

Canada's Functional Food and Nutraceutical Industry



Canadian functional food and nutraceutical companies are world leaders in quality and innovation. Canada is well positioned to become a leading supplier of functional foods and nutraceuticals to the world. Along with a food inspection system that is world renowned, Canada has an excellent international reputation for a pure, clean environment resulting in safe, high-quality food products. There are strong, cost-effective research capabilities across the country and a collaborative environment among governments, universities, health institutions and industry.

The functional food and nutraceutical industry holds significant potential to improve the health of citizens, support environmental initiatives, reduce health care costs, support economic development in rural communities, and help growers and the marine industry to diversify. All regions, from British Columbia to Atlantic Canada, are actively pursuing opportunities in this sector.

Leadership in Action

The Canadian functional food and nutraceutical industry has over 300 companies, from small start up companies to multinational organizations, with an estimated market size of \$6.6 billion¹. The market for functional foods and nutraceuticals is being driven by a growing consumer understanding of the link between diet and health, aging populations, rising health care costs, advances in food technology and nutrition. The market is also driven by scientific and clinical research validating the effectiveness of functional foods and nutraceuticals in preventing diseases.

Canada's active, research-oriented industry includes globally recognized food and nutraceutical companies such as Ocean Nutrition Canada (omega-3 fatty acids), Bioriginal Food and Science (essential fatty acid oils), Forbes Medi-Tech (plant sterols), Institut Rosell (probiotics), Natural Factors (Echinacea extracts), Flora Manufacturing (Certified organic essential fatty acid oil blends), and Nature's Path Foods (certified organic cereal products). Major multinational corporations such as Kellogg's, Heinz, Quaker, Unilever, Dupont, Novartis, Cargill, Hormel, Abbott Laboratories and Royal Numico are also active in this sector. In 2004, the *Global Market Review of Functional Foods – Forecasts to 2010* estimated that of the 6.6 billion dollar market, 41% is spent on functional foods. This figure translates to over \$2.7 billion CAD spent on functional foods per year in Canada, with Canadians spending more than \$212.32 per capita CAD on nutritional food products annually². In an effort to provide safe, efficacious products to more consumers, the Canadian functional foods and nutraceuticals industry is focused on its ability to make scientifically validated health claims. As such, the industry is putting significant resources into research and development.

High Technology Capacity

Canadian companies have demonstrated high technology capacity throughout the value chain. For example, Canada is a leader in the development and manufacturing of essential fatty acid (EFA) products from plant and marine sources including, evening primrose oil, flaxseed, borage, hemp, and marine animal oils. Further, Canadian companies have developed specialized encapsulation and other packaging technologies that preserve the integrity and bioactivity of EFA products. Milled flax (as a source of lignans) and soy sterols/stanols are also sold to the health food market in the form of capsules, blended with oil or in food.

Expertise in the formulation and manufacturing of single and complex vitamins, minerals and antioxidants is available from a number of Canadian manufacturers. In addition to consumer brands, Canadian companies also offer full-service contract manufacturing of private label vitamin and mineral supplements as well as herbals, specialty and combination products.

Canadian companies are embracing research through innovative technologies to develop and enhance value-added constituents from both plants and animals. In addition, such research is focusing on the development of food processing enzymes, seed meal enhancers, functional food ingredients and natural health products.

Canadian companies are developing new technologies to transform plant, animal, and marine biomass into beneficial health care products such as medicinal products from fish liver and shark cartilage, as well as other plant, animal, and marine by-products.



¹ Global Market Review of Functional Foods – Forecasts to 2010. 2005 Edition, Justfoods.com, Aroq Limited. December 2004.
² Ibid.



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Vast Natural Resources

Canada's varied landscape offers an abundant source of wild plants, marine resources, and fertile land, which are ideal locations for the cultivation and manufacturing of a wide variety of functional food and nutraceutical products. It is estimated that between \$300 million and \$1 billion CAD of farm production value goes to supplying ingredients for functional foods in Canada³.

The range of herbs produced by Canadian companies is diverse. For example, Saskatchewan growers alone produce over 70 different herbs and spices ranging from some of the most common to many specialty varieties. Canada's marine resources are also extensive and companies have successfully looked to the sea as a source of high value nutrients.

Value-Added Processing

Along with enhancing the nutritive value and functional properties of crops, Canada has also developed an industrial capacity in the value-added processing and extraction of nutritionally valuable elements. For example, Canadian companies have developed specialized fractionation technologies for the processing of raw materials such as legumes, oats and other cereals into starch, protein and fibre. New companies have formed to commercialize novel processing techniques such as microwave enhanced drying (EnWave Corporation), and microwave-assisted extraction (Radiant Technologies Inc).

Canadian companies and researchers specializing in the standardization of herb and plant extracts have developed extraction, isolation, and purification expertise to fulfill Canada's stringent standards for foods, pharmaceuticals and natural health products. Companies have refined analytical methods to verify the potency and bio-activity of herbal extracts and other compounds. Canadian companies have also developed technologies and expertise in the extraction, characterization, stabilization, modification, and enhancement of the flavonoid components of fruits.

The food and food ingredient sector is a very important part of the Canadian nutrition industry. Examples of products produced by Canadian companies include milk and eggs with increased levels of omega-3 fatty acids; cereals and grains including wheat, oat, barley and fenuGreek products with enhanced amounts of dietary fiber; yogurts containing probiotics; modified fatty acid vegetable oils; and vegetable proteins from soy, canola and hemp, legumes and fruit products.

³ Potential Benefits of Functional Foods and Nutraceuticals to the Agri-Food Industry in Canada, Scott Wolf Management Inc. March 2002.

Research and Development Capacity

Canada is well positioned to be a leader in the development of functional foods and nutraceuticals. Research and development is critical to this rapidly developing field and Canada has strong, cost-effective research capabilities across the country that include collaborations among governments, academia, health institutions and industry. The groundbreaking collaboration between AAFC, the University of Manitoba, and St. Boniface General Hospital has scientists and medical researchers working side by side to do further research on health related claims of various foods, through the identification of active ingredients and analysis on their safety. Functional food and nutraceutical development is increasingly focused on scientifically validated health claims and technology development.

A Federal Commitment

At the federal government level, Agriculture and Agri-Food Canada (AAFC), www.agr.gc.ca takes a team approach to research, with world-class experts from across the country working to bring together knowledge and ideas in specific fields to cover the value chain spectrum from farm to fork. The Matching Investment Initiative (MII) encourages this collaboration with industry and academic partners by matching private funding for research projects brought to AAFC and approved under this program.

AAFC research centres have a wide variety of expertise in functional food and nutraceutical applications including:

- **isolation and characterization of value-added components**
- **development of novel processes for the fractionation, extraction, isolation and purification of bioactive compounds**
- **bio-ingredients research including flavours and colorants**
- **enhancement of food antioxidant capacity**
- **development and pilot scale production of high value biologically active components**
- **in-vitro assays, in-vivo studies and analytical chemistry**
- **molecular and conventional approaches to plant breeding**

Functional foods and nutraceuticals research straddles two AAFC science programs (Food Safety and Quality, and Bioproducts and Bioprocesses) and is presently carried out at seven federal research centres:

- **Atlantic Food and Horticultural Research Centre (Kentville, Nova Scotia)** <http://www.res2.agr.ca/kentville/>
- **Food Research and Development Centre (Saint-Hyacinthe, Quebec)** <http://www.sci.agr.ca/crda>
- **Eastern Cereal and Oilseed Research Centre (Ottawa, Ontario)** <http://www.res2.agr.ca/ecorc>
- **Southern Crop Protection & Food Research Centre (London, Guelph, Vineland and Delhi, Ontario)** <http://www.res2.agr.gc.ca/london>
- **Pacific Agri-Food Research Centre (Summerland, British Columbia)** <http://www.res2.agr.ca/parc-crapac>
- **Saskatoon Research Centre (Saskatoon, Saskatchewan)** www.src.sk.ca
- **Cereal Research Centre (Winnipeg and Morden, Manitoba)** <http://www.res2.agr.ca/winnipeg>



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The National Research Council (NRC) of Canada, www.nrc-cnrc.gc.ca is a leader in genomics and bioinformatics - fields that are increasingly being directed towards the study of natural health products, nutraceuticals, and functional foods. Two NRC institutes have initiatives specific to the sector. The Plant Biotechnology Institute (PBI), www.pbi.nrc.ca, in Saskatchewan is developing a technology cluster of researchers and activities in the Western provinces. PBI's Crops for Enhanced Human Health Program focuses research on the production and processing of agricultural crops for nutraceuticals and related purposes. The Institute of Nutrisciences and Health in PEI, www.inh-isns.nrc-cnrc.gc.ca, is currently being built and is scheduled to be open in early 2006. NRC's Industrial Research Assistance Program (IRAP) www.irap-pari.nrc-cnrc.gc.ca helps increase the innovation capacity of small-and-medium sized Canadian firms. Firms associated with this program are better equipped to perform research and development, commercialize new products and processes, and access new markets.

In addition, there is ongoing collaboration between industry, academia, and other research institutions for the purpose of commercializing scientific research.

Regulatory Environment

Health Canada regulates the functional foods and nutraceuticals industry and the Canadian Food Inspection Agency (CFIA), www.inspection.gc.ca, enforces these regulations. Within Health Canada, there are two regulating entities: the Food Directorate www.hc-sc.gc.ca/food-aliment, for functional foods, and the Natural Health Products Directorate, www.hc-sc.gc.ca/hpfb-dgpsa/nhpd-dpsn/index.html, for nutraceuticals and other natural health products. In 2003, Health Canada approved five generic health claims pertaining to:

- sodium, potassium and hypertension
- calcium, vitamin D and osteoporosis
- saturated fat, trans fat and heart disease
- vegetable and fruit and some types of cancers
- sugar alcohols and dental caries

Information on nutrition labelling and health claims can be found at: www.inspection.gc.ca/english/fssa/labeti/nutrition-pagee.shtml

Academic Excellence

Canadian universities are active participants in functional food and nutraceutical research. Their work is generally interdisciplinary in approach and focused on all areas of the industry - from production to consumption. The following organizations have taken an active role in this sector:

- Institut des nutraceutiques et des aliments fonctionels, Université Laval (Quebec), www.inaf.ulaval.ca
- Universities of Guelph and Toronto (Ontario), www.uoguelph.ca/hnru and www.utoronto.ca/nutrisci
- National Centre for Agri-Food Research in Medicine and St. Boniface General Hospital Research Centre (Winnipeg, Manitoba), www.sbrc.umanitoba.ca and www.umanitoba.ca/afs
- University of British Columbia, The Food, Nutrition & Health program, www.agsci.ubc.ca/fnh/index.htm

Getting the Players Together

Research players in the functional food and nutraceutical field - from governments to the academic community, institutions and industry - are working together to advance collective interests in this exciting field.



There are several research networks involving scientists from across Canada, including:

- Bioproducts and Bioprocess Network, and the Food Quality and Safety national science programs led by AAFC
- Nutraceuticals and Functional Foods Institute (INAF), a collaborative effort of research institutes in Quebec and the Maritimes
- Richardson Centre for Functional Foods, in collaboration with St. Boniface Hospital, INAF and the Plant Biotechnology Institute
- NRC technological cluster
- The network on marine biomass utilization involving Quebec and Maritime institutions
- Networks on probiotics, natural health products and cardiovascular diseases

In addition, the Agriculture Wellness Products Network maintains a Wellness West infrastructure database listing western based researchers, consultants, facilities and equipment and can be accessed at <http://www.agwellness.ca/wellnesswest/>

Clustering for Success

The business climate in Canada is fostering investment in high technology areas such as biotechnology and functional foods by forming geographic concentrations of interconnected companies and institutions. Some of Canada's functional food and nutraceutical research clusters include:

British Columbia

- AAFC Pacific Agri-Food Research Centre
- University of British Columbia
- British Columbia Functional Food and Nutraceutical Network
- British Columbia Institute of Technology



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Alberta

- University of Alberta
- University of Calgary
- University of Lethbridge
- Food Processing Development Centre
- Olds College School of Innovation
- Centre for Agri-Industrial Technology
- Alberta Research Council

Saskatchewan

- AAFC Saskatoon Research Centre
- University of Saskatchewan
- POS Pilot Plant
- Saskatchewan Food Industry Development Centre
- Innovation Place Bioprocessing Centre
- Canadian Light Source Inc.
- Ag-West Bio Inc.

Manitoba

- Richardson Centre for Functional Food & Nutraceuticals, University of Manitoba
- National Centre for Agri-Food Research in Medicine
- Manitoba Food Processing Centre

Ontario

- AAFC Southern Crop Protection & Food Research Centre; Greenhouse & Processing Crops Research Centre; Eastern Cereal and Oilseed Research Centre
- University of Guelph: Centre for Functional Foods; Human Nutraceutical Research Unit; Natural Health Products Technology Cluster; Guelph Food Technology Centre, Advanced Foods and Materials Network
- University of Western Ontario Centre for Human Nutrition
- University of Toronto

Quebec

- McGill University Phytochemical Metabolism Group
- Université Laval Functional Food & Nutraceutical Research Institute
- AAFC Food Research & Development Centre

Atlantic Provinces

- AAFC Atlantic Food and Horticulture Research Centre
- Université de Moncton Food Research Centre
- National Research Council Institute for Marine Biosciences
- PEI Food Technology Institute
- BioAtlantech
- BioNova

Canada - Cold Winters, Hot Business Climate

Canada is a leading producer and exporter of agricultural products. Canadian farmers also have expertise in the improvement of the agronomic qualities of various crops.

Agriculture in Canada is an active, research-oriented industry geared towards innovative discoveries with an emphasis on value-added processing and the extraction of nutritionally valuable constituents. Collaborative efforts on the part of the industry and research community will continue to foster economic growth.

Canada is a land of business opportunity. The KPMG Competitive Alternatives study ranks Canada as the overall cost leader for business, labour and research and development costs among the G7 countries.

Functional foods and nutraceuticals represent a tremendous value-added growth opportunity for the Canadian agri-food industry, both domestically and internationally. Industry and market development is a priority for all government and industry stakeholders.

Because of Canada's strong research capabilities in the area of functional foods and nutraceuticals and its cost effectiveness in research and development, the sector is able to develop top-quality products based on scientific evidence for their efficacy and safety. This is key allowing the sector to further develop, grow and capitalize on tremendous global market opportunities.

AAFC Functional Food and Nutraceutical website

This site www.agr.gc.ca/food contains information on industry, markets and research initiatives, as well as policy and regulatory developments. It also features a searchable database of more than 100 Canadian companies and research organizations involved in functional food and nutraceutical activities and helps promote partnerships. It can be found at: www2.agr.gc.ca/nutraceuticals/index_e.cfm.

For more information on the Canadian Functional Food and Nutraceutical Industry, or the work of AAFC in this sector, please contact:

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