



Building Networks

Innovation and Collaboration in
Agricultural, Environmental and
Health Genomics Research

Annual Report 2008 – 2009



GenomePrairie



CONTENTS

- 3** Introduction
- 4** Message from the Chair
- 5** Presidents' Message
- 6** Chief Scientific Officer's Message
- 7** Research Highlights
- 8** New Projects
- 10** North American Conditional Mouse Mutagenesis (NorCOMM)
- 12** Crop Adaptation Genomics (CAG)
- 14** Designing Oilseeds for Tomorrow's Markets (DOTM)
- 16** Public Education and Outreach
- 18** Canadian Flax Genomics Initiative (CFGl)
- 19** Western Canadian Vaccine Network (WCVNet)
- 20** Canadian Brassica Genomics Network (CBGN)
- 21** Societal Impacts of Genomics Network (SIGNet)
- 22** Genome Prairie Partners

Vision Genome Prairie will transform the future of the bioscience sector by fostering world-class research and commercialization in Manitoba and Saskatchewan.

Cumulative Cascades

Creating Networks of Knowledge

Genes direct all biological processes through cascades of code—one process triggering another in a network of interactions among DNA, RNA, genes, and proteins. The processes that create cells and organisms and determine whether they survive and thrive, or dwindle and die, are intricately interlinked.

Just as genes do not function individually, research does not happen in a vacuum. Genome Prairie has built strong networks and collaborations nationally and internationally to expand and share the cumulative knowledge of genomics research in the fields of health, agriculture, environmental stewardship, and the impact of genomics on society.

Genomics Glossary

The letters **C**, **A**, **T**, and **G** each represent one of the four types of molecules, or nucleotide bases, which bind with sugars and phosphates to form two long, intertwined polymers of DNA. The sequence of these four bases is the key to encoding genetic information.



Leading Genomics Research

This past year has been an exciting and challenging one for Genome Prairie. Our Annual Report for 2008-09 outlines the progress we have made in genomics research in health, agriculture, environmental stewardship, and the societal impacts of genomics research.

Genome Prairie has provided leadership in establishing the Western Canadian Genomics Networks dedicated to increase collaborations among stakeholders from industry, academia and government in order to facilitate genomics projects from concept to commercialization.

Genome Prairie's success is due to the expertise and diligence of regional scientists, to our outstanding managerial and support team, and to the dedicated leadership of an expert board of directors. Particular thanks to the vision and commitment of our previous and current CEO, who successfully carried Genome Prairie forward during this time of leadership transition.

Finally, our sincere thanks to the federal and provincial governments and their respective agencies for their crucial support in these challenging economic times. The most recent announcement of three major awards to Genome Prairie from Genome Canada underscores the quality and importance of biological sciences programs and genomics research in Canada's Prairie provinces.

Dr. Arnold Naimark
Chair

Board of Directors

Ms. June Bold

Chief Executive Officer
Saskatchewan Health Research
Foundation

Dr. Gerald L. Brown

Director of Commercialization
Pan-Provincial Vaccine Enterprise
(PREVENT)

Dr. David Gauthier

Chief Executive Officer
Entrepreneurial Foundation of
Saskatchewan Inc.

Dr. Martin Godbout

(ex officio)
President and CEO
Genome Canada

Dr. Digvir S. Jayas

(effective June 27, 2008)
Vice-President (Research)
University of Manitoba

Dr. Murray McLaughlin

President
Sustainable Chemistry Alliance

Mr. Lyle Merrell

President and CEO
Cronus BioPharma Inc.

Dr. Arnold Naimark

(Chairman of the Board)
Director, Centre for the
Advancement of Medicine,
University of Manitoba

Dr. Gordon Neish

(to June 27, 2008)
Director General
Agriculture and Agri-Food Canada

Dr. Ashley O'Sullivan

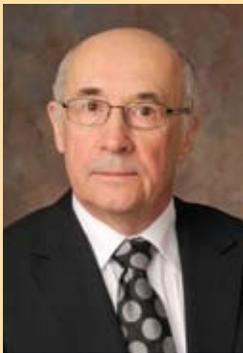
(Acting President:
July 1- September 30, 2008)
Past President and CEO
Ag-West Bio Inc.

Dr. Ian Smith

Director General
National Research Council Canada



Mr. Jerome Konecsni



Dr. Wilf Keller

Continuing Teamwork through Transition

We share a commitment to ensure that research institutions in our region are competitive and have the best teams to capture funding to attain the highest level of socio-economic benefits from genomics research in this region.

This past year we achieved many milestones through collaborations and partnerships with key stakeholders. With the support of Western Economic Diversification, Genome Prairie established four overarching genomics networks to facilitate these goals. We were also extremely successful in Genome Canada's competition in Applied Genomics Research in Bioproducts or Crops (ABC), with the funding of three major genomics projects valued at over \$27 million.

We are fortunate to have a wealth of resources in regional research infrastructure, highly qualified people, and provincial governments and agencies who share our view of the vital role genomics is playing in the Prairie region. While the tools of genomic sciences are new, they will have a tremendous impact on human health, agriculture and food, and environmental sustainability in the future.

We would like to thank all regional researchers and our office team members for their support and dedication in facilitating our smooth transition in leadership, and for their commitment to our values and initiatives—to ensure outstanding genomics research that provides the best quality of life for the people of the prairies.

Mr. Jerome Konecsni
President and CEO
(to June 30, 2008)

Dr. Wilf Keller
President and CEO
(effective October 1, 2008)

Prairie Genome Staff

Dr. Carolyn Ashley
Project Manager
North American Conditional Mouse
Mutagenesis (NorCOMM) Project

Chris Barker
Project Manager
Crop Adaptation Genomics Project

Colette Chantler
Office Manager and
Executive Assistant to CEO

Gladys Coombes
Accountant

Lisa Jategaonkar
Director, Business Development
(on leave)

Lana Mollard
Administrative Assistant

Faye Pagdonsolan
Branch Office Manager and
Executive Assistant to CSO
(Winnipeg)

Patrick Pitka, FCA
Chief Financial Officer

Dr. Reno Pontarollo
Chief Scientific Officer

Daniel Ramage
Communications and
Business Development Officer

Patricia Reid
Accountant

Carol Reynolds
Director, Corporate
Development and
Communications

Cindy Yungwirth
Corporate Secretary



Establishing Priorities in Genomics Research

Genome Prairie has achieved several research milestones during the past year, culminating in being awarded three Genome Canada projects in the Applied Genomics Research in Bioproducts or Crops (ABC) competition. This success is the result of a three-year process that began with the Genome Prairie-led position paper on crop genomics—ranked highest in Canada.

A national call for position papers in the ABC Competition prompted Genome Prairie to work with regional researchers and submit project proposals. As a result, successful projects in the areas of flax, biofuels and the impact of genomics on society were awarded to Genome Prairie.

With this funding support, Genome Prairie will continue to lead these national priority projects in Canada. The research highlights outlined in this annual report show the progress we have made and the success we have achieved with ongoing projects and those that are nearing completion. We look forward to working with Genome Canada and other centres toward the continued development and expansion of our regional, national and international collaborations in genomics research.

Dr. Reno Pontarollo
Chief Scientific Officer



Genome Canada ABC Projects Funding Announcement

Saskatoon, April 20, 2009 –

The Honourable Gary Goodyear, Minister of State (Science and Technology), underlined the importance of genomics research funding in Canada. “Supporting research in Canada promotes job creation, enhances Canadians’ quality of life and strengthens the economy of future generations,” commented Goodyear. Genome Canada announced funding awards of 12 new genomics projects in the Applied Genomics Research in Bioproducts or Crops (ABC) Competition.

Genome Prairie Research Highlights

- Genome Prairie researchers with the **Crop Adaptation Genomics** project have identified 20 c-repeat binding factor genes (*Cbfs*), which activate other genes that protect the plant from cold.
- They have also identified eleven *Cbfs* in rye, the most cold tolerant of all cereals, and have compared their expression to similar genes in wheat and barley.
- Winter wheat varieties were planted in fall 2008 and spring wheat has been planted in 2009. Plants will be tested for a number of traits, including yield, quality and cold tolerance.
- Genome Prairie researchers with the **North American Conditional Mouse Mutagenesis** project provide embryonic stem cell lines to biomedical researchers worldwide.
- They also provide DNA vectors—an intermediate knockout product—which allow studies to be adapted to different tissues and biological systems.
- Project scientists are working to provide baseline phenotypes of knockout mice, which allow researchers to study the effects of a missing gene in a whole animal.
- Genome Prairie researchers with the **Designing Oilseeds for Tomorrow's Markets** project have identified twenty candidate genes related to the yellow-seeded phenotype of canola for further characterization.
- Genomic library and gene expression studies are almost complete for the identification of genes and other genetic elements involved in seed coat cell wall formation.
- Four genes that play an important role in oil biosynthesis and seed development have been identified and are being functionally characterized.





Dr. Calvin Stiller, Board Chair for Genome Canada, and Honourable Gary Goodyear, Minister of State (Science and Technology), discuss genomics research funding while Dr. Wilf Keller, President and CEO of Genome Prairie, looks on. Saskatoon, Saskatchewan, April 20, 2009.

New Genome Prairie Projects

PROJECT NAME	Genome Canada Contribution	Co-funding	Total Project Value
Microbial Genomics for Biofuels and Co-products from Biorefining Processes (MGB)	\$4.9 million	\$5.6 million	\$10.5 million
Total Utilization Flax Genomics (TUFGEN)	\$5.6 million	\$6.4 million	\$12.0 million
Value Generation through Genomics (VALGEN)	\$2.6 million	\$2.8 million	\$5.4 million

Leading New Projects

In April 2008, Genome Canada issued a request for applications for large-scale research projects that focused on the application of genomics in bioproducts, crops and the social, environmental, economic, and ethical issues related to research in these strategic areas. Genome Prairie achieved outstanding success with the funding of three new projects from Genome Canada and co-funding from regional, national and international partners.

Microbial Genomics for Biofuels and Co-products from Biorefining Processes (MGB)

Clean energy from biomass products such as ethanol and hydrogen are a promising renewable energy source. However, the cost of grain-based ethanol production is high, and the use of food grains has negative social and economic implications. While waste products such as wood chips and straw provide other sources of cellulose-containing biomass for the synthesis of biofuels, the conversion of these waste products to ethanol and hydrogen remains uneconomical. The goal of MGB is to establish Canada as a leader in the production of biofuels and high-value bioproducts. MGB research will:

- Characterize the genes and functions of the bacteria involved in conversion of cellulose biomass to ethanol, hydrogen, bioplastics and other bioproducts.
- Engineer mixed designer populations of bacteria with enhanced biosynthesis, which can break down cellulose without expensive energy-consuming processing. This novel approach will economically convert cellulose-rich biomass into biofuels and bioproducts, thereby increasing the viability of these processes.



Total Utilization Flax Genomics (TUFGEN)

Flax seed and fibres have been used for hundreds of years in industrial oil and solvents and in textiles. Today, flax is becoming an increasingly popular food ingredient. Flax seed is rich in omega-3 oils and plant estrogens, which are known to reduce “bad” cholesterol and moderate the risks of heart disease and some cancers. The goal of TUFGEN research is to develop flax as a dual-purpose crop that provides both seed and fibre products of high quality and value. TUFGEN research will:

- Develop genomics methods to study flax growth and performance.
- Sequence the entire flax genome, which will be the largest contribution of any Canadian research team.
- Develop genetic and physical maps that outline the position and relationship of genes important for improving flax usefulness.

Value Generation through Genomics (VALGEN)

Genomics research is now fundamental to all areas of biological science, including agriculture—so critical to the economic well-being of the Prairie provinces and Canada in general. VALGEN researchers will study how Canada can benefit from applying genomic research to agriculture in order to remove barriers to innovation in Canada’s bio-based economy. VALGEN research will:

- Examine the role of intellectual property in moving laboratory discoveries toward practical applications.
- Study ways of regulating new technologies and products to ensure Canadians benefit as quickly as possible from publicly funded research.
- Develop engagement tools to help Canadians participate in decisions about how we choose new agricultural products and technologies.

At NorCOMM we are working to develop better genetic models to study human disease. With the Toronto Centre for Phenogenomics, we study whole animal models to make discoveries about gene function as it relates to human disease. Together, these approaches are helping translate genomic research into clinical treatment.

- Dr. Geoff Hicks, Project Co-leader,
NorCOMM, and Director,
Mammalian Functional Genomics Centre,
University of Manitoba



*front row, left to right: Dr. Songyan Liu, Research Associate,
Dr. Geoff Hicks and Dr. Carolyn Ashley with research team.*

North American Conditional Mouse Mutagenesis (NorCOMM)

Managed by: Genome Prairie

Project Co-leader: Dr. Geoff Hicks, Director, Mammalian Functional Genomics Centre, Manitoba Institute of Cell Biology, University of Manitoba

Project Co-leader: Dr. Janet Rossant, Chief of Research, Toronto Hospital for Sick Children, University of Toronto; Director, Centre for Modelling Human Disease (CMHD), Toronto

Lead Project Manager: Dr. Carolyn Ashley, Genome Prairie, Winnipeg

Toronto Project Manager: Lauryl Nutter, CMHD

Project Value: \$20.4 M

Genome Canada Contribution: \$8.4 M

Province of Manitoba Contribution: \$560,000

Advancing Genomics in Health and Disease

The North American Conditional Mouse Mutagenesis (NorCOMM) project is part of a major international initiative that develops mouse models to accelerate genomics health research and therapeutic drug discovery.

NorCOMM is part of the International Knockout Mouse Consortium (IKMC), which brings together research groups from across Canada, the United States and Europe. NorCOMM scientists develop mouse models for the international research community to study the function and role of genes in health and disease and to facilitate therapeutic drug research.

- In 2008, NorCOMM project co-leader Dr. Janet Rossant assumed the chair of the IKMC.

- NorCOMM was also selected to host the 2nd International Conference of the Functional Annotation of Mammalian Genome, which was held in Banff, April 2009.

Integrated into all Genome Prairie projects is research on the societal effects of genomics research. NorCOMM researchers continue to examine the value and use of the resources they create, as well as the effectiveness of communication and interaction within such a large collaboration.

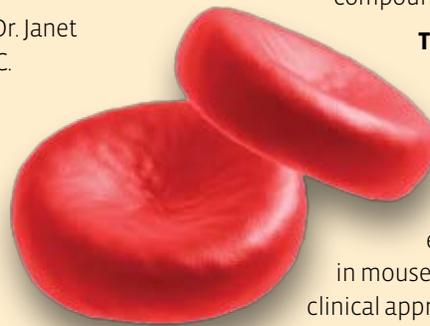
NorCOMM has an international reputation for developing knockout mouse embryonic stem (ES) cell lines for biomedical research.

- Over the past year, NorCOMM has focused on high-throughput targeted gene knockouts, prioritizing requests from researchers and biotech companies worldwide.
- Interactive gene targeting increases the impact, relevance and value of NorCOMM resources.

- In addition to supplying ES cell lines, NorCOMM provides DNA vectors—an intermediate knockout product—which allow researchers to adapt studies to different tissues and biological systems.

NorCOMM is working to provide baseline phenotypes of knockout mice. Initial plans are to phenotype a minimum of fifteen knockout mouse lines derived from the NorCOMM resource.

- Knockout mice allow researchers to study the effects of a missing gene in the context of the whole animal.
- Specific findings in one research area (i.e., diabetes) often have applications in other areas (i.e., obesity). Information will be shared with the IKMC database, thereby compounding knowledge and increasing efficiency.



The Toronto Centre for Phenogenomics

(TCP) is an innovative collaboration among four major research hospitals and is the premiere mouse clinic in North America. Based on fee-for-service, medical researchers across Canada can request evaluation of a broad range of disorders in mouse models, with state-of-the-art testing and clinical approaches.

- NorCOMM conducts and supports genetic research in collaboration with TCP and is planning to add specialized testing based on strength of phenogenomics research in Manitoba.

Genomics Glossary

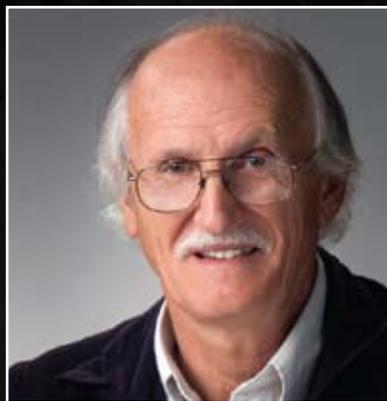
GENE KNOCKOUT: By knocking out the function of a specific gene in the mouse, researchers can determine the role of similar genes in humans.

PHENOTYPE: The observable traits of an organism as a result of the organism's gene expression, interaction with the environment and random (or targeted) variation.

Developing genomic tools for selection is a priority for the Crop Adaptation Genomics (CAG) project. These tools will greatly reduce the time to cultivar development and expand the opportunity for effective marker-assisted breeding programs for cold hardiness in winter wheat.

- Dr. Brian Fowler, Crop Development Centre, University of Saskatchewan

Photo: Winterwheat



Dr. Brian Fowler

Crop Adaptation Genomics: Use of Genomic Tools for Crop Improvement in Temperate Climates (CAG)

Managed by: Genome Prairie

Project Leader: Dr. Brian Fowler, Crop Development Centre, University of Saskatchewan

Project Manager: Chris Barker, Genome Prairie, Saskatoon

Project Value: \$8.1 M

Genome Canada Contribution: \$4.1 M

Province of Saskatchewan Contribution: \$3 M

Increasing Cold Tolerance in Crops

Genome Prairie research in Crop Adaptation Genomics (CAG) is helping traditional crop breeders develop frost-hardy crops better suited to Canada's short growing season.

The key to cold tolerance in grain crops lies in the complex interplay of genes and proteins. Wheat has one of the most complex genomes of all grains because it evolved from the natural crossing of several different grasses. As a result, the mechanism for cold tolerance involves a signalling cascade of thousands of genes. By studying rye, wheat's simpler, hardy cousin, Genome Prairie researchers are applying that knowledge to test new frost-resistant spring and winter wheat varieties. Planting cold-tolerant crops has multiple benefits for farmers and for the environment.

- Improved cold tolerance in winter wheat allows farmers to rotate crops and expand production.
- Increasing winter wheat acreage increases weed control options and reduces herbicide use and costs.
- Winter wheat fields provide an undisturbed, safe nesting place for birds and waterfowl.
- Increasing cold tolerance in both spring and winter wheat reduces risk of frost damage during the growing season.

Genome Prairie researchers have identified 72 new genetic markers, corresponding to eleven different quantitative trait loci (QTL), on the genomes of different wheat and barley species. These markers are used to combine desirable traits of select lines in plant breeding programs.

- CAG researchers have identified twenty different C-repeat binding factor (*Cbf*) genes, which activate other genes that protect the plant from cold. The large number of *Cbf* genes in Norstar wheat may be responsible for that variety's cold tolerance.
- They have also identified eleven *Cbfs* in rye, the most cold-tolerant of all cereals, and have compared their expression to similar genes in wheat and barley.

- Winter wheat varieties were planted in fall 2008, and spring wheat will be planted in 2009. Plants will be tested for a number of traits, including yield and quality, as well as cold tolerance.

In an ongoing collaboration with the US Department of Agriculture and the Affymetrix microarray facility in Santa Clara, California, CAG researchers have studied the multiple gene expression patterns of winter, spring, hardy, and cold-sensitive varieties of wheat. They discovered that thousands of genes are expressed differently in cold-tolerant versus cold-sensitive varieties of hardy winter and tender spring wheat varieties.



An interactive winter wheat survival model,

developed as part of the CAG website, uses daily weather data from all three Prairie provinces as well as the Czech Republic.

- The web-based model is widely used by farmers to determine the best crop varieties to plant based on historical weather data and projected climate change. It also provides researchers with better estimates of crop survival.

Economic and environmental factors with respect to land use, value to farmers, and impact on farming practices are also being studied. For example, winter wheat production has advantages in crop rotation and requires less use of herbicides. However, the ability to expand production into more northerly areas as our climate changes poses important environmental and ethical questions, which are being addressed by CAG researchers.

Genomics Glossary

Both **GENOTYPIC DATA** (segments of DNA that specify different traits) and **PHENOTYPIC DATA** (numerical measurements or classification of characters related to the genes of interest) are required to identify quantitative trait loci for use in marker-assisted crop breeding programs.



Dr. Gopalan Selvaraj

Designing Oilseeds for Tomorrow's Markets

Managed by: Genome Alberta

Project Co-leader: Dr. Randall Weselake, Canada Research Chair in Agricultural Lipid Biotechnology, University of Alberta

Project Co-leader: Dr. Gopalan Selvaraj, National Research Council – Plant Biotechnology Institute

Supported by: Genome Prairie

Project Manager: Dr. Jeff Parker, Genome Alberta, Calgary

Project Value: \$14.8 M

Genome Canada Contribution: \$6.8 M

Province of Saskatchewan Contribution: \$1.6 M

Samples of canola seeds

Dark seed coat (conventional)

Yellow seed coat (under development)

Adding Value to Canola Crops

By enhancing the quality of canola meal and increasing the oil content in the seed, Genome Prairie researchers are working to add value to one of Canada's key export crops.

Canola oil is one of the most heart-healthy vegetable oils — with zero trans fat, no cholesterol and low saturated fat. Also prized for its versatility and light taste, canola oil comprises 70 percent of all vegetable oil products in Canada. With exports, canola contributes over \$13 billion annually to the Canadian economy, and \$3 billion in farming revenue in Western Canada.

By understanding the genetic factors that control seed coat thickness and oil yield, Genome Prairie researchers are working to maximize the value of canola to farmers and to industry. While oil is the primary product of canola, the by-product of seed crushing is high-protein meal, which comprises half the weight of the seed. Improving the quality of canola meal for animal feed represents a huge market potential. Researchers are working to:

- Understand the genetic basis of yellow-seeded canola types that have thinner coats and are associated with higher seed oil yields and lower fibre in canola meal.
- Reduce anti-nutritional compounds in the meal such as sinapine, which gives it a bitter taste, and phytates, which are indigestible in swine and poultry and are released as phosphates into the environment.
- Reduce seed coat thickness by understanding and manipulating seed coat development genes, which will result in lower-fibre meal that is more easily digestible.



Several milestones have been achieved to date:

- Twenty candidate genes related to the yellow-seeded phenotype have been identified for further characterization.
- Early lines will be tested in field trials in spring 2009.
- Genomic libraries and gene expression studies are nearing completion for the identification of genes and other genetic elements involved in seed coat cell wall formation.
- Functional characterization of 40 selected seed quality genes is underway.

In a related project, Improving Brassica Oil Content, researchers are investigating the genetic interplay between embryo endosperm, seed size and seed coat development, with the goal of improving the oil content in canola seed.

- Four genes that play an important role in oil biosynthesis and seed development have been identified and are being functionally characterized.
- A key publication on endosperm genomics has been accepted for publication in *BMC Genomics* journal.

Researchers are also working to address issues of risk, costs, benefits, and barriers to research and to getting genetically enhanced canola oil and quality meal into the marketplace.

Genomics Glossary

GENE EXPRESSION is the process by which inheritable information from a gene or DNA sequence is transcribed, or copied, into RNA, which is then translated into proteins and other functional gene products.

Genome Prairie continues to support the development of science, biotechnology and genomics programs for educators and students in Manitoba. Their direct financial and in kind support allows MindSet, as a program of Manitoba Science, Technology, Energy and Mines, to offer relevant and immediate information to our educators and promising young scientists.

- Norman Lee, Coordinator, MindSet, The Manitoba Network for Science and Technology, Manitoba Science, Technology, Energy and Mines



Muriel Adams, Agricultural Biotechnology International Conference (ABIC) Coordinator, and Jill Maase, Vice President Plant Biotechnology, Government & Public Affairs, CropLife Canada.



Carol Reynolds presents the Genomics Award to Scott Adams at the Sanofi-aventis BioTalent Awards Banquet, April 2008 in Saskatoon, Saskatchewan.



Carol Reynolds talks with volunteers at Biotechnology Outreach Day, University of Saskatchewan, Saskatoon, Saskatchewan.

Educating and Communicating

Genomics research touches almost every area of society, from health and agriculture, to energy and information. Genome Prairie is committed to advancing knowledge and fostering understanding of how genomics researchers are helping to fight disease, improve health and create a more sustainable economy.

Through extensive education and outreach programs, Genome Prairie strives to engage the public in genomics research and to inspire young people to consider careers in biosciences. Over the past year, several successful initiatives were carried out.

- Genome Prairie oversaw the facilitation of a special event at the Agricultural Biotechnology International Conference (ABIC) in Ireland. The event was hosted by Genome British Columbia, Genome Alberta and Genome Prairie and attracted more than 100 international stakeholders, funders and dignitaries.
- Genome Prairie hosted CBC science journalist Bob McDonald at a free public presentation in Saskatoon, which was broadcast simultaneously at the National Bioscience

Educators' Conference in Toronto. More than 200 members of the public came out to the Saturday morning presentation in Saskatoon, and McDonald's presentation was viewed by nearly 100 participants in Toronto.

- In 2008–2009, Genome Prairie was an active organizing sponsor of the annual Sanofi-aventis BioTalent Challenge, and continued to provide the Genome Prairie awards for outstanding genomics projects by grades seven to twelve students from Manitoba and Saskatchewan.
- As one of six genome centres in Canada, Genome Prairie facilitated and co-hosted the second annual Canadian Genomics Reception at the International Plant and Animal Genomics Conference in San Diego. More than 150 researchers, funding partners and international stakeholders attended.
- Genome Prairie sponsored several science fair events and career fairs in Manitoba and Saskatchewan.
- Educational tours and receptions for government officials and representatives were held in both provinces and were very well attended by provincial Members of the Legislative Assembly and local federal Members of Parliament. Ongoing education and dialogue with government officials, agencies and other potential stakeholders remains a priority for Genome Prairie.



Genome Prairie is represented at various educational events in Manitoba and Saskatchewan.



The GEEE! in Genome Suitcase is well received by students at schools, events, and career fairs.



Innovation to Commercialization

Canadian Flax Genomics Initiative (CFG I)

One of the first domesticated plants, flax is a foundation crop of modern agriculture, historically valued for oil and fibre. Canada is the world’s largest producer and exporter of flax—about 40 percent of world production—with annual exports valued at \$150-\$180 million. In Saskatchewan, one in every four farms incorporates flax into the crop rotation. Most of the flaxseed grown in Western Canada is exported as flax oil, as well as flaxseed meal and flax fibre. Flax has been used predominantly for industrial oil, animal feed meal in North America, and as a food staple in countries such as India and China.

New markets are emerging for flax in health and nutrition, and natural fibres. The essential omega-3 fatty acid in flax oil and the soluble fibre in the flaxseed kernel are known to contribute to wellness. There is a rising interest to develop and use natural fibres such as flax in environmentally sustainable products. For example, the non-allergenic and biodegradable characteristics of linoleum made from solidified flax (linseed) oil and wood dust have led to a resurgence of demand for this product.

Flax Facts

- Flax oil is low in saturated fat and is a rich source of omega-3 fatty acid, beneficial for cardiovascular health, inflammatory disorders, immunity, and certain cancers.
- Flax contains up to 800 times more phytoestrogenic compounds known as lignans than other plant sources. Lignans provide protection against certain forms of cancer and can also lower serum cholesterol, reducing the onset of both Type 1 and Type 2 diabetes.
- Flaxseed contains approximately 28 percent dietary fibre, which may have protective effects against colon cancer.
- Flaxseed is an excellent source of protein, with a similar protein profile to soybean.
- Flax fibres can be processed to make excellent insulation, specialty pulp and paper, textiles, and building products.

CFG I Partners

Agriculture and Agri-Food Canada
 Ag-West Bio Inc.
 Alberta Agriculture and Food

Canadian Grain Commission
 Desai and Desai Inc.
 Flax Canada
 National Research Council, Plant Biotechnology Institute (NRC-PBI)

Saskatchewan Flax Development Commission
 Saskatchewan Ministry of Agriculture
 University of Alberta

University of Saskatchewan
 Viterro

The CFG I is a Western Canadian genomics network that is bringing together multiple stakeholders to identify common areas of interest and collaboration in flax research and commercialization.



GenomeBritishColumbia



GenomeAlberta



GenomePrairie

supported by:



Western Economic Diversification Canada

Diversification de l'économie de l'Ouest Canada



Innovation to Commercialization

Western Canadian Vaccine Network (WCVNet)

Canada has gained a reputation as a world leader in vaccine and infectious disease research. Western Canada has several major vaccine enterprises, including three of the four Grand Challenges in Global Health (GCGH) projects funded by the Bill and Melinda Gates Foundation. The National Microbiology Laboratory in Winnipeg and the Vaccine and Infectious Disease Organization International Vaccine Centre (VIDO/InterVac) in Saskatoon house extensive laboratories and animal facilities—from levels 2 to 4 biocontainment—to enable world-class research and ensure biosafety.

Over the past two decades, a number of research networks have been established to promote vaccine development, vaccine usage and the implementation of immunization programs. The newly established Western Canadian Vaccine Network (WCVNet) will facilitate communication and coordinate activities to achieve greater synergies between those networks doing basic research and those working in vaccine formulation and drug delivery.

WCVNet Partners

Cangene

Dalhousie University

Microtek International

University of Alberta

University of British Columbia

University of Calgary

Vaccine and Infectious Disease Organization (VIDO)



The Western Canadian Vaccine Network

Linking Vaccine Research in Western Canada

- Research Alliance for the Prevention of Infectious Disease (RAPID) deals with vaccines, public health, vaccine formulation, pediatric immunity, and disease modelling.
- Pan-Provincial Vaccine Enterprise (PREVENT), one of Canada's new Centres of Excellence in Commercialization and Research, is involved in preclinical vaccine development and clinical trials of both animal and human vaccines.
- Alberta Heritage Foundation for Medical Research Interdisciplinary Team in Vaccine Design and Implementation focuses on computer modelling, public health and development of vaccines for bacterial infections.
- Grand Challenges in Global Health Neonatal Vaccine Team is focused on the development of novel vaccine formulations for neonates.
- University of Alberta viral vaccine teams investigate immune responses and chronic viral diseases.
- Commercial vaccine production is currently led by Microtek International (Victoria), QSV (Edmonton) and Cangene (Winnipeg).

The WCVNet is a Western Canadian genomics network that is linking existing vaccine networks to facilitate discovery, communication and commercialization of vaccine research.



GenomeBritishColumbia



GenomeAlberta



GenomePrairie

supported by:



Western Economic Diversification Canada

Diversification de l'économie de l'Ouest Canada



Innovation to Commercialization

Canadian Brassica Genomics Network (CBGN)



Researchers in Western Canada are world leaders in Brassica crop genomics. The Canadian Brassica Genomics Network (CBGN), supported by Western Economic Diversification Canada (WD), is working to preserve and strengthen Canada's position in canola research and commercialization.

The network's goal is to increase collaborations among industry, academia and government so that all stakeholders benefit. By sharing resources, leveraging research funding and exchanging information, genomics researchers in Western Canada will stay at the forefront of a competitive market. Members of the CBGN are involved in various projects, with goals that include:

- Improving the digestibility and energy content of canola meal to produce high-value livestock feeds from the seed husk by-product.
- Developing high-value meals for aquaculture, to open up another value-added market.
- Sequencing the entire canola genome, thus providing the basis for genetic improvement of agronomic traits.
- Understanding what genes are involved in agronomic traits such as yield, oil content and oil profile in order to make improvements at the crop level.

Canola Industry Facts and Figures

- The canola industry generates \$13 billion annually for the economy in Canada, and employs 214,000 people.
- Canola oil is recognized for its healthy fatty acid profile, evidenced by the US Food and Drug Administration (FDA) health claim that it reduces cardiovascular disease.
- There are strong indications that canola oil can be of benefit in other diseases as well.
- Increasing canola oil content by one percent is equivalent to \$60 million additional annual revenue to producers.
- Increasing harvested yields in Canadian small grains and oilseeds by one percent adds \$136 million to rural economies

CBGN Partners

Agriculture and Agri-Food Canada
Canola Council of Canada

CropLife Canada
National Research Council, Plant Biotechnology Institute (NRC-PBI)

Saskatchewan Ministry of Agriculture
University of Alberta
University of British Columbia

University of Manitoba
University of Saskatchewan

CBGN is a Western Canadian genomics network created to guide and facilitate Brassica genomics projects from concept to commercialization.



GenomeBritishColumbia



GenomeAlberta



GenomePrairie

supported by:



Western Economic Diversification Canada

Diversification de l'économie de l'Ouest Canada



Innovation to Commercialization

Societal Impacts of Genomics Network (SIGNet)

The process of getting new discoveries into the marketplace involves an array of disciplines and expertise in science, technology, industry, business, and the social sciences. Societal Impacts of Genomics Network (SIGNet) was established to connect social science and humanist scholars working in the field of genomics across Western Canada.

In bringing a new product or technology to the marketplace, issues of economics and ethics are inextricably intertwined. When individual aspects of the process are isolated and evaluated, often the process of isolation makes evaluation an artificial and non-repeatable event.

SIGNet will facilitate interaction among genomics and society scholars and project scientists in order to help transform research and discoveries into viable programs and products that will have maximum value for producers, industry and society.

A focus of SIGNet is to bring together scientists engaged in deductive analysis with scholars using inductive and comparative models in order to develop best practises and new, standardized methods of project evaluation. These areas include valuation, licensing, legal structures, governance, and societal impacts. SIGNet will include researchers from the Universities of Saskatchewan, Regina, Calgary, Alberta, British Columbia, and Victoria, and Simon Fraser University.

SIGNet Partners

University of British Columbia
University of Regina
University of Saskatchewan

Adoption and Commercialization

The SIGNet will:

- Create synergies among SIGNet researchers involved in specific genomics projects.
- Bridge the gap between biological science, social science and humanist research methods.
- Train high-quality personnel to become more involved in research and commercialization processes.
- Provide a foundation for investigating the legal, social, economic, environmental, and ethical issues around genomics research.
- Enhance and add value to genomics research.

SIGNet is a Western Canadian genomics network created to unite scholars in genomics and society in order to build new models of acceptance and commercialization for repeated success.



GenomeBritishColumbia



GenomeAlberta



GenomePrairie

supported by:



Western Economic
Diversification Canada

Diversification de l'économie
de l'Ouest Canada

Canada

Genome Prairie Partners

Regional, national and international partners are key to successful research discoveries and innovations. Genome Prairie believes in the collaborative efforts of networks and relationships to enhance the beneficial global impact of genomic research.

We would like to acknowledge our strategic partners in this mission.

Ag-West Bio Inc.	Institut fur Entwicklungsgenetik, GSF	United States Department of Agriculture
Agriculture and Agri-Food Canada	Life Sciences Association of Manitoba	University of Alberta
British Columbia Cancer Agency	Manitoba Institute of Cell Biology	University of British Columbia
Canadian Foundation for Innovation	Mount Sinai Hospital	University of Calgary
CancerCare Manitoba	National Institutes of Health	University of California, Davis
Crop Production Institute, Czech Republic	National Research Council – Plant Biotechnology Institute	University of Giessen
CryoLab	Ontario Genomics Institute	University of Manitoba
Dalhousie University	Oregon State University	University of Saskatchewan
Ducks Unlimited	Province of Alberta	University of Toronto
European Union	Province of Manitoba	Vaccine and Infectious Disease Organization
Flax Canada 2015	Province of Saskatchewan	Wellcome Trust Sanger Institute
Flax Council of Canada	Saskatchewan Flax Development Commission	Western Ag Innovations
Genome Alberta	Saskatchewan Health Research Foundation	Western Economic Diversification – Government of Canada
Genome Atlantic	Simon Fraser University	Western Grains Research Foundation
Genome British Columbia	St. Boniface General Hospital	
Genome Canada	Swedish Agricultural University	
Genome Quebec	Toronto Hospital for Sick Children	
Human Resources and Skills Development Canada		



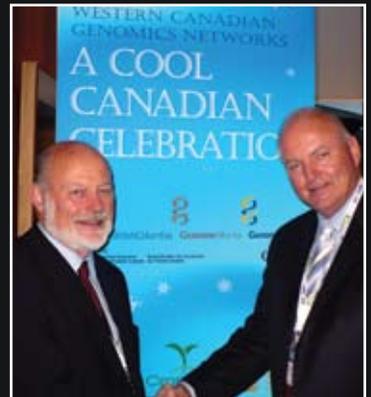
Dr. Pierre Meulien, CSO, Genome BC with journalist at the Plant and Animal Genomics Conference, San Diego, CA.



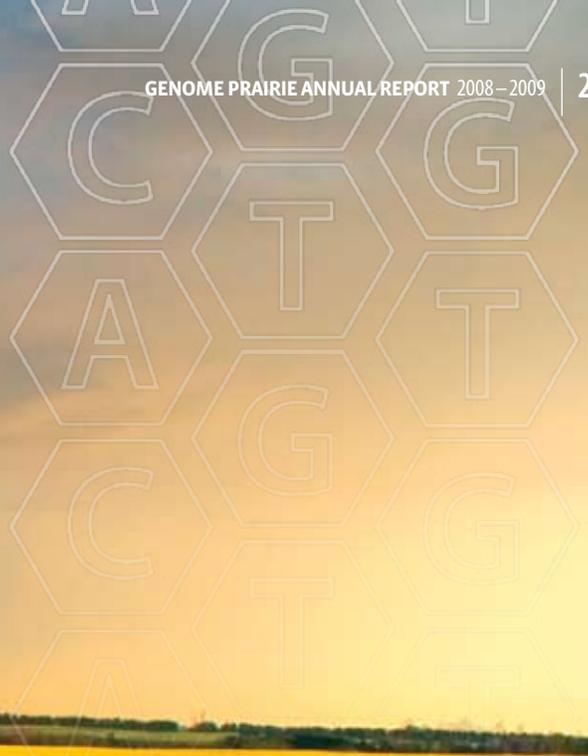
Dr. Reno Pontarollo, Dr. Abdul Jalil, Director, Research Branch, Saskatchewan Ministry of Agriculture, and Dr. Wilf Keller at an MLA event in Regina, SK.



Another partnership – Genome Prairie and Life Sciences Association of Manitoba.



Dr. Patrick Cunningham, Chief Science Advisor to the Irish Government with Lyle Stewart, Saskatchewan Minister of Enterprise and Innovation at ABIC 2008 in Cork, Ireland.



Genome Prairie is committed to supporting young people interested in biosciences and continues to sponsor events such as SABC.



Dr. Martin Reaney, University of Saskatchewan, watches as Honourable Gary Goodyear assists in his lab.



Canadian Prime Minister Stephen Harper discusses the federal government's commitment to research in Canada with Carol Reynolds, Genome Prairie. PMO Photo by Jason Ransom.

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GenomePrairie

Financial Statements of

GENOME PRAIRIE

Year ended March 31, 2009



KPMG LLP
Chartered Accountants
600-128 4th Avenue South
Saskatoon Saskatchewan S7K 1M8
Canada

Telephone (306) 934-6200
Fax (306) 934-6233
Internet www.kpmg.ca

AUDITORS' REPORT TO THE DIRECTORS

We have audited the statement of financial position of Genome Prairie as at March 31, 2009 and the statements of earnings and changes in net assets and cash flows for the year then ended. These financial statements are the responsibility of the Corporation's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Corporation as at March 31, 2009 and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.

KPMG LLP

Chartered Accountants

Saskatoon, Canada
June 8, 2009

GENOME PRAIRIE

Statement of Financial Position

March 31, 2009, with comparative figures for 2008

	2009	2008
Assets		
Current assets:		
Cash	\$ 2,395,511	\$ 3,441,729
Receivables	89,122	29,976
GST receivable	17,801	14,577
Project advances	348,373	(67,070)
Prepaid expenses	16,757	64,985
	<u>2,867,564</u>	<u>3,484,197</u>
Equipment and leasehold improvements	3,506	-
	<u>\$ 2,871,070</u>	<u>\$ 3,484,197</u>
Liabilities and Net Assets		
Current liabilities:		
Accounts payable and accrued liabilities	\$ 193,161	\$ 224,369
Deferred contributions:		
Expenses of future periods (note 4)	2,408,916	2,994,341
Equipment and leasehold improvements	3,506	-
	<u>2,605,584</u>	<u>3,218,711</u>
Net Assets		
Unrestricted	265,486	265,486
	<u>\$ 2,871,070</u>	<u>\$ 3,484,197</u>

See accompanying notes to financial statements.

On behalf of the Board:



Director



Director

GENOME PRAIRIE

Statement of Earnings and Changes in Net Assets

Year ended March 31, 2009, with comparative figures for 2008

	2009	2008
Revenue:		
Project revenues (note 4)	\$ 3,433,877	\$ 4,288,542
Administrative support revenues (note 4)	1,538,907	794,095
Amortization of deferred capital contributions related to equipment and leasehold improvements	3,506	27,859
Interest	95,540	198,368
	<u>5,071,830</u>	<u>5,308,864</u>
Expenses:		
Research project expenditures	3,433,877	4,288,542
General and administrative (note 6)	1,440,621	992,463
Project development costs	193,826	-
Amortization	3,506	27,859
	<u>5,071,830</u>	<u>5,308,864</u>
Excess of revenue over expenses	-	-
Net assets, beginning of year	265,486	265,486
Net assets, end of year	<u>\$ 265,486</u>	<u>\$ 265,486</u>

See accompanying notes to financial statements.

GENOME PRAIRIE

Statement of Cash Flows

Year ended March 31, 2009, with comparative figures for 2008

	2009	2008
Cash flows from (used in):		
Operations:		
Excess of revenues over expenses	\$ -	\$ -
Items not involving cash:		
Amortization of deferred capital contributions	(3,506)	(27,859)
Amortization	3,506	27,859
Change in non-cash operating working capital:		
Receivables	(59,146)	18,572
GST receivable	(3,224)	2,911
Project advances	(415,443)	718,795
Prepaid expenses	48,228	(52,707)
Accounts payable and accrued liabilities	(31,208)	22,118
Net change in deferred contributions	(585,425)	(1,533,343)
	(1,046,218)	(823,654)
Financing:		
Capital contribution	7,012	5,056
Investing:		
Purchase of equipment and leasehold improvements	(7,012)	(5,056)
Decrease in cash	(1,046,218)	(823,654)
Cash, beginning of year	3,441,729	4,265,383
Cash, end of year	\$ 2,395,511	\$ 3,441,729

See accompanying notes to financial statements.

GENOME PRAIRIE

Notes to Financial Statements

Year ended March 31, 2009

1. Nature of business:

Genome Prairie (the "Corporation") was incorporated in 2000 under the *Canada Corporations Act* as a not-for-profit organization. The Corporation funds organizations and institutions that conduct genomic research and development for the economic benefit of the Prairie Region (Saskatchewan and Manitoba) and Canada.

2. Significant accounting policies:

(a) Use of estimates:

The preparation of financial statements in conformity with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amount of revenue and expenses during the reporting period. Actual results could differ from these estimates.

(b) Revenue recognition:

The Corporation follows the deferral method of accounting for contributions which includes funding from Genome Canada, Provincial Ministries, the Commercial sector and other funding sources.

Deferred contributions related to expenses of future periods represent unspent externally restricted funding and related investment income, which are for the purposes of providing funding to eligible recipients and the payment of operating and capital expenditures in future periods.

Deferred contributions related to capital assets represent the unamortized amount of contributions received for the purpose of capital assets. The amortization of such contributions is recorded as revenue in the statement of operations. Restricted contributions related to the purchase of capital assets are deferred and recognized to revenue using the same methods and rates of the capital assets.

Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

(c) Equipment and leasehold improvements:

Equipment and leasehold improvements are recorded at cost. Amortization is provided for on the straight line basis to amortize the cost of the assets over their remaining estimated useful life which is determined based on committed funding.

GENOME PRAIRIE

Notes to Financial Statements (continued)

Year ended March 31, 2009

2. Significant accounting policies (continued):

(d) Financial Instruments:

Financial assets and financial liabilities are initially recognized at fair value and subsequent measurement is dependent on their classification as described below:

- Cash and short-term investments are classified as financial assets held for trading and are measured at fair value. Fair value fluctuations in these assets including interest earned, interest accrued, gains and losses realized on disposal and unrealized gains and losses are included in investment income.
- Accounts receivable are classified as loans and receivables and are recorded at amortized cost using the effective interest method.
- Accounts payable and accrued liabilities and other liabilities are classified as other liabilities and measured at amortized cost using the effective interest method.

Transaction costs related to held for trading financial assets are expensed as incurred. Transaction costs related to other liabilities and loans and receivables are netted against the carrying value of the asset or liability and are then recognized over the expected life of the instrument using the effective interest method.

(e) Derivative instruments - embedded derivatives:

The Corporation selected January 1, 2003 as the transition date for embedded derivatives, as such only contracts or financial instruments entered into or modified after the transition date were examined for embedded derivatives. As at March 31, 2009, the Corporation does not have any material outstanding contracts or financial instruments with embedded derivatives that require bifurcation.

(f) Income taxes:

The Corporation qualifies as a tax exempt organization under Section 149 of the Income Tax Act.

GENOME PRAIRIE

Notes to Financial Statements (continued)

Year ended March 31, 2009

2. Significant accounting policies (continued):

(g) Changes in accounting policies:

The Corporation adopted the following recommendations of the Canadian Institute of Chartered Accountants ("CICA") Handbook:

Financial Instruments

Section 3862, *Financial Instruments - Disclosures* and Section 3863 *Financial Instruments - Presentation*, Section 3862 requires the disclosure of information about: a) the significance of financial instruments for the entity's financial position and performance and b) the nature and extent of risks arising from financial instruments to which the entity is exposed during the period and at the balance sheet date, and how the entity manages those risks. The required disclosures are included in note 3. Section 3863 contains standards for presentation of financial instruments and non-financial derivatives. The adoption of this Section had no impact on the financial statements.

3. Financial instruments and risk management:

The Corporation, through its financial assets and liabilities, has exposure to the following risks from its use of financial instruments: credit risk and market risk (interest rate risk and other price risk).

Credit Risk

The Corporation's principal financial assets are cash and accounts receivable, which are subject to credit risk. The carrying amounts of financial assets on the statement of financial position represent the Corporation's maximum credit exposure at the balance sheet date.

The Corporation's credit risk related to accounts receivable is virtually non-existent since the amounts have since been paid. The credit risk on cash is limited because the counterparties are chartered banks with high credit ratings assigned by national credit-rating agencies.

Interest Rate Risk

Cash has a limited exposure to interest rate risk due to its short-term maturity.

Fair Values

The fair values of cash, accounts receivable, accounts payable and accrued liabilities approximate their carrying values due to their short-term maturity.

GENOME PRAIRIE

Notes to Financial Statements (continued)

Year ended March 31, 2009

4. Expenses of future periods:

The Corporation receives funding from Genome Canada, Provincial Ministries, Western Economic Diversification Canada and other sources to be held, administered and distributed in accordance with the related funding agreements between Genome Prairie and the other parties. Deferred contributions related to expenses of future periods represent these unspent externally restricted funding and related investment income, which are for the purposes of proving funding to eligible recipients and the payment of operating and capital expenditures in future periods. The changes in the deferred contribution balances for the period are as follows:

	2009	2008
Opening deferred contributions for expenses of future periods	\$ 2,994,341	\$ 4,527,685
Contributions for the year:		
Genome Canada	3,889,495	3,329,921
Western Economic Diversification	350,000	150,000
University of Manitoba	46,428	16,428
Province of Manitoba	33,089	2,500
Government of Canada - Service Canada	15,000	-
Sanofi Aventis	13,000	-
Educational Activities Contributions	12,600	-
Bio Talent	12,000	-
Province of Saskatchewan	10,000	-
Expense Recoveries and others	12,759	-
Flax Council of Canada	-	29,698
Genome Alberta	-	15,498
Ag-West Bio Inc.	-	2,728
Genome Atlantic	-	1,894
Genome Quebec	-	1,894
Ontario Genomics Institute	-	1,894
Genome BC	-	1,894
	4,394,371	3,554,349
Total contributions available	7,388,712	8,082,034
Less amounts recognized as project revenues	(3,433,877)	(4,288,542)
Less amounts recognized as administrative support revenues	(1,538,907)	(794,095)
Transfer to deferred contribution - equipment and leasehold improvements	(7,012)	(5,056)
Closing deferred contributions for expenses of future periods	\$ 2,408,916	\$ 2,994,341

GENOME PRAIRIE

Notes to Financial Statements (continued)

Year ended March 31, 2009

5. Project commitments:

In accordance with an agreement for funding signed with Genome Canada effective April 1, 2008, Genome Prairie has agreed to obtain equivalent funding support from other parties. As specified in the agreement, Genome Canada may provide transition funding to Genome Prairie notwithstanding the fact that formal commitments from other parties have not yet been secured. In such cases, funds provided in advance "in good faith" as part of the transition budget shall not be reimbursable in the event such commitments from other parties have not been secured. Genome Canada may then terminate the agreement or funding for a particular component. Additional funding arrangements are negotiated with Genome Canada to cover administration, program management, and position papers.

6. General and administrative expense:

	2009	2008
Per financial statements	\$ 1,440,621	\$ 992,463
Net work expenses included in expense	(345,731)	-
Position paper expense	(19,607)	-
Expense recoveries included in revenue	(203,931)	-
Net administration costs, comparative basis	\$ 871,352	\$ 992,463

7. Comparative figures:

Certain comparative figures have been reclassified to conform with the financial statement presentation adopted in the current year.