



**CANADA FOUNDATION FOR INNOVATION**

**Innovation Fund**

**13-1**

**Notice of Intent**

- Completed NOIs must be submitted by the Associate Dean (Research)/Research Liaison Officer of the “Lead” Unit to the Office of Research Services to: [Birtukan.Gebretsadik@umanitoba.ca](mailto:Birtukan.Gebretsadik@umanitoba.ca) by May 15, 2018.

<b>Proposed name of project:</b> <b>PROFIT:</b> PROtein Foods Innovation Team	<b>Estimated Total Project Costs: \$15,000,000</b>	
<b>Designated Project Leader/Faculty/Dept:</b> James D. House, Faculty of Agricultural and Food Sciences (FAFS), Department of Food and Human Nutritional Sciences (FHNS)		
	CV:	<input type="checkbox"/>
<b>List Principal Users/Faculty/Dept:</b>		
1. Rotimi Aluko, FAFS, FHNS	CV:	<input type="checkbox"/>
2. Zhenyu Wu, Asper School of Business/Business Administration	CV:	<input type="checkbox"/>
3. Martin Nyachoti, Animal Science	CV:	<input type="checkbox"/>
4. Carla Taylor, FAFS, FHNS	CV:	<input type="checkbox"/>
5. Peter Jones, FAFS, FHNS	CV:	<input type="checkbox"/>
6. Martin Scanlon, FAFS, FHNS	CV:	<input type="checkbox"/>
7. Filiz Koksel, FAFS, FHNS	CV:	<input type="checkbox"/>
8. Joyce Slater, FAFS, FHNS	CV:	<input type="checkbox"/>
9. Mike Nickerson, U of S	CV:	<input type="checkbox"/>
<b>'Lead' Unit ADR/RLO:</b> <b>Name:</b> Martin Scanlon, Associate Dean (Research), FAFS		

Briefly describe (max 2 pages, 12 pt. font size, 2 cm margins):

- The proposed research and how it is world-class, innovative and demonstrates clear benefits to Canada.
- The infrastructure and how it will enhance the University’s existing research capacity.
- The excellence of the team, including expertise and existing collaborations necessary to conduct the proposed research.
- Plans to secure matching funds and the potential funding sources for the operation and maintenance of the infrastructure.

## **Proposed research: how it is world-class, innovative and demonstrates clear benefits to Canada**

The proposed research will establish a systems-based approach termed **PROFIT** (**PRO**tein **F**oods **I**nnovation **T**eam) for the development and evaluation of novel, protein-rich foods and food ingredients derived from both plant- and animal-based sources, through i) **Production Optimization and Innovation**; ii) **Process Innovation and Entrepreneurship**; and iii) **Human Intervention Trials and Community Engagement**. The knowledge gained from the **PROFIT** program will enhance value-added opportunities for protein, and establish evidence to guide food, nutrition and health policy development. Facilitated through the interactions afforded by the Senate-approved Food Systems Research Group, **PROFIT** completely aligns with and will bolster the University of Manitoba's (UofM) research theme of "Safe, Healthy, Just and Sustainable Food Systems".

As an example of the world-class research to be performed, collaborators will use a unique, systems-based approach to assess the nutritional quality (House; Nyachoti) and functionality (Aluko; Scanlon, Nickerson) of protein derived from the University of Manitoba's high protein canola breeding program (Rob Duncan - collaborator). Through the established research continuum, involving co-applicants and collaborators, novel food products containing canola protein, including innovative plant:animal blends, will be developed (Koksel) and assessed for clinical efficacy (Jones; Taylor), market potential (Wu, Kelley Main - collaborator) and nutritional relevance to consumer diets (Slater). Elements of this research program (stages i and ii) are included in an approved research project within the Canola Science Cluster program (2018-2023; Canadian Agricultural Partnership; CAP). This research program has the potential to take low value canola meal, typically destined for livestock feed, and transform it to a high-value, plant-based protein source for inclusion in human foods. Furthermore, the requested infrastructure will enhance food and nutrition literacy and knowledge translation research. The latter will further our understanding of factors influencing the acceptability, utilization and importance of plant- and animal-based protein-rich foods. Knowledge translation research is critical for establishing the analytical language to understand how innovative protein-rich foods and food ingredients are created. This understanding will drive entrepreneurship, leading to a higher percentage of ideas translating into successful SMEs, thus becoming a template for advancing innovation in other sectors. Research and innovation in support of new protein-rich foods and their positioning to consumers will be enhanced via the requested infrastructure that will progress interdisciplinary food systems research at the UofM. It will also enhance engagement with external partners who will conduct the economic, social and environmental transformations with the results.

A 2016 Canadian Agri-Food Policy Institute report identified complacency about adding value as a major challenge to Canada's future competitiveness. Major initiatives, including the recently announced supercluster Protein Industries Canada serve to emphasize the federal importance of adding value to agricultural commodities. The planned research will use protein-rich food systems as the model for understanding innovation across the whole food system for social acceptability, economic viability and environmental sustainability. Finally, with respect to major benefits to Canada, the **PROFIT** team will train highly skilled HQP in high demand across the Canadian food system, including food manufacturing; the latter contributes to 8% of our GDP and 26% of our manufacturing.

## **The infrastructure and how it will enhance the University's existing research capacity**

In order to realize **PROFIT**, the following infrastructure is requested to advance the three food system stages (identified above):

- **Laboratory and pilot-scale liquid protein stream processing infrastructure**, including equipment for the isolation, extraction, blending, purification, sterilization and drying of liquid protein streams. Included in this component is infrastructure to realize innovations in dairy and non-dairy beverages, yogurts, cheeses and frozen desserts in a CFIA-approved facility. This infrastructure will

complement the major investments made by the UofM and CFI in dry protein processing, including milling equipment, air classification and laboratory-scale extrusion.

- Advanced analytical platform for high-throughput screening of nitrogen and amino acid composition of grains, oilseeds, milk and other protein-based ingredients, including sample preparation and **NIR and FTIR platforms, Liquid and Gas Chromatography-Mass Spectrometry systems**. This new capacity is critical to advancing protein crop breeding programs, where sample size is limited.
- **Human intervention trial infrastructure**, including installation of new capacity within the Richardson Centre for Functional Foods and Nutraceuticals to assess the impact of protein-based food and protein ingredients on measures of human performance, appetite, body composition and metabolic health.
- **Novel food preparation and community engagement infrastructure**, including the development of a metabolic kitchen, for the development and preparation of foods for human clinical trials, and a “clinical cafeteria” setting, to facilitate supervised clinical meal consumption, knowledge translation activities related to food literacy, and the understanding of factors influencing entrepreneurial development and consumer responses to food innovation.

### **Team excellence: expertise and existing collaborations necessary for the proposed research**

The team of researchers involved in **PROFIT** reflects a combination of established and emerging leaders. Analysis of the research contributions of the PI cohort, from 1996-2018 (SciVal data), documents that their 1,164 publications (945 peer-reviewed articles) have garnered 26,932 citations and an h-index of 72. A third of their publications are among the top 10% most viewed publications worldwide and 40% of their publications are in the top 10% journals by CiteScore. Together they have a Field Weighted Citation Impact of 1.3 or more in the Agricultural and Biological Sciences, Chemistry and Medicine; indicating that their publications are cited more often than the world average (1.0) in three different fields. Notably, 45% of their publications involve one or more international collaborators and these contributions have a field-weighted citation impact of 1.47, demonstrating the impressive international impact of their research. The team consists of members with international recognition in protein chemistry, protein and amino acid nutrition, cereal chemistry, food processing, human intervention trials, food literacy and entrepreneurship. Over the past 6 years, the team has published 604 manuscripts, given 438 presentations, and have trained in excess of 307 HQP at all levels. **PROFIT** researchers have existing and ongoing collaborations with other members within **PROFIT** (House, Aluko, Scanlon, Nyachoti, Duncan on canola), the UofM Food Systems Research Group, the Canadian International Grains Institute, Food Development Centres across Canada, and national (Laval, Toronto, Guelph, Alberta, Saskatchewan (Nickerson) & UBC) and international (Queensland University of Technology; Penn State; USDA) academic and government research teams. Over the past 6 years, **PROFIT** members have secured \$30,493,143 in funding from tri-council, AAFC, government and non-government organizations (NGO), and industry partners.

### **Plans to secure matching funds and sources for the infrastructure’s O&M support**

We will secure the required 20% matching funds through a combination of educational discounts from suppliers of the equipment, and targeted fundraising in support of new construction, renovation and equipment installation. The latter will be requested via coordinated efforts between the UofM and stakeholder partners, leveraging the potential created through Protein Industries Canada and the Protein Highway initiative. Research funding will be sought through both provincial (e.g. CAP, Research Manitoba) and federal (e.g. NSERC, SSHRC, CIHR) funding as well as through NGOs, and industry at both the national (e.g. Industry-specific Science Clusters) and provincial levels. The **PROFIT** members have established clear evidence of their abilities to attract research support.

