensitivity phenotyping. This study provides a pan-genome based on the nine FgNAM founders' genomes combined with transcriptome analysis, which will facilitate the identification of novel genes related to fungicide insensitivity, aggressiveness toward wheat and mycotoxin production in *F. graminearum*.

What's Special About Eggs? Chinese Consumers' Attitudes and Trust Towards Cage-Free Eggs

Huipin Lee(1), Maria Chen(1), Daniel Weary(1)

(1) Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada

Approximately 90% of eggs in China are produced within cage systems and research on the motivations for Chinese consumers to choose cage-free eggs are limited. The aim of this study was to better understand the perspectives of Chinese consumers towards cage-free eggs through exploring how and why they purchase these products. We used purposive sampling to recruit 19 participants who identified themselves as purchasers of cage-free eggs. Each participant participated in 2-4 semi-structured interviews. Participants were also asked to keep a food diary, in which they recorded purchasing, cooking, and eating experiences with eggs. All data were analysed using reflexive thematic analysis. All participants felt that cage-free eggs (非笼养鸡蛋) were superior compared to conventional or 'normal' (普通) eggs. The main perceived benefits of cage-free eggs included improved: 1) flavour and texture of eggs, 2) lived experience of the chickens, 3) health of the chickens and thus the consumers themselves, and 4) environmental impact. How participants obtained cage-free eggs reflected their trust in these products. Some participants repeatedly requested or purchased cage-free eggs from people or companies they trusted and strongly believed in the superior quality of cage-free eggs. Participants who purchased cage-free eggs from multiple sources were more flexible when choosing between cage and cage-free eggs. Understanding the purchasing behaviours and priorities of consumers may facilitate targeted strategies for marketing of cage-free eggs, and potentially public education regarding the welfare of laying hens reared in cage-free housing systems in China.

UBC
Faculty of
Land and Food
Systems

The impact of different progesterone concentrations during the follicular growth on the transcriptome profile of early embryos recovered from superovulated Holstein heifers

Jessica Christina dos Santos Marques(1), JPO Maciel(2), MA Sirard(3), RLA Cerri(1)

(1) Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada
(2) Faculty of Veterinary Medicine, Rural Federal University of Pernambuco, Recife, Brazil
(3) Department of Animal Sciences, Laval University, Quebec, Canda

The objective of this study was to evaluate the impact of different progesterone (P4) concentrations during the follicular growth on the transcriptome profile of early embryos recovered from superovulated Holstein heifers. A total of 63 Holstein heifers were randomly assigned into two experimental groups: LowP4 (n = 31) and HighP4 (n = 32). Animals received a pre-synchronization protocol followed by a protocol of superovulation that included the allocated P4 treatment. Embryo collection was performed 7d post artificial insemination and embryos were evaluated for stage of embryonic development and grades of quality. Embryos graded as good or excellent quality (High P4 = 27; Low P4 = 27) were randomly allocated in 3 replicates per treatment group, balanced for stage of embryonic development. Embryo RNA was extracted from each replicate and six libraries were prepared and sequenced (Illumina). Principal component analysis and Ingenuity Pathways Analysis were performed. A total of 1,429 gene transcripts were identified to be differentially expressed between treatment groups. The expression of 563 gene transcripts were significantly increased, whereas 866 were significantly decreased in HighP4 embryos when compared to LowP4. Approximately 1% (n = 13) of the differentially expressed genes (DEGs) were pseudo genes and 11.2% (n = 160) represented novel transcripts. Upregulated DEGs (2.7 – 6.1 log2 fold-change) included: CCR3, MPO, IGFBP1, and RSAD2 ($P < 0.05$). Downregulated DEGs (1.9 – 9.0 log2 fold-change) included: RETN, ESR1, CNFN and TNFRSF17 ($P < 0.05$). Different P4 concentrations during the follicular growth is associated with gene expression patterns of early embryos recovered from superovulated Holstein heifers.

What does a dog prefer to do? An investigation of individual dogs' preferences for human-social enrichment in an animal shelter

Antonio Hou(1), Alexandra Protopopova(1)

(1) Animal Welfare Program, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, BC, Canada

Environmental enrichment (EE) for dogs housed in animal shelters helps improve their well-being. Physiological and in-kennel behavioral change of animals has been utilized as a proxy to assess EE efficacy. However, preference assessments may add additional information – does a particular individual actually prefer a certain EE item or activity? Previous research showed utility of preference assessments for object- but not yet activity-based EE. This study aimed to determine the feasibility of identifying individual preferences for EE in shelter dogs (n = 6). Each dog received two phases: a choice phase and a control phase. In the choice phase, each dog was (max 21 trials) asked to enter a colour-coded T-maze with two exit options (counterbalanced by entrance), one leading to an outdoor play yard and the other leading to an outdoor trail for on-leash dog walking. Preference was determined when a participant picked the same activity in 8 out of the 10 last trials. Subsequently, a control phase was conducted, in which their previously preferred side now led back to their kennel and the opposite exit to their preferred EE, to examine if the EE they chose reflected their true preference. Of the six participants, preference could be determined for five: three preferred the yard, two preferred the trail. Our findings show that preference assessments may also be used for activity-based EE, and not just stimulus-based EE. Additionally, our study could bring a simple methodology to help determine the preference of shelter dogs and tailor the EE to individual needs.

UBC
Faculty of
Land and Food
Systems

Effects of variable rate fertilization application on improving inter-vine uniformity of vegetative growth and grape quality

Pin-Jui Chen(1), Joshua VanderWeide(2), Simone D Castellarin(1)

(1) Food, Nutrition and Health, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, BC, Canada
(2)Department of Horticulture, Michigan State University, East Lansing, MI, USA

Conventional grape management consists in applying constant rates of fertilizers in vineyards on the assumption of a general homogeneity of soil and vine growth. However, soil nutrient composition varies by topography, soil properties, and microclimate. The variation in soil nutrient composition results in different vine vigor and physiological response, leading to variations in yield and grape quality within vineyards. Variable rate fertilization (VRF) is a precise agriculture strategy, allowing localized application of fertilizers in variable doses in response to soil and grapevines spatial variability within vineyards. VRF can prevent overfertilization without compromising yield and grape quality, reducing grower's costs and improving the uniformity within a vineyard of vine vigor, yield, and grape quality. The research was conducted in two commercial vineyards in the Okanagan Valley, British Columbia. In each vineyard, three digital prescription maps were generated based on three soil sampling densities (number of soil samples collected to assess soil nutrient composition), one (low resolution), two, and four (high resolution) soil samples per acre, respectively. Nitrogen, boron and phosphorus fertilizers were applied at a constant rate (industry standard) in control plots or based on each digital prescription maps. The future works will focus on the effects of VRF treatment on aroma accumulation in grapes and discuss the correlation between the effects of VRF on vine growth and physiological parameters and grape quality.

UBC
Faculty of
Land and Food
Systems

Evaluating the efficacy and adverse side effects of two forms of iron in prenatal micronutrient supplements: Study protocol for a randomized controlled trial in Vancouver, Canada

Lulu X Pei(1), Crystal D Karakochuk(1)

(1) Food, Nutrition and Health, Faculty of Land and Food Systems, The University of British Columbia, Vancouver, BC, Canada

Iron deficiency in pregnancy has serious consequences for both the pregnant individual and the infant. Prenatal micronutrient supplements contain iron commonly in the form of iron salts (e.g., ferrous fumarate) which are poorly absorbed and associated with adverse side effects, such as nausea and constipation. Excess iron passes unabsorbed from the duodenum into the colon and increases susceptibility to pathogen growth, as many enteropathogens utilize iron for virulence and colonization. An alternative and more bioavailable form of iron, ferrous bisglycinate, has been shown to be as effective as 'conventional' iron salts even when administered at a lower dose. The provision of prenatal supplements is critical to ensure adequacy of nutrients delivered to the fetus to reduce risk of adverse health outcomes and neurocognitive impairments. However, most studies examining the efficacy of iron supplements in pregnancy have focused primarily on indicators of maternal iron and anemia status. We will conduct a double-blind randomized controlled trial that aims to compare the effects of two forms of iron on maternal and umbilical cord ferritin concentrations, as well as maternal gut pathogen abundance and occurrence of adverse side effects. Pregnant women (19-42 years of age) at 13-25 weeks' gestation will be randomized to receive a prenatal micronutrient supplement containing 24 mg elemental iron either as ferrous bisglycinate or as ferrous fumarate for a minimum of 12 weeks during pregnancy. This research will inform optimal oral iron supplementation practices during pregnancy to support adequate transfer of iron to the fetus while minimizing adverse side effects.