UK-Canada Plant-Based Protein Collaboration Event

7th June 2023 15:00 – 17:00 BST

> Kaeli Johnson, Knowledge Transfer Manager, Agrifood Innovate UK KTN www.ktn-uk.org



Innovate UK KTN

- Please stay on mute throughout the talks
- Please put any questions for speakers in the Chat (please start with Q-) and also use the Chat to network
- The talks will be recorded and slides will be circulated after the event
- The Collaboration Session will not be recorded



Agenda

15:00 – 15:05	Welcome
15:05 – 15:15	Overview from Innovate UK
15:15 – 15:25	Overview from Protein Industries Canada
15:25 – 15:35	Case study – Canadian project
15:35 – 15:45	Case study – Canadian project
15:45 – 15:55	Case study – UK project
15:55 – 16:05	Q&A
16:05 – 16:10	Break
16:10 – 16:15	Collaboration activity introduction
16:15 – 16:30	Themed breakout room – Round 1
16:30 – 16:45	Themed breakout room – Round 2
16:45 – 16:50	Random breakout room – Round 1
16:50 – 16:55	Random breakout room – Round 2
16:55 – 17:00	Closing remarks

Kaeli Johnson, IUK KTN Tom Jenkins & Kathryn Miller, IUK James Street & Meghan Gervais, PIC Matthew Lentsch & Margaret Hughes, Avena Foods Tristan Choi, Lupin Platform Sarah Gaunt, SPG Innovation

Kaeli Johnson, IUK KTN Facilitated by IUK KTN Facilitated by IUK KTN Facilitated by IUK KTN Facilitated by IUK KTN Kaeli Johnson, IUK KTN





About Us

Innovate UK KTN exists to connect innovators with new partners and new opportunities beyond their existing thinking – accelerating ambitious ideas into real-world solutions.



We have deep expertise in AgriFood



Livestock & Aquaculture



Crops







Food



How we can help





Make powerful connections

Secure funding



Get expert insight



Keep up to date









Innovate UK

Kathryn Miller

Innovation Lead – Food and Nutrition





Benefiting everyone through knowledge, talent and ideas

UK Research and Innovation brings together the 7 Research Councils, Innovate UK and Research England.

As part of UK Research and Innovation, Innovate UK drives productivity and economic growth by supporting businesses to develop and realise the potential of new ideas including those from the UK's world-class research base.





Innovate UK

- We are the UK's innovation agency
- We support business-led innovation in all sectors, technologies and UK regions
- A key delivery body of the Government's Innovation Strategy

Our Mission

To help UK businesses grow through the development and commercialisation of new products, processes, and services, supported by an outstanding innovation ecosystem that is agile, inclusive, and easy to navigate.



Innovate UK



Our Impact

Confidence in the Plan for Action

Growing Companies

Through our programmes, we have invested £4.6bn in 12,000 companies, helping to create over 100,000 jobs and contribute £32.2bn in added value to the UK economy.

Building Sectors

We have helped the UK lead the way in new industries that are fundamental to our future prosperity.



We helped make the UK a world leader in offshore wind – now generating more than 10% of UK electricity.



We helped build the third largest cluster of cell and gene therapy companies in the world.



We helped attract more than £1.8 billion private investment for synthetic biology start-ups between 2014 and 2019.



We helped London grow into a world centre for the visual effects industry and open new studios across the UK.



We helped a semiconductor cluster in Wales contribute £172 million to the Welsh economy in 2020 and is supporting 2,100 jobs.



Building the Future Economy Plan for action for UK business innovation





Building the future economy

Plan for action for UK business innovation

2021-2025

inspire involve invest

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We have launched a <u>plan for action</u> to explain how we will deliver the <u>Government's UK Innovation Strategy</u>, with the vision for the UK to become a global hub for innovation by 2035.

Our actions will be guided and prioritised by the following:



UK priorities

Better Food for All

- enhancing food quality
- functional foods: foods with specific health benefits
- stratified nutrition
- fortified and biofortified foods
- plant-based and alternative proteins
- preservation, packaging and storage technologies

Novel Low Emission Food Production Systems

- plant based products or production systems
- acellular food production, for example, algal, bacterial or fungal fermentation systems
- cellular food production, for example, cell culture systems for meat production
- novel aquaculture systems, for example, fin-fish and shell-fish
- new food production systems, for example, insect farming, seaweed cultivation and other alternatives to traditional animal production systems
- Total Controlled Environment Agriculture (TCEA) systems



Total budget



Canada and the UK

Tom Jenkins, Deputy Challenge Director

Transforming Food Production/Farming Innovation Programme Innovate UK



Introduction UK - Canada

- Canada is a strategic priority country for UKRI (UK Research and Innovation) and DSIT (Department for Science, Innovation and Technology)
- Agri-Tech is a strategic priority for collaboration and was a founding pillar in the MoU signed between DSIT and Global Affairs Canada
- Innovating with Canada provides opportunities for UK businesses to:
 - Co-develop & supply innovative goods & services into the larger companies driving Canadian economy;
 - Enable UK companies to increase their own technological abilities and productivity; and
 - Form strong relationships with Canadian partners to access global business opportunities jointly.
- Having completed successful programs to Canada in the agri-food sector, Innovate UK is looking to build on promoting collaboration and partnerships
- Bilateral funding opportunities are now being developed with the Global Business Innovation Programme being a critical activity to help establish strong collaborations and consortia.



Activities to build strategic partnerships with Canada

- 1. March 2017 UK 'expert mission' to Canada: scoping priority themes to establish Agri-Tech bilateral partnership opportunities.
- 2. June 2017 Online workshop: to establish priority theme areas for industry-led Agri-Tech CR&D competition.
- **3. Sept 2017** London Roadmap: short- medium- and long-term challenges and opportunities for Agri-food sector towards 2030.
- **4. June 2018** Global Business Innovation Programme (GBIP) mission: 12 UK SMEs join for mission to Canada (Sask, Toronto/Guelph).
- 5. December 2018 Online workshop: establishing priority themes to address challenges in food supply chain and nutrition sector.
- 6. February 2019 Canadian mission to UK: 10 SMEs with visits to MTC & Campden BRI; London workshop to promote IUK / NRC-IRAP funding competition.
- 7. January 2020 GBIP mission: 13 UK SMEs join for Agri-Tech and launch of IUK / NRC-IRAP bilateral Agri-Tech competition

Innovate UK

Innovate UK is part of UK Research and Innovation

Creating a shared vision for the agri-food sector

How the UK and Canada can stay competitive by working together

June 2018

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Innovate

UK

UK-Canada co-innovation: Agri-Tech

RootDetect: Remote Detection and Precision Management of Root Health



Developing an early-warning system for harmful algae blooms to improve productivity on salmon farms

CINNOVASEA

Advancing Bioprocess Sustainability for Poultry Feed from Algal Biotechnology



Transforming Germplasm and Genetic Quality to Drive Livestock Productivity



Sustainability and Supply Chain Benefits of Antibiotic Replacement Technology for Canadian

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Clarity

and UK Livestock Sectors TRUST

Precision Agriculture Remote Connectivity System

Electronics

Integration

JC

(.nanotech.



Bix

Precision Decision

• FARMSCANAG

Gold nanorod diagnostic test and data management system for detection and control of bovine tuberculosis



UK-Canada co-innovation – Food manufacturing



SIUF8: Application of a novel cell concentration device to a nutritional heterotrophic algae process



Smart Mixing: Food process efficiency -Optimize product quality using Artificial Intelligence



SPL-MIX: Enhancing industrial liquid processing through intelligent pipeline mixing CALGAVIN. AltaML



FoodScan: Combining recent pathogen microbiological developments with the latest advances in data science technology

AGRI-NEO





Innovate

UK

... and we're excited to explore new plant-based bilateral opportunities with Canada ...



Innovat UK

Global Business Innovation Programme (GBIP)

- Opportunity for UK SMEs to understand the Canadian plant-based protein ecosystem
- Programme of support:
 - Preparation
 - Innovation visit
 - Post-visit exploitation
 - Follow-up support

Applications close 16 June 2023

Innovate UK

Global Business Innovation Programme AgriFood - Canada

The Global Business Innovation

Programme, organised by innovate UK and delivered by innovate UK EDGE, consists of a preparation phase, an 6-day innovation visit, a post-visit exploitation workshop and follow-up support of approximately 12 moniths from an innovate UK EDGE innovation & Growth Specialist. helping your business maximise the opportunities identified, including developing innovation projects with partners in the territory. This initiative will be delivered physically and could include virtual activities.

Innovate UK is committed to ensure that anyone, from any background, has an equal opportunity to be successful.

Focus Areas:

We would welcome applications from companies who are involved in developing innovations to support the plant-based protein sector in (but not limited to) the following areas:

Ingredients - The development, scaling and optimisation of plant-based ingredients, e.g. onto, beans, peas.

 Products - The conversion of high protein crops, ingredients and co-products into consumption-ready goods.

- Adding value / enhancing quality

 Innovations to improve the nutritional quality, cross-sumer acceptability, sustainability, and safety of plant-based products.
- Waste stream management -Innovations to add value to waste streams produced during processing of crops such as field peas, lentils, canola, and related inpredients.
- Animal feed / pet food applications

 Innovations related to uses focussed on plant-based animal feed and pet food.

Why Canada?

Cañada is home to a vibrant start-up culture and a strong ecosystem of worldleading agriculture and food companies. It is the 5th largest agricultural commodities exporter in the world with the sector benefiting from an abundant supply of natural resources including diverse plant, animal and marine life.

Agri-Tech is a strategic priority for

collaboration and was a founding pillar

2022, \$150 million was earmarked for Protein Industries Canada (PIC). This builds on the previous \$173 million entrusted to Protein Industries Canada, through the Global Innovation Cluster Program to advance Innovation in plant-based food and ingredients. Having completed successful programs to

(Department for Science, Innovation and

Technology) and Global Affairs Canada.

Plant-based protein is a key area of focus

for Canada. As part of Canada's Budget

Innovate

naving completed successful programs to Canada in the agri-food sector, Innovate UK is looking to build on promoting collaboration and partnerships. Bilateral funding opportunities are now being developed with the Global Business Innovation Programme being a critical activity to help establish strong collaborations and consortia.

Benefits:

 Explore Canadian partnership opportunities focussed on plant-based proteins.
 Designs a better understanding of the

- Develop a better understanding of the challenges and opportunities of doing business in Canada.
- Find potential innovation collaborators and partners and develop your network in the UK and globally.
- Improve your company value proposition to international partners and investors.



Canada-UK priority areas of interest

- Ingredients The development, scaling and optimisation of plant-based ingredients, e.g., oats, beans, peas.
- Products The conversion of high protein crops, ingredients and co-products into consumption-ready goods.
- Adding value / enhancing quality Innovations to improve the nutritional quality, consumer acceptability, sustainability, and safety of plant-based products.
- Waste stream management Innovations to add value to waste streams produced during processing of crops such as field peas, lentils, canola, and related ingredients.
- Animal feed / pet food applications Innovations related to uses focused on plant-based animal feed and pet food.





Thank You

🥑 @InnovateUK

Innovate UK





@weareinnovateuk



Protein Industries Canada and the Canadian Plant-Based Ecosystem

June 7th, 2023

We co-invest in innovation to accelerate the growth of Canada's plant-based food, feed and ingredient sector.



WE WILL CONTINUE TO CO-INVEST IN INNOVATION TO ACCELERATE THE GROSECTOR.

Protein Industries Canada

Progress of the past four years

Protein Industries Canada







445 Partners involved in projects

\$264.48 million Follow-on investment

\$477 million Dollars invested in total project value

90,782 Students engaged with STEM programs in more than 140 communities across the prairie provinces including

55

Projects

7,983 Indigenous youth With more than 53,338

youth in digital skills activities related to digital agriculture

including 2,050 Indigenous youth



Canada's Ingredient Landscape

- Reliable and high-quality supplier of key crops and subsequent ingredients
- PIC projects support improvements across both the range of crops and the entire value chain

Ingredient Processing Capacity by Crop





Project Collaboration

June 2023

Value Chain Innovation

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Optimize fava bean breeding for regional climate

Seeds

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Explore agronomy and quality of fava bean varieties Optimize hulling and milling of fava beans

ROQUETTE

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Clinical nutrition trials; recipe formulation; consumer testing; production scaleup

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ALBERTA

RED RIVER COLLEGE Big Mountain Foods products can be found in a variety of grocery stores



Technology Pillars



Genetics (15%): germplasm development with an aim to improve processing efficiency, quality, sensory and the development of novel ingredients



Crops (10%): technologies to measure and improve on farm sustainability and information flow along the value chain



Ingredients (50%): the development, scaling and optimization of plant-based ingredients



Products (25%): the conversion of Canadian made ingredients and co-products into consumption-ready goods

Technology Readiness

Proof of Concept (20%): Projects that will demonstrate feasibility at pilot scale by generating data to assess technical and economic feasibility.

Technology Scaling (50%): Projects that will enable the first commercial deployment of a technology.

Commercially Ready (30%): Projects that will enable companies to optimize and deploy commercially viable technology for Canadian crops and conditions



Commercialization and Scaling



Typical Project Lifecycle





Thank You

projects@proteinsupercluster.ca

Avena Foods Building Partnerships Collaborative R&D in the UK

UK-Canada Plant-Based Protein Collaboration Event 2023.06.07









Avena Foods Limited

Partnering for safe, healthy diets and a sustainable world



Farmer Field Presentation Avena Customer and Farmer Appreciation Day (CAFAD) Regina, Saskatchewan R&D Training Food Development Centre Portage la Prairie, Manitoba





Avena Purity Protocol Oat Mill, Oat Cleaning Plant, Pulse Cleaning Plant, Pea Splitter Rowatt, Saskatchewan



Avena Pulse Flour, Grit, Fiber and Functional Flours Mill Portage la Prairie, Manitoba



Avena Head Office and Purity Protocol Oat Mill Regina, Saskatchewan



Avena R&D UK Partnerships: Warburtons





PIC Project: 'Exploiting the Potential of Tempered Whole Pulse and Oat Flours'

- PIC approved a 3-year investment of \$8 million in Avena and consortium partners, including The Village Bakery UK.
- Avena developed a proprietary process for tempering or precooking pulse and oat flours that offer functional benefits.
- The project also explored the impact of germplasm on the functionality of flours, develops applications and formulations, and supports marketing.
- Avena Best specialty milled flours are RTE and can be used to partially or completely replace eggs in many applications.







Avena Best Pulse Visco Enhancer NB replacing eggs in bakery





Avena R&D UK Partnerships with The Village Bakery





Avena R&D UK Partnerships





Avena Best Pulse Visco Enhancer NB© structure, emulsifying, binding, thickening



Vegan Caesar, Mayonnaise and Ranch Dressing Pulse Visco Enhancer NB© Flour



Chef Gordon Bailey, Red River College Vegan Mayonnaise Demo Winnipeg, Manitoba

Pulse Visco Enhancer NB Product Prototypes





Avena Foods Sustainability Initiatives

- Field to Market Canada (FTM C) Innovation Project extended to oat crops: 30 farms (pulse and oat) including 20,000 plus acres
- August 2022 'CAFAD' Customer and Farmer Appreciation Day: including Experimental Field Plots (intercropping and cover cropping) with commercial partners (Bob's Red Mill, Danone Canada, H2Oats, IWON Organics, Oats Overnight, Old Dutch, and Warburtons)







ASAP (Avena Sustainability Advisory Panel)

Margaret Hughes, VP Sales and Marketing, Co-Chair Mike Gallais, Director of Procurement, Co-Chair Barbara Lee Budin, Director of Sales and Business Development, Sustainability Coordinator

Commercial company representatives:

Jean-Marc Bertrand, Procurement, Danone Canada

Todd DeKryger, Sustainable Agricultural Development, Nestlé North America Procurement Julia Person, Sustainability Manager, Bob's Red Mill

Farmers:

Mike and Regan Ferguson, Wilmar Farms

Colin Rosengren, Rosengren Farms

Lynnell Pomedli, Farmer and Agronomist, Seed Source

Researchers and civil societies:

Lana Shaw, Research Manager, SouthEast Research Farm Markus Weber, Director of Implementation and Technology, Field to Market Canada Jannatul Ferdous, PhD student UBC, Life Cycle Analysis (LCA) funded by Canadian National Research Council



UBC is calculating the Life Cycle Analysis (LCA) of Avena's pulse and oat ingredients to ISO 14040/44 standards



Jannatul Ferdous (PhD, IGS-Sustainability, UBC) is working with James DelFarari, VP Operations, Avena Foods to calculate the Life Cycle Analysis (LCA) of Avena's pulse and oat ingredients

The pulse ingredients work will result in an academic publication on pulse ingredients life cycle analysis to the ISO 14040 standard.

This will be peer reviewed and the first publication in the world on LCA of pulse processing.





UK-Canada Plant-Based Protein Collaboration Event

Challenges

- Culture
- Regulation
 differences
- Language differences
- Freight moving product around
- Time difference impact on communications

Preferences

- In country representation
- In country champion
- Warehouse for smaller and larger trial samples

Connecting

- Fostering new research and development relationships
- Tradeshows
 - EU, UK & US
 - Bakery
 - Meat / Plant Based
 - Dressings / Sauces
 - Free From



Partnering for safe, healthy diets and a sustainable world.

Thank you!

Matthew Lentsch Director, Sales & Business Development mlentsch@avenafoods.com



SPGinnovation

Innovate UK Smart project: Sustainable Ingredients for the plant-based food market

Dr Sarah Gaunt

SPG Innovation Ltd

Sustainable Nutrition

- Meeting the trends and needs of today without being detrimental to the future
- Key areas of interest; plant based, waste valorisation, fibre, salt/sugar/fat reduction
- Multi-disciplinary team including food scientists, development chefs and commercial expertise to offer concept to commercialisation for sustainable food products
- Food grade development kitchen and analytical lab with capabilities to produce textured vegetable proteins and plant-based products
- Based in Nottingham UK and team which covers the food supply chain



- We are re-defining the plant based food sector
- Three core values
 - Sustainability
 - Health
 - Taste
- Using by products of the food industry to create plant based foods



Project aims

Objective:

Determine the viability of developing a low- and high-moisture TVP product from a variety of food industry co-products which are less refined than current protein isolates.

Project drivers:

- Move away from expensive isolates which are highly processed and sourced from overseas
- Improve the diversity of TVP products, have a UK source and reduce cost, increasing access by reducing cost
- Some sales of protein powder from these co-products but sales are low, and majority goes to animal feed







Project Activity

 Processed via milling and extrusion a number of co-products to produce a range of textured vegetable proteins

innovation



Product exiting extruder





Product going through the dryer



Sensory Study Key results:

- Our TVP was <u>significantly more acceptable</u> than all other samples for:
 - Appearance
 - \circ Smell
 - Flavour
 - \circ Texture
 - \circ Overall acceptability
- Our TVP had the <u>highest level of satisfaction</u> for:
 - Depth of colour
 - Strength of flavour
 - o Firmness
- Our TVP had the <u>highest level of purchase intent</u> and was <u>significantly more likely to be purchased</u> than all other samples.

School of Food Science and Nutrition

- FACULTY OF ENVIRONMENT
- Dr Alan Javier Hernández Álvarez SMART Proteins LAB
- <u>https://environment.leeds.ac.uk/food-nutrition/staff/8812/dr-alan-javier-hernandez-alvarez</u>







Our group studies the separation principles, including the molecular interactions and molecular modifications of proteins during processing, and their consequences for the functionality of the ingredient and final food product (e.g., plant-based analogues, functional and nutraceutical foods). Emphasis will be on protein-protein interactions and interactions of proteins with other components (such as ANF and phenolic components), in relation to the component's environment such as the presence of interfaces, and/or within a food matrix (emulsion, foam or gel). From the health point of view the characterization of bioactive peptides and proteins in foods that promote health benefits for reducing oxidative processes, and markers of type 2 diabetes inflammation, cancer, and cardiovascular disease risk.



TVP Usage/USP



Hemp Textured Vegetable Protein (TVP)



Crispy 'Beef' Spring rolls

TVP has been hydrated with flavouring then cooked in a sticky sauce. The TVP gives the meaty texture customers expect without the need for the addition of meat.



Blackened Bean Burger

The Hemp TVP has been added to a Blackened Bean Burger mix to add extra texture and protein. TVP this gives the burger a meaty look and mouth feel while keeping it plant focused.



Texican Chilli and Nachos

The Hemp TVP has been hydrated then slow cooked in a chilli sauce. The TVP absorbs all the flavours and adds the unique meaty texture you'd expect from a chilli and delivers protein. During cooking the TVP colour changes to give a dark cooked meat appearances.

Smokey Hemp Dog Hemp TVP has been hydrated then added to a Smokey Hit Dog mix to give a meany texture

Rootiful Hemp Textured Vegetable Protein

Net 20kg

Sustainability

- · Utilises a by-product of food grade oil production to reduce waste streams
- Locally grown and processed for shorter and robust supply chains
- One hectare of industrial hemp can absorb 22tonnes of CO2 / hectare.

Taste

- Independent taste panel at Campden BRI had a significant preference for Hemp TVP over soy or pea
- · Repurchasing intentions were significantly higher with Hemp TVP
- Cleaner taste with limited bitter notes.

Health

· Offering an alternative protein source to add into healthy plant based diets.

Manufacturing

Capabilities to manufacture in UK and Europe up to 10 tonne per day

New protein source

 With the market being saturated with Pea and Soy, our product is helping the diversification of protein moving us away form single crop usage.

Colouring

 Green colouring transfers to cooked brown meat colour once the product is cooked.

Applications

- Beef/Lamb Mince replacement
- Meat Reduction Products
- · Vegan Burger and sausages
- · Flavoured and used for crumbs or coatings



• A small range of products have been worked on showing the versatility of the TVP and how it can be used in a range of ways.





Other project outputs

Centre plate options for consumers

Food service, Retail

- Unique solutions
- Responsibly sourced
- Health

First product is New-Fu

- A tofu-inspired product without soy
- Made from British grown pea, quinoa and lentils

Food service trials underway:

- County Council for leisure centres and schools
- UK Universities
- Nottingham-based street food company

Retail:

- Initiated discussions with retailers
- Retail consultant engaged to drive uptake





Other project outputs



Interests going forward

- Exploring other plant based proteins to develop food ingredients and products
- Use of whole crops and by-products rather than protein isolates
- Development and application of technologies to texturize plant based proteins beyond extrusion







Break

We'll be back at 16:10





Collaboration Session



Innovate UK KTN

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Agenda

- 16:10 16:15 Collaboration activity introduction
- 16:15 16:30 Themed breakout room Round 1
- 16:30 16:45 Themed breakout room Round 2
- 16:45 16:50 Random breakout room Round 1
- 16:50 16:55 Random breakout room Round 2
- 16:55 17:00 Closing remarks



Breakout Rooms

- 2 x 15 min themed breakout rooms *your choice!*
- 2 x 5 min small, random breakout rooms
- Turn on camera and mic
- Introduce yourself: name, organisation, country (verbally or in the chat depending on group size)



- **1. Ingredients** Development, scaling and optimisation of plant-based ingredients
- 2. **Products** Conversion of high protein crops, ingredients and co-products into consumption-ready goods.
- **3.** Adding value / enhancing quality Innovations to improve the nutritional quality, consumer acceptability, sustainability, and safety of plant-based products.
- **4. Waste stream management** Innovations to add value to waste streams produced during processing of crops such as field peas, lentils, canola, and related ingredients.
- **5.** Animal feed / pet food applications Innovations related to uses focussed on plant-based animal feed and pet food.



Collaboration Database



Click on each section to be taken to the relevant page

Robotic and automated machines

Imaging, sensing, and monitoring devices and

Systems for automated on-farm processing and



Innovate UK KTN

LinkedIn – UK-Canada Plant-Based Protein: Finding Information and Partners

- We have created a targeted LinkedIn group will go live after the event, details to come
- Please join this group and use it to network as per the group rules
- Specific to this opportunity
- Be clear on what you want or can offer



- **1. Ingredients** Development, scaling and optimisation of plant-based ingredients [*Kaeli*]
- 2. Products Conversion of high protein crops, ingredients and co-products into consumption-ready goods [*Simon*]
- **3.** Adding value / enhancing quality Innovations to improve the nutritional quality, consumer acceptability, sustainability, and safety of plant-based products [*Jo*]
- **4. Waste stream management** Innovations to add value to waste streams produced during processing of crops such as field peas, lentils, canola, and related ingredients [*Cameron*]
- 5. Animal feed / pet food applications Innovations related to uses focused on plant-based animal feed and pet food [*Caroline*]



Thank you

Collaboration Database

LinkedIn Group

kaeli.johnson@iuk.ktn-uk.org



