Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

EASTERN CEREAL AND OILSEED RESEARCH CENTRE (ECORC)

CENTRE DE RECHERCHES DE L'EST SUR LES CÉRÉALES ET LES OLÉAGINEUX (CRECO)

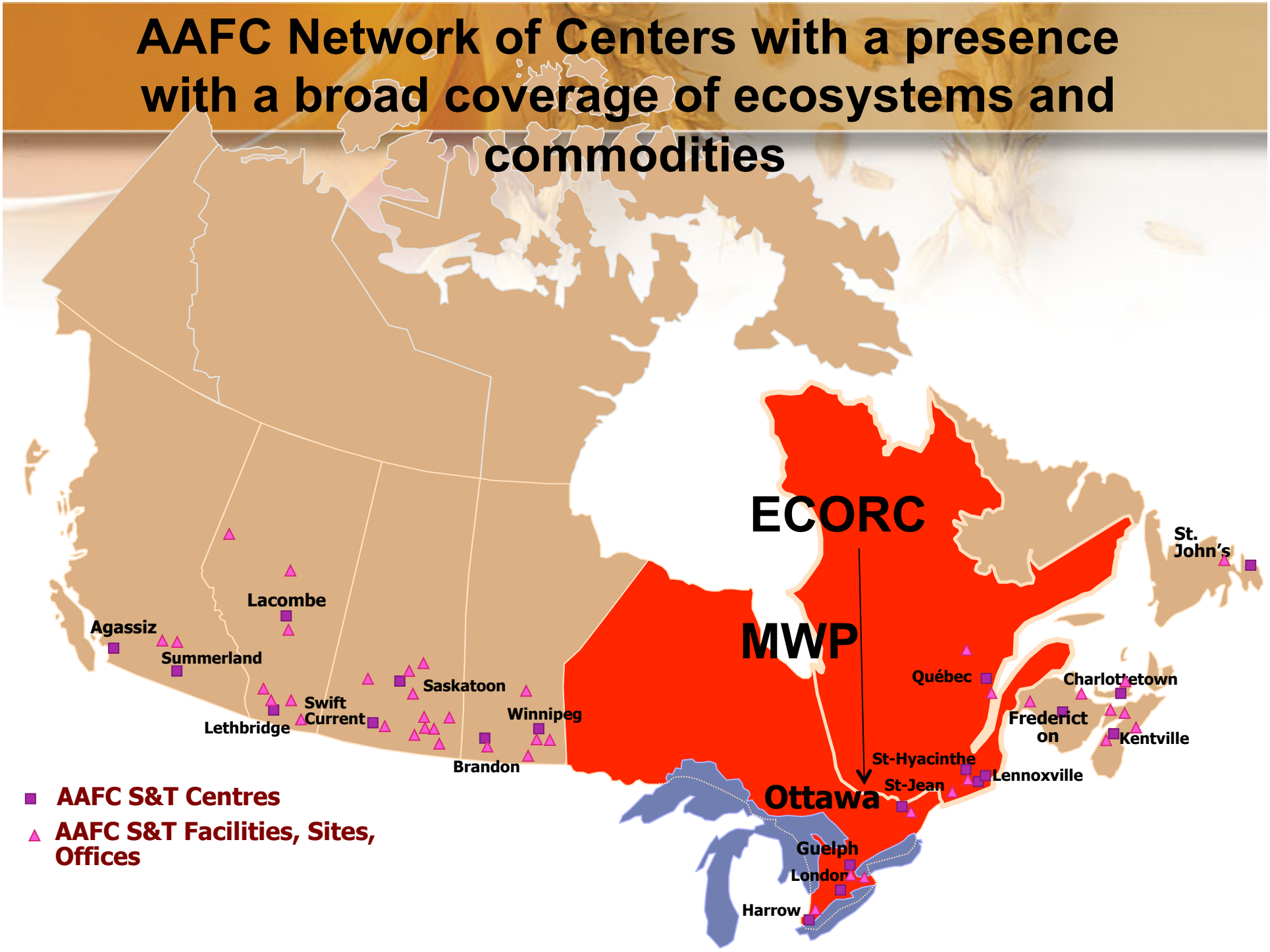
Michele Marcotte, Director Research and Development

American Oat Workers Conference – July 13, 2014

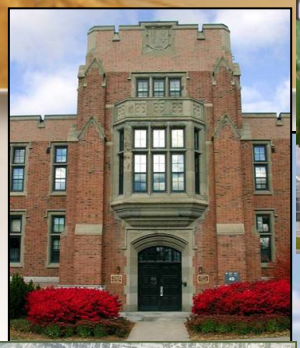
K.W. NEATBY BLDG
CENTRAL EXPERIMENTAL FARM
960 Carling Avenue, OTTAWA, Ontario, K1A 0C6

Canada

AAFC Network of Centers with a presence with a broad coverage of ecosystems and commodities



Our mandate...



National: for assessing and utilizing biodiversity and environmental resources for Canadian agriculture

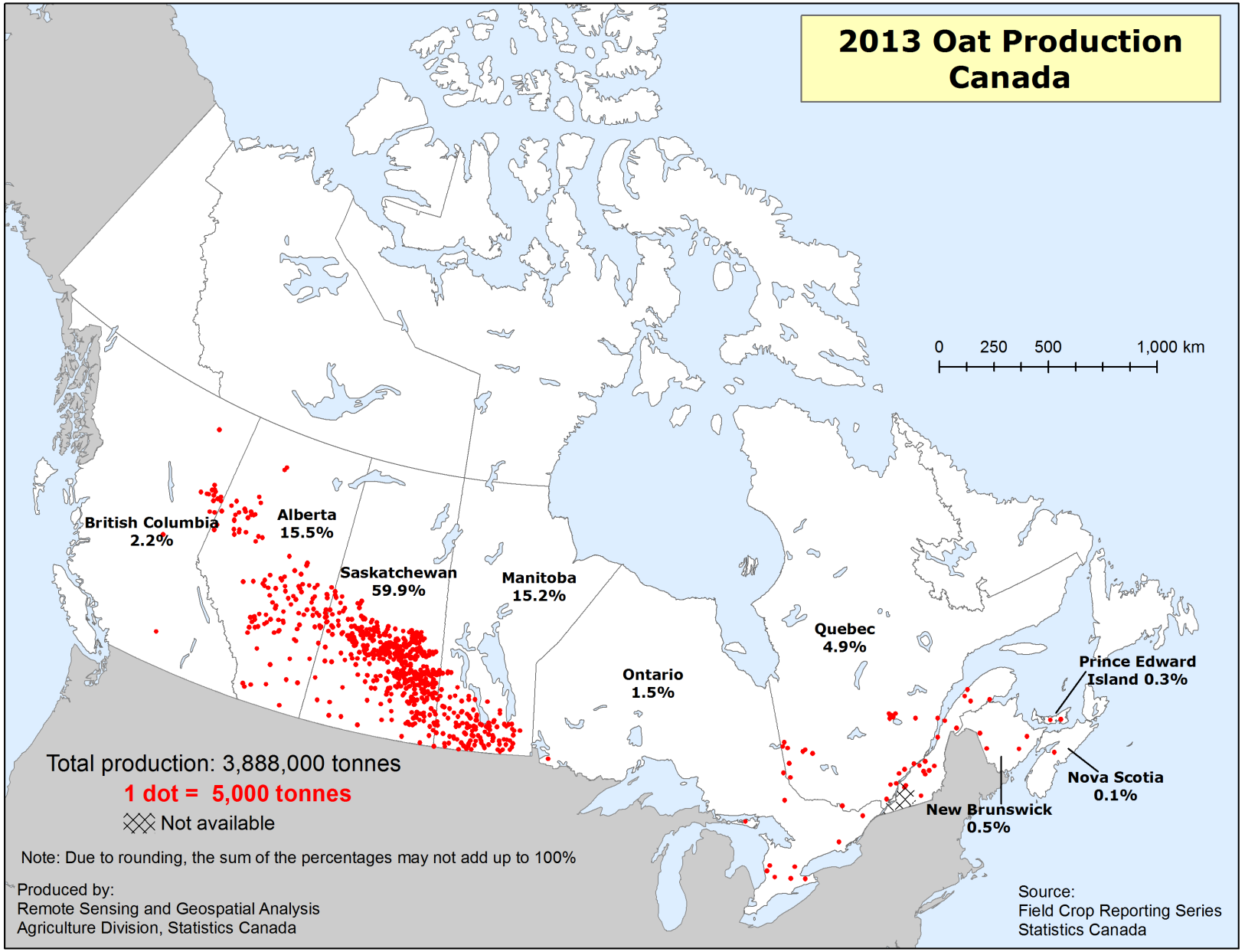
Regional: for crop development for Eastern Canadian producers located between Manitoba and PEI.
Our focus is on Oats, Wheat, Barley, Corn and Soybean

Areas of Research Focus

- Better Products for Stronger Markets
- Investing in Healthier Crops
- Delivering Value through Science
- Enhancing Environmental Performance
- New Knowledge and Innovation

Facts, Figures, and Facilities

- **<u>67 research scientists 13, research professionals, total staff of 252</u>**
- 18 honorary research associates or emeritus researchers
- 9 terms and 9 casuals, 80-100 students, ~50 personnel for Integrated Services Management
- 425 hectares of experimental fields and plots on the historic Central Experimental Farm in downtown Ottawa
- Integrated Growth Facility – Greenhouses (2200 m^2) established in 2008
- Research Laboratories (mainly Neatby for 26689 m^2 but also Saunders for 10000 m^2)
- One of seven national sites in the AAFC Watershed Evaluation of Beneficial Management Practices (South Nation)
- National Arthropod Containment Facility providing a single entry point for exotic insects with beneficial biocontrol potential
- National Mycotoxin Analysis Laboratory serving AAFC cereal breeders and *Fusarium* resistance research projects
- National Soil Databases containing soil, climate, land use, and crop yield
- Central genomics facility performing global gene expression profiling for a variety of organisms (plant, fungal, animal) using an extensive DNA sequence database, a DNA microarray printer and scanner, and robotic equipment
- Electronic microscopy and nuclear magnetic resonance center for use by AAFC scientists
- National bioinformatics capacity for “biodiversity”


2013 Oat Production
Canada
0 250 500 1,000 km
British Columbia
2.2%
Alberta
15.5%
Saskatchewan
59.9%
Manitoba
15.2%
Ontario
1.5%
Quebec
4.9%
Prince Edward
Island 0.3%
Nova Scotia
0.1%
New Brunswick
0.5%
Total production: 3,888,000 tonnes
1 dot = 5,000 tonnes
Not available
Note: Due to rounding, the sum of the percentages may not add up to 100%
Produced by:
Remote Sensing and Geospatial Analysis
Agriculture Division, Statistics Canada
Source:
Field Crop Reporting Series
Statistics Canada

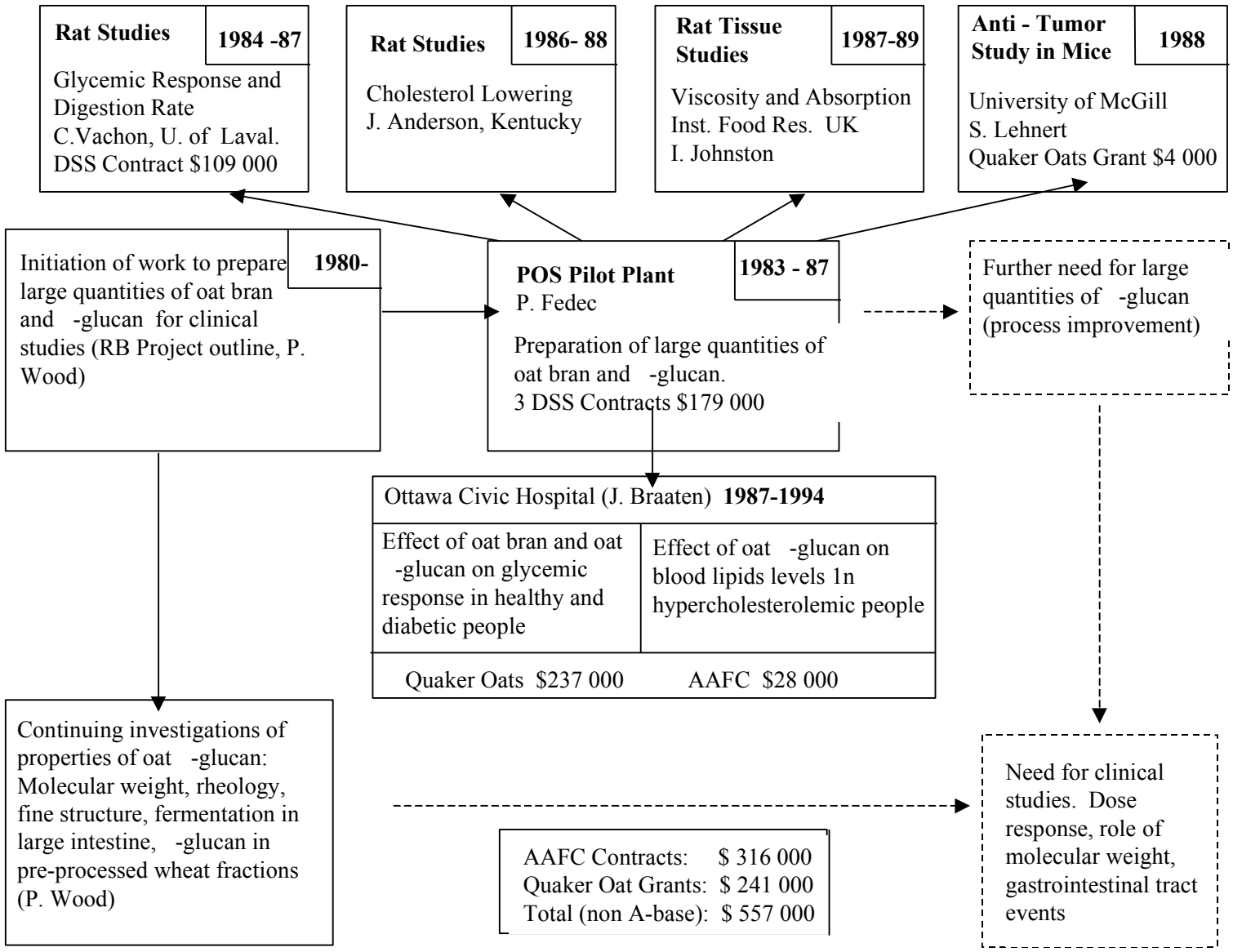
OAT PRODUCTION IN CANADA

- Acreage
  - About 4.1 M Acres
  - 90% in Western Canada 10% in Eastern Canada
  - Mostly covered oats
  - Some naked oats
- Use of oats
  - FOOD
  - EXPORT
  - Feed
  - Straw

CANADIAN EXPORTS

Canadian Dollars	2014 - April	2013	2012	2011	2010	2009
United States	156,204,979	402,617,211	395,983,171	399,550,173	322,815,373	362,183,573
Japan	3,180,377	13,082,404	11,990,853	15,360,097	9,266,137	7,174,064
Mexico	233,811	2,203,294	8,445,852	2,846,263	2,119,320	1,590,471
Ecuador	0	1,758,200	3,434,429	1,353,045	953,947	2,553,011
South Korea	187,108	833,147	541,343	569,283	25,423	138,396
United Arab Emirates	199,873	792,571	1,121,426	1,383,206	11,748	18,162
United Kingdom	36,857	122,918	383,864	348,298	291,662	279,063
Philippines	0	69,600	40,372	910,692	0	162,167
Hong Kong	27,553	65,487	528,559	234,691	0	0
China	20,559	62,709	23,654	16,880	0	0
Ukraine	0	28,002	0	0	0	0
Panama	6,302	24,337	44,153	8,885	66,960	54,829
Trinidad and Tobago	2,040	18,398	48,480	50	0	19,290
Costa Rica	0	13,182	0	0	0	0
Lebanon	0	12,226	0	5,560	9,421	8,603
Taiwan	0	7,254	15,690	21,112	5,191	75,809
Nigeria	0	1,463	0	0	0	0
Netherlands Antilles	0	445	0	0	0	0
Germany	0	109	0	132,034		

AAFC RESEARCH TO DEVELOP OATS AS A FUNCTIONAL FOOD FOR HEALTH, AND RELATED ACTIVITIES
Studies done by P. Wood and collaborators 1980 - present.



Oat Health Claim – Food&Health

- Quaker Oats submitted the file (approximately 10 years ago) to Health Canada. The file was updated many times.
- Recent high impact of the research as approval by Health Canada for the health claim for oat beta-glucan related to lowering of cholesterol and reduced risk of coronary heart disease was granted in the fall of 2010 and published officially in the Gazette of Canada, Part 2. A similar health claim was granted by the European Food Safety Agency. HC and EFSA work together.
- Report of a 4 year research project on oat beta-glucan and oat:
  - Physiochemical characteristics of beta-glucan in all foods used in clinical trials were studied.
  - Simulated digestion protocol was used to estimate the amount and characteristics of beta-glucan in the upper intestine.
  - Viscosity of beta-glucan extracted was significantly related to the physiological effects observed in human subjects, confirming the hypothesis that the mechanism of action involves the development of the viscosity in the gut.
  - Effects of processing (e.g. baking and extrusion) conditions such as heat, moisture and enzymes influence the solubility and molecular weight, factors that determine the viscosity. These conditions can be optimized to maximize the bioactivity of beta-glucan in different foods (e.g. breakfast cereal, muffins, porridge, and granola bars).
- Work conducted in this and previous abovementioned projects at AAFC was influential in these decisions.
- Some breakfast cereals. with high level of oat beta-glucan, now display health claim. This project was highly innovative, achieved high impact, and should be used as a "model".

Oat and Barley Human Clinical Trial

Human studies supporting health claims that oat and barley β-glucans lower serum cholesterol: effects of dose and viscosity

Goal: to determine the dose dependant effect of barley and oat β-glucan on cholesterol absorption, turnover, fecal excretion of sterols and bile acids

Partners: Richardson Centre; Univ of Toronto

Results: 8 volunteers taken through a cross-over study design. Samples taken for gene expression and metabolite trafficking

Product Pipeline Stages from Foundational to Clinical Research

INNOVATION STREAMS

- **"Inherently Functional Foods" (e.g. oats, barley fruits & vegetables)**
- **("Functional Foods") Supplemented, Fortified Foods (Transitional terms)**
- **AAFC does research only on NHP's sold and consumed as foods (e.g. probiotics) not "pills, capsules, etc"**

FOOD/HEALTH LINKAGES MAP

THROUGH THE AGRI-FOOD SECTOR STRATEGY (2014-2019)
FOOD INNOVATION FOR GROWTH
Improve attribute for food and non-food uses

PRODUCT PIPELINE Evaluation

Foundational		*Pre-clinical*		*Clinical*
Stage 1 Bioactive Research	**Stage 2 *In vitro* Evaluation**	**Stage 3 Cell & Tissue Evaluation**	**Stage 4 Animal Models**	**Stage 5 Human Trials**

At the discretion of the Minister, AAFC-STB MAY participate in human trials but only through Collaborative R&D Agreements with LICENSED, MEDICAL/ CLINICAL CAPACITY AND EXPERTISE

AAFC-STB will continue perform and publish foundational and pre-clinical research (Stages 1-4).

1. ***Supplies authenticated, sustainable sources of agricultural and agri-food products for downstream health and nutrition research.***
2. ***Such reliable, well-documented resources contribute directly to the scientific rigorous and unbiased research integrity required for health claim petitions.***

DECISION CRITERIA

Funding approval requires a case-by-case, fact-based "risk/benefit" evaluation by qualified personnel using 3 different criteria frameworks

1. ***LIABILITY FRAMEWORK (doing things safely)***
   - ***Legal relationship with recipient***
   - ***Crown personnel or property involvement***
   - ***Project evaluation decision by qualified personnel***
2. ***ARCHITECTURAL FRAMEWORK (doing things right)***
   - ***Experimental Protocol in accordance with Health Canada's "Best Practices" guidelines on Human Clinical Trials and Tri-Council Policy Statement 2010 (TCPS2)***
   - ***Research carried out according to the REB-approved protocol with yearly reviews, and approval by REB of any amendments***
3. ***ECONOMIC FRAMEWORK (doing the right things)***
   - ***Targeted agri-food product or sector importance demonstrated and potential increase of its competitiveness for Canada***
   - ***Timely translational plan for disseminating the results regardless of the outcomes***

Canada