Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Canada

SUPPORTING FOOD INNOVATION TO ENHANCE THE CANADIAN DIET

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Our Vision

Driving innovation and ingenuity to build a world leading agricultural and food economy for the benefit of all Canadians.

Our Mission

Agriculture and Agri-Food Canada provides leadership in the growth and development of a competitive, innovative and sustainable Canadian agriculture and agri-food sector.

DISCLOSURES

- Government of Canada Employee
- Received research grants from:
  - Saskatchewan Pulse Growers;
  - AAFC Pulse Canada Growing Forward II;
  - Ontario Bean Growers
- Workshop attendance partially paid for by ISLI/CNS

OUTLINE

- AAFC's Strategic Objectives for Agriculture and Agri Food in Canada
- Drivers of AAFC activities on Food, Nutrition and Health
- Funding Mechanism to Drive Innovation in Agri Food
- AAFC's Research Innovations in Agri Food
- Conclusions

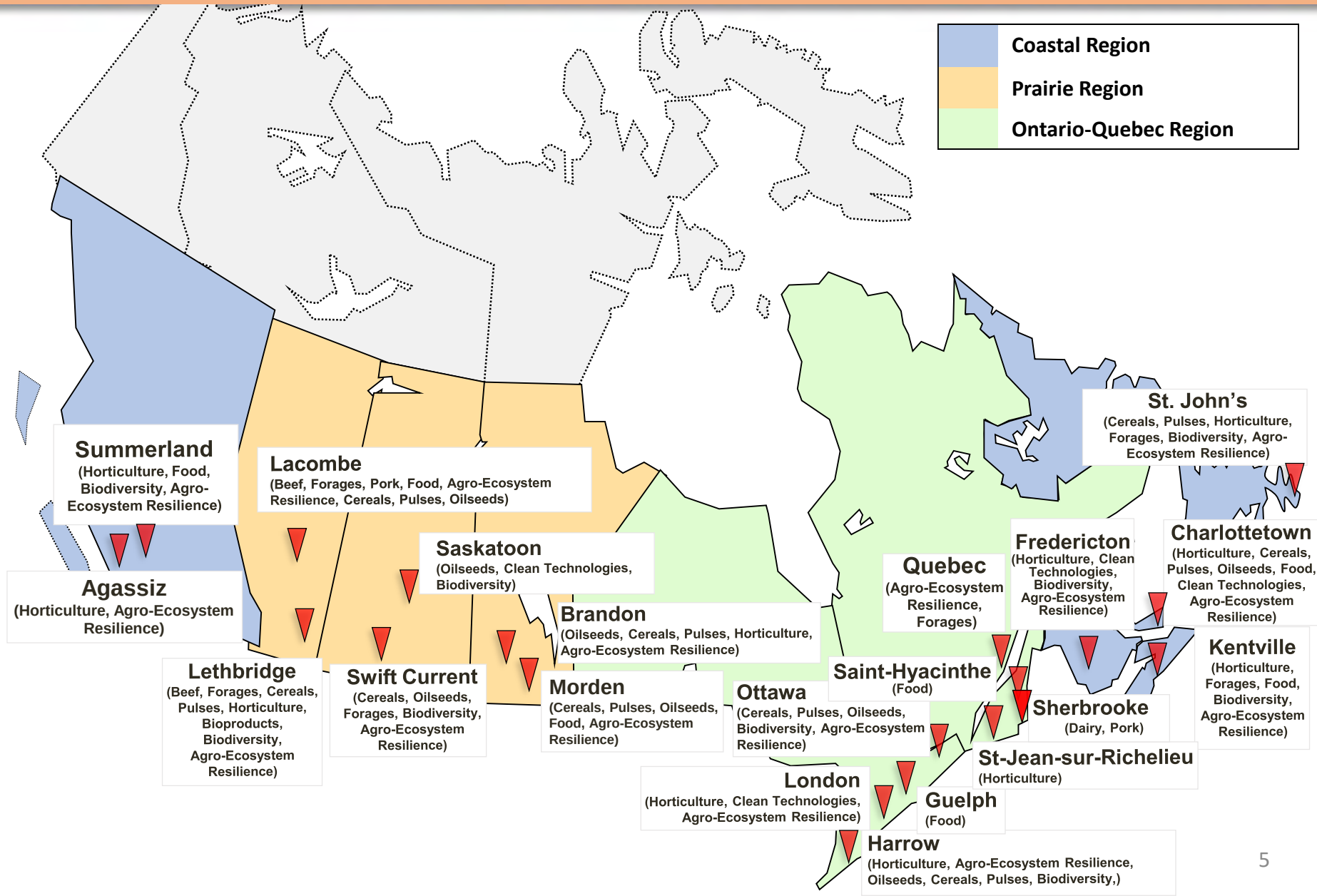
PROMOTING SAFE, NUTRITIOUS AND HEALTHY FOOD IN CANADA

- To improve the health of Canadians we need to:

  - Address issues related to the production, processing, distribution, and consumption of food along the full value chain

  - Ensure a supply of safe and nutritious foods is readily available to everyone

WHAT WE DELIVER: RESEARCH AND DEVELOPMENT CENTRES AND AREAS OF FOCUS

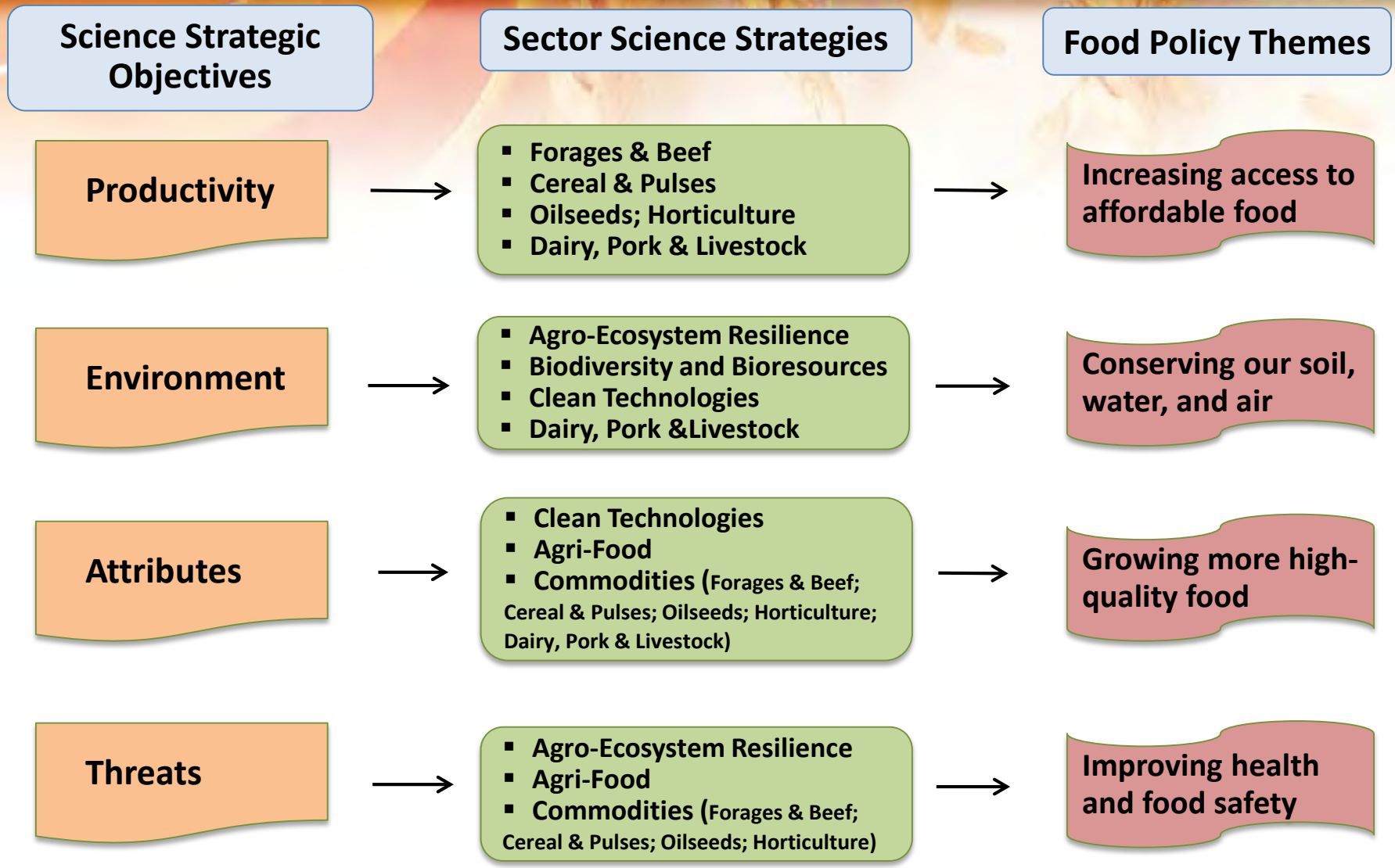


AAFC's SCIENCE DELIVERY MATRIX

AAFC delivers its science through a matrix of nine sectoral science strategies and four strategic objectives

Strategic Objectives	Sector Strategies					
	Cereals and Pulses	Oilseeds	Horticulture	Beef and Forages	Dairy, Pork, Poultry and other Livestock	Agri-Food
Increase agricultural productivity						
Enhance environmental performance						
Improve attributes for food and non-food uses						
Address threats to the value chain						
	Biodiversity and Bioresources					
	Agro-Ecosystem Resilience					
	Clean Technologies					

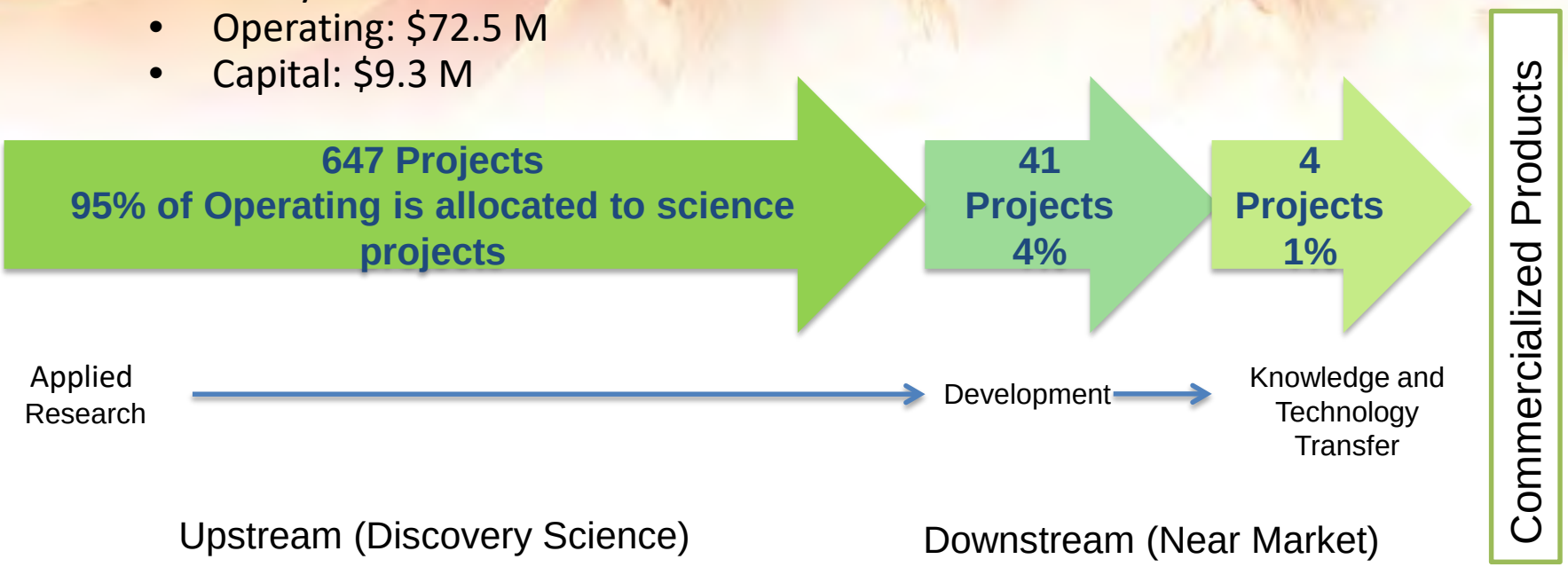
AAFC SCIENCE ACTIVITIES ARE LINKED TO GOVERNMENT PRIORITIES



AAFC - CURRENT INVESTMENT IN SCIENCE

Science and Technology Branch Budget 2017-18: $**246.7M** including:

- Salary: $164.9 M
- Operating: $72.5 M
- Capital: $9.3 M



AAFC contributes to upstream and downstream activities within a broader research science ecosystem of partnerships

CANADIAN AGRICULTURAL PARTNERSHIP (CAP)

- Five-year, $3 billion investment by federal, provincial and territorial governments to strengthen the agriculture and agri-food sector
- Goal is to accelerate the pace of innovation;
  - ✓ Supports pre-commercialization activities
  - ✓ Invests in cutting-edge research to benefit the Agriculture and Agri Food sector

CANADIAN AGRICULTURAL PARTNERSHIP - (CAP)

Under this new partnership, foundational and innovative agricultural science will be supported through the following programs:

AgriScience Clusters - $160 Million

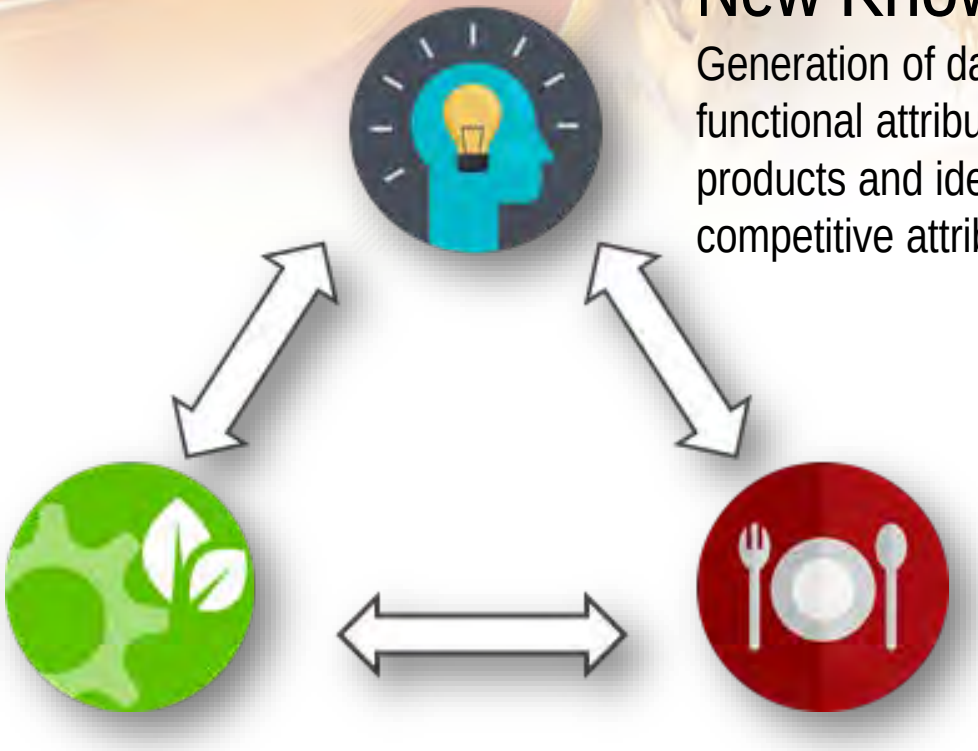
- Applications received for 20 Clusters
- Requests exceeded available funding amount

AgriScience Projects - $178 Million

- Funding will be used for short-term projects
- Meant to address specific industry challenges
- Areas of focus identified by industry and government

5 year
$338
million
initiative

AAFC TARGETED SCIENCE OUTPUTS



New Knowledge

Generation of data on the quality, health and functional attributes of Canadian agri-food products and identification of unique competitive attributes

Innovative Products

Development new competitive healthy and functional food products and ingredients

Innovative Technologies

Novel food processing and preservation technologies that have a lower environmental footprint and increase economic competitiveness.

AAFC SCIENCE FOCUS: FOOD ATTRIBUTES

- Identified health-promoting attributes of food
  - ✓ Advancing health claims to promote value in Canadian foods:
    - Approved health claim for Barley β-glucan consumption and cholesterol lowering effect
    - Approved health claim for Soy consumption and cholesterol lowering effect
    - Industry submission for approval of a Pulse health claim for blood glucose lowering effect of pulses

- Improved methodologies for formulation and assessment of novel foods with enhanced attributes

- Novel processing technologies for production of fresh food and food ingredients with high nutrient quality

2013-2018 PULSE CLUSTER OUTPUTS

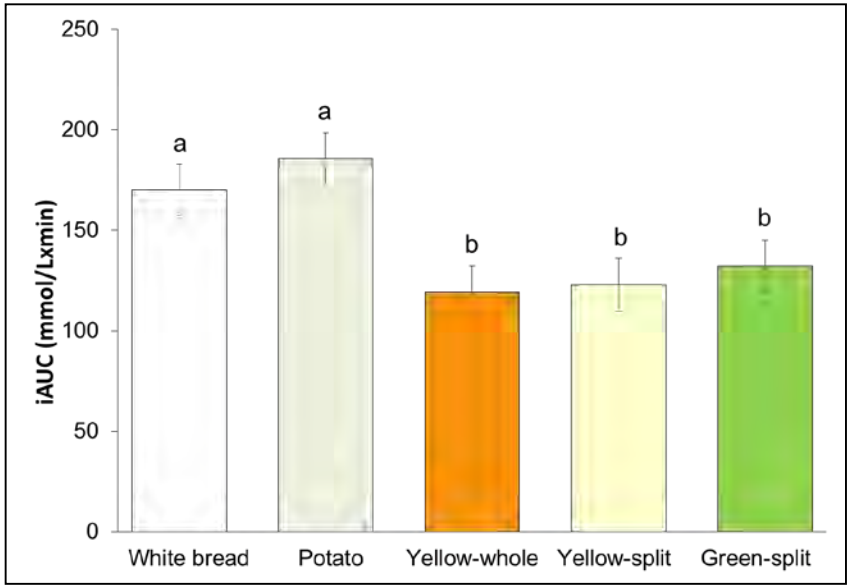
Carbohydrate Replacement of Rice or Potato with Lentils Reduces the Postprandial Glycemic Response in Healthy Adults in an Acute, Randomized, Crossover Trial.

JN
THE JOURNAL OF NUTRITION
A Publication of the American Society for Nutrition • https://academic.oup.com/jn

Postprandial glycemic response to lentils
Dietary fiber and chronic kidney disease
Fat-free mass accretion and linear growth

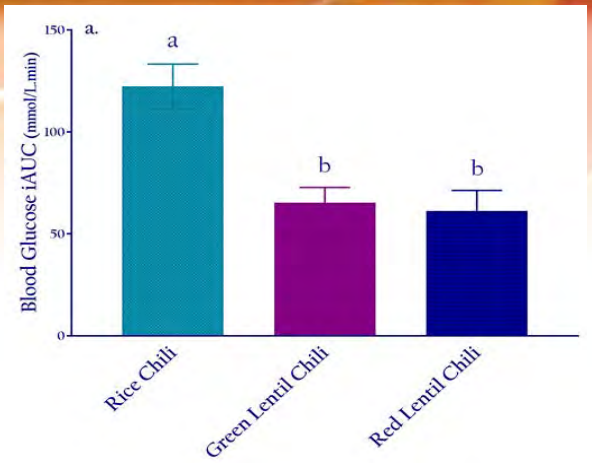
Moravek, D, Duncan, AM, VanderSluis, LB, Turkstra, SJ, Rogers, EJ, Wilson, JM, Hawke, A. and Ramdath, DD. 2018. The Journal of Nutrition, 148;535-541.

Replacement of ½ the available carbohydrates in rice or potato with lentil or yellow pea lowers blood glucose response by ~23 to 38%



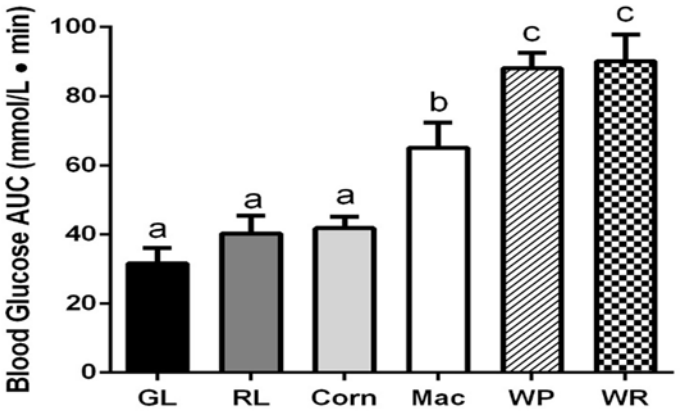
Heather Blewett, J Petkau, S Ludwig, DD Ramdath. Substituting peas for potatoes significantly reduces post-prandial glycaemic response & glycemic index. CNS Halifax 2018

BLOOD GLUCOSE & SATIETY EFFECT OF PULSES

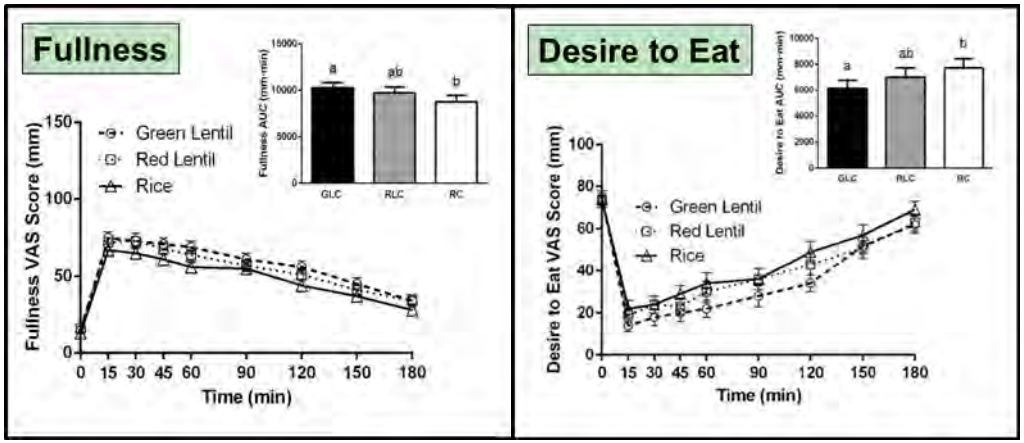


Substituting rice with lentils in a chili reduces postprandial blood glucose in healthy adults. **Dita Moravek**, AM Duncan, PK Lukus, MD Loreto, FL Pals-Horne, A Hawke, M Aliani, DD Ramdath. CNS Halifax, 2018

Blood glucose AUC following consumption of ½ and ¼ cup servings of lentils or starchy controls



The effect of green and red lentils in half and quarter cup serving sizes on acute postprandial glucose response compared to multiple starchy controls. **Brittany A. MacPherson**, D D Ramdath, WS Newton, TE Murphy, A Hawke, AM Duncan. CNS Halifax, 2018



Green lentils increase satiety but do not affect food intake when substituted for rice in a chili matrix in healthy adults. **Sandra L. Clark**, DD Ramdath, BV King, KE O'Connor, M Aliani, A Hawke, AM Duncan. CNS Halifax, 2018

AAFC SCIENCE FOCUS: FOOD PROCESSING

- Develop or adopt new manufacturing processes for food formulations
  - Low fat cheese; vegetable fermentation process

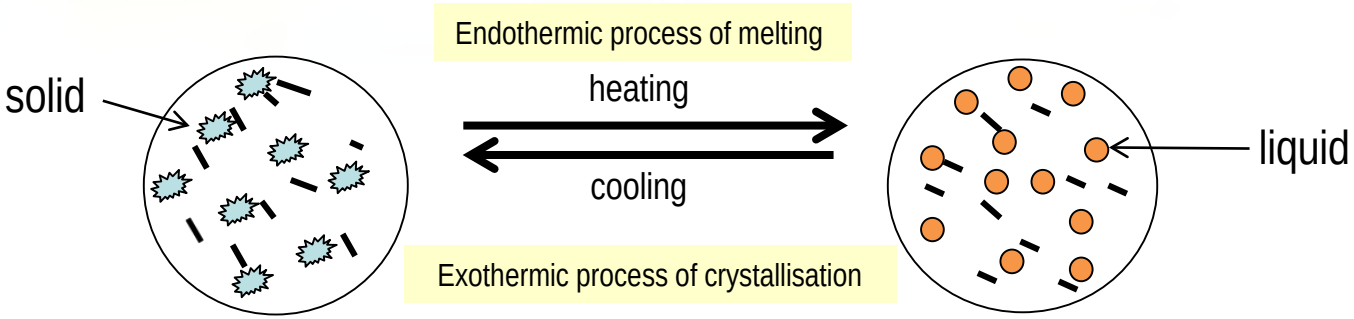
- Improve energy costs and standardize formulation for enhanced quality or safety
  - Optical device to check the quality and purity of maple syrup
- Identify added value for underused food by-products
  - new plant protein-based bioplastic that will keep meat, dairy, and other food products fresher longer

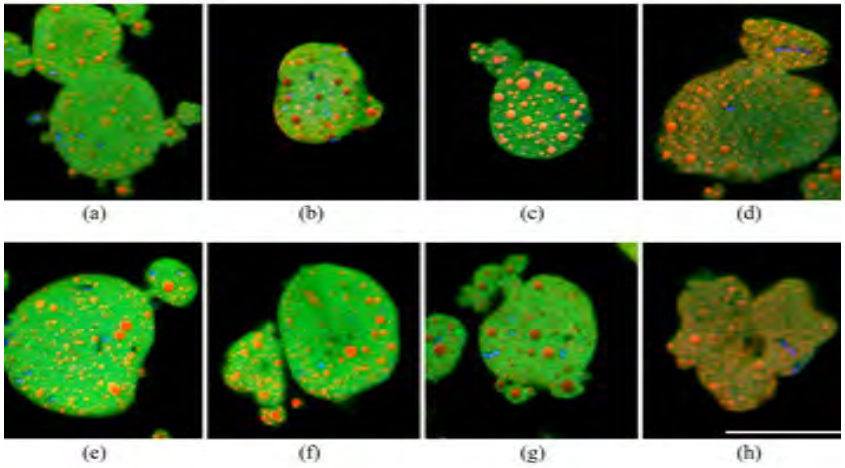
- Mitigate the effects of manufacturing processes and formulations on availability of bioactive ingredients in novel food formulations
  - Developed a technique for encapsulating probiotic bacteria

MICROENCAPSULATION TECHNOLOGY FOR PROTECTING PROBIOTICS

Objective: To encapsulate probiotics to improve the heat resistance during further processing involving thermal treatment

❑ Results:





Microcapsules: Oil or fat in red, bacteria in blue and NaCas in green.

Title: Method for preparing microencapsulated heat-sensitive bioactive material
US Patent Application Number: 15/565,558

❑ Impact:

Processing Recovery rate: >80%
Probiotics survival Rate: >90%

Attracted several queries from industry

AAFC SCIENCE FOCUS: FOOD SAFETY

- Microbial threat: Pathogen and antimicrobial resistance
  - Control of pathogenic bacteria
  - Alternatives to the use of antibiotics
  - Control of pathogenic fungi and mycotoxins

- Chemical threat: Hazardous chemicals and toxins (mycotoxins, acrylamide, nitrosamines) in raw and processed foods

- Processing, technology development and validation of methods to enhance pathogen control in meats and other foods

CONTAINMENT LEVEL 2 PILOT PLANT

ENHANCE SAFETY OF SODIUM-REDUCED FOODS USING HIGH PRESSURE PROCESSING

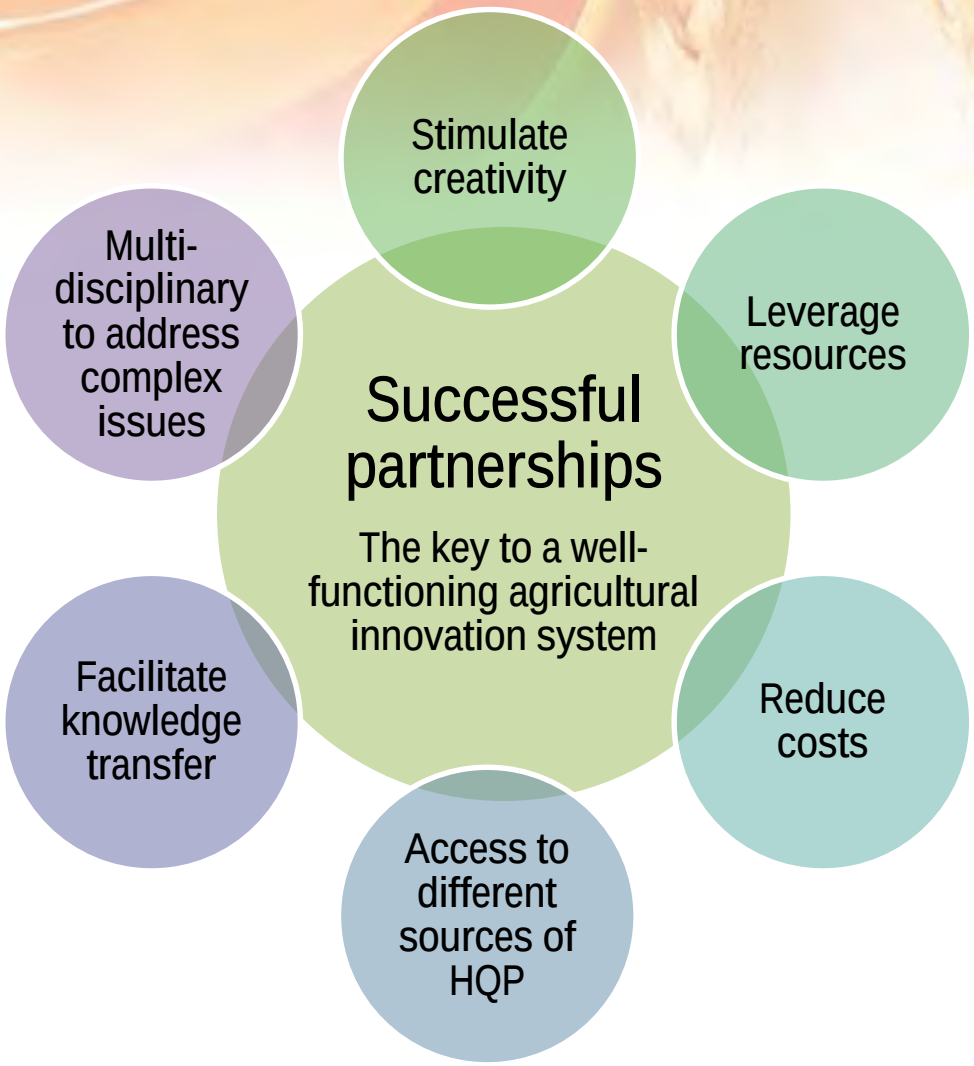
- Effect of HPP (600 MPa, 3 min) on *L. monocytogenes* inactivation in pre-blended ground chicken formulations containing different salt (NaCl, KCl and $CaCl_2$) levels
  - Formulations with increasing concentrations of NaCl or KCl showed significantly lower reduction in *L. monocytogenes*
  - Increase in $CaCl_2$ concentration resulted in a significantly higher *L. monocytogenes* reduction
  - Increase in concentration of monovalent salts increases baroresistance
  - Increase in concentration of divalent salt decreases baroresistance.
- HPP is a viable technology to improve microbial safety of sodium reduced meats.

Balamurugan et al. 2016. Int. J. Food Microbiol. 218, 51-56.

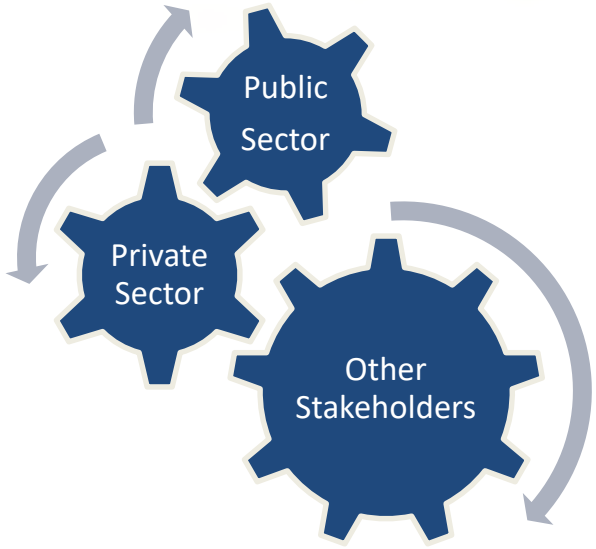
CONCLUSIONS

- Science is fundamental to AAFC's food, nutrition and health policies
- AAFC strategic objectives include fostering research innovations to enable the Canadian Agri Food Industry to be compliant with emerging Health Canada policies
- Collectively, these activities can promote an enhanced food environment in Canada and drive value added exports

ROLE OF PARTNERSHIPS IN INNOVATION



A strong innovation agenda must involve all players



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Collaborators

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- Thomas Wolever - U of Toronto
- Michel Aliani – U of Manitoba
- Alison Duncan – U of Guelph

Technical & Students

- Aileen Hawke; Yolanda Brummer; Liz Donner; Padma Maharaj; Jamie Matthews; Jay Petkau; Dita Moravek; Rasem El-Fahkhri; Simone Renwick; Sidra Sarfaraz; Brittany MacPherson; Sandra Clark

THANK YOU !
MERCI!

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