



# **Canadian Centre for Swine Improvement Annual Report**

**2007-2008**  
Annual Meeting  
June 9-10, 2008  
Canmore, Alberta







The Canadian Centre for Swine Improvement Inc. is a national organization managed by a Board of Directors with representatives from the following member organizations:

**CANADIAN PORK COUNCIL**

**CANADIAN MEAT COUNCIL**

**CANADIAN SWINE BREEDERS ASSOCIATION**

**ATLANTIC SWINE CENTRE**

**QUÉBEC CENTRE FOR SWINE IMPROVEMENT INC.**

**ONTARIO SWINE IMPROVEMENT INC.**

**WESTERN SWINE TESTING ASSOCIATION**

CCSI's mission is to enhance the ability of the Canadian swine industry to compete domestically and abroad, by providing leadership, coordination and services for swine genetic improvement.



Canadian Centre for Swine Improvement Inc.

## Annual Report 2007/2008

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## 1. Message from the Chairman

The last year has been a big challenge for all parts of the hog industry. Since we are all aware of the reasons behind the difficulties, I am not going to dwell on them.

I believe that CCSI has a very important role to play in leading the hog industry through the coming years. This will take great effort from the board and the staff. In my opinion, we will have to deal with an industry that is still shrinking. Here in Alberta, current slaughter numbers are at about 50% of where they peaked in 2006, and the decline is not over yet.

We also have to examine what kind of industry is left and who the participants are: family farms, corporate farms or integrated systems. We also have to keep a close eye on where genetic improvement comes from and what is needed in this fast changing market place in regard to production cost and quality of the product. Soaring feed costs has lead some producers to supply their swine with cheaper sources of feed. As an end result, the producer loses on the growth of the pig and on the extra cost of feed to get that animal to the market. The cost of production between Canadian producers and producers from other countries should be examined. The pork industry worldwide is facing some serious challenges, it is imperative to know how we fit in the “whole picture”.

There is a need to work together quickly at a provincial, regional and national level to help the pork industry. There needs to be some changes and action. I believe we, producers, can help the industry: we have the land, the technology and the infrastructure. A master plan and funding is needed to ensure people get together, to ensure they have access to proper experts that will help set up business plans and to open the lines of communication with all links in the chain. All facets involved in the pork industry should view this industry as a process from the soil to the plate.

CCSI with its long-term strategic plan in place will have to look at all the new opportunities that come their way which would fit into this plan. There is enough knowledge on CCSI’s Board of Directors, CCSI staff and CCSI’s member organizations to play an important role in the industry.

Again I would like to thank the Board members for their time and effort. Thank you Brian for managing CCSI and staff for all your work and service to CCSI. I would like to wish everyone all the best in the coming year.

Chairman

John Vande Glind

## 2. Proposed Agenda for June 9-10, 2008

1. Message from Chair
2. Approval of agenda
3. Approval of minutes from last Annual Meeting - June 13, 2007
4. Activity reports
  - 4.1 General Manager's report
  - 4.2 Chief Geneticist's report
  - 4.3 Computer Services Manager's report
5. Presentation and approval of financial report
  - 5.1 Financial report for year completed March 31, 2008
  - 5.2 Selection of Auditor
6. CCSI awards
7. Names of Directors appointed to CCSI's 2008/09 Board
8. Other business
9. Adjournment



### 3. Minutes from Last Annual Meeting

**ANNUAL MEETING OF THE CORPORATION  
Four Points Sheraton, London, Ontario  
June 13, 2007**

**Board of Directors 2006/07**

Madeleine Hayeur	Canadian Swine Breeders Association
Stephen Moffett	Canadian Pork Council
John Webb	Canadian Meat Council
Dan Hurnik	Atlantic Swine Improvement Centre
Donald MacDonald	Atlantic Swine Improvement Centre
Bernard Dion	Centre de Développement du Porc du Québec
Pierre Falardeau	Centre de Développement du Porc du Québec
John Gough	Ontario Swine Improvement
Phil Smith	Ontario Swine Improvement
John Vande Glind	Western Swine Testing Association
Alfred Wahl	Western Swine Testing Association

**Board of Directors 2007/08**

Madeleine Hayeur	Canadian Swine Breeders Association
Stephen Moffett	Canadian Pork Council
John Webb	Canadian Meat Council
Dan Hurnik	Atlantic Swine Improvement Centre
Donald MacDonald	Atlantic Swine Improvement Centre
Pierre Falardeau	Centre de Développement du Porc du Québec
Yet to be appointed	Centre de Développement du Porc du Québec
John Gough	Ontario Swine Improvement
Phil Smith	Ontario Swine Improvement
John Vande Glind	Western Swine Testing Association
Alfred Wahl	Western Swine Testing Association

Directors present at the meeting were Bernard Dion, Pierre Falardeau, John Gough, Donald MacDonald, Scott Robinson in place of Madeleine Hayeur, Phil Smith, John Vande Glind, Alfred Wahl and John Webb.

**1. Message from Chair**

John Vande Glind opened the meeting at 9:30 am. The Chair's message is shown on page 1 of the 2006/07 Annual Report. John thanked out-going director Bernard Dion for his many years of service on CCSI's Board and the insight he has brought to the industry.

**2. Approval of Agenda**

Moved by Phil Smith. Seconded by Donald MacDonald. Carried.  
That the agenda be approved as circulated.



- 3. Approval of minutes from the last Annual Meeting**  
Moved by John Gough. Seconded by Bernard Dion. Carried.  
That the minutes be approved as circulated.
- 4. Activity Reports**
  - 4.1 General Manager's Report**  
The General Manager's report was presented by Brian Sullivan and is shown on pages 5 and 6 of the Annual Report.
  - 4.2 Chief Geneticist's Report**  
The report of the Chief Geneticist was presented by Pramod Mathur and is shown on pages 7 to 11 of the Annual Report.
  - 4.3 Computer Services Manager's Report**  
The report of the Computer Services Manager was presented by Jim Groves and is shown on page 12 to 14 of the Annual Report.
- 5. Presentation and Approval of CCSI's Financial Statements**
  - 5.1 Financial statements for year completed March 31, 2007**  
Moved by Alfred Wahl. Seconded by Bernard Dion. Carried.  
That CCSI's financial statements for 2006/07 be approved as circulated.
  - 5.2 Selection of an Auditor**  
Moved by Donald MacDonald. Seconded by John Gough. Carried.  
That Bath Haché LLP be selected as the firm to conduct the next financial audit for CCSI.
- 6. CCSI Awards**  
John Forsyth was the winner of the Brian Kennedy Memorial Award for 2007. John will be present this afternoon to receive the award. Fernand Soucy was the winner of the CCSI Swine Breeders' Merit Award, which was presented to M. Soucy earlier this month at the CDPQ annual meeting. John Peter Van Haren was last year's winner of the CCSI Swine Breeders' Merit Award. He was unable to attend last year's meeting, but will be present to receive the award this afternoon.
- 7. Names of Directors appointed to CCSI's 2007/08 Board**  
Members of the Board of Directors for 2007/08 are listed above.
- 8. Other business**  
There was no other business.
- 9. Adjournment**  
Moved by Bernard Dion that the meeting be adjourned.  
  
The meeting was adjourned at 10:18 am.

## 4. Activity Reports

### 4.1 General Manager's Report

CCSI's primary business activity is the delivery of the Canadian Swine Improvement Program (CSIP). This program harnesses the power of many breeders and organizations working together with a common goal of world class genetics suited to the Canadian pork industry. The breeders using the program form one of the largest selection pools in the world with over 8000 nucleus sows. CCSI also supports and works with other purebred breeders in Canada who register with the Canadian Swine Breeders Association (CSBA), but who have chosen to operate private genetic improvement programs, but often modelled after the CSIP. Based on number of litters registered in 2007, there are at least 1100 more purebred nucleus sows in these other herds. All breeders recognize the importance and power of working together, and the participation in CSBA is one way that connects CSIP and other breeders. Overall, there are over 9000 Canadian purebred nucleus sows represented in the national database at CCSI.

<i>Breed</i>	<i>Number of sows on CSIP</i>	<i>Registered sows on other programs</i>	<i>Total number of nucleus sows</i>
<i>Yorkshire</i>	4220	500	4720
<i>Landrace</i>	2669	320	2989
<i>Duroc</i>	1096	288	1384
<i>Lacombe</i>	127		127
<i>Others</i>	74	29	103
<b>Total</b>	<b>8186</b>	<b>1137</b>	<b>9323</b>

The number of nucleus sows is estimated based on purebred litters in the national database at CCSI assuming an average of 2.2 litters per sow per year. This reflects the top tier nucleus animals. Cross-bred litters from purebred sows used in multiplication are not counted, since it is only the purebred progeny that go back into the nucleus pool for on-going genetic improvement.

During the past year close to 74,000 purebred pigs were tested in 90 different CSIP herds. In addition to performance testing of progeny, over 60,000 litter records on purebred nucleus and multiplier sows were included in genetic evaluations for litter size and other sow productivity traits. Close to 20,000 of these are the purebred litters of top tier sows mentioned above and 40,000 are F1 litters from purebred sows used in multiplication. About 67% of these litters contributed to evaluations for piglet survival to 24 hours, and 92% were used in evaluations for number of piglets weaned. There were also about 38,000 records recorded on pigs for computation of genetic evaluations of number of functional teats, 13,000 records for genetic evaluation of feet and legs, and 162 detailed carcass records for genetic evaluation of several meat quality traits.

Accurately recording important data is fundamental to the program. With the number of traits recorded and new technology developments, there have been increasing efforts in the area of national standards. A national standards session is held at least once per year in Canada. Senior technicians from across the country meet at the national sessions to maintain and enhance ultrasonic standards. There are currently 9 senior (level 2) and 17 level 1 technicians, for a total of 26 technicians with CCSI certification

for use of ultrasonics on pigs. Senior technicians maintain standards in their own region and are responsible to train and certify the level 1 technicians.

National standards sessions are also an opportunity to develop standards using new technology and for standardizing evaluation of new traits on farms. In the past year there has been a large focus on ultrasonic measurement of intramuscular fat on live pigs, with very encouraging results. There has also been a focus on standardizing the evaluation for strength of feet and legs. Through these national standards sessions, everyone can be confident that measurements taken on CSIP herds anywhere in Canada are comparable. I would like to thank Jean-Paul Daigle for his role as national standards officer for CCSI, our geneticist Laurence Maignel and the senior technicians across Canada for their hard work and dedication to national standards and the swine industry. The success of the breeders depends on the quality that you bring to the data.



Good quality data is an absolute baseline for the program. However, the timeliness of common genetic evaluations, as well as effective selection and mating tools are also critical to a breeder's success and that of the Canadian nucleus pool. This includes common, science-based evaluation models and selection objectives kept up to date by a network of Canadian scientists specialized in both genetics and economics. There is a continual effort to enhance the routine delivery of these services. This includes technical details of how genetic evaluations are calculated and how traits are combined for ranking animals based on optimal economic returns. It also involves the on-line tools for regional centres and breeders themselves to enter and correct data directly through CCSI's eFarm program. This ensures that the data is as up to date and accurate as possible.

The frequency of evaluations is another critical part of an effective program. Breeders can instantly get up to date evaluations at any time with the click of a mouse using the on-line interim evaluation program. This takes into account any new data or corrections to data that were just made for the herd. Within seconds, the breeder has a report with very good approximations to the full national evaluations that are now run on a bi-weekly basis. Li Li is our computer specialist who looks after the routine national evaluation runs, while our geneticist Laurence Maignel implements enhancements and oversees the genetic evaluation programs. Although everyone at CCSI has a role to play in these

key services, I would like to especially congratulate these two ladies for their efforts. There were 24 regular genetic evaluation runs in 2007 and countless test runs for enhancements. There is a lot of effort behind the scenes that keeps this service running smoothly.

In addition to on-line data entry, editing and evaluations, there are numerous reports and tools being enhanced regularly. This includes new applications but also changes for ease of use and more functionality. One example is the very popular icon based drill-down feature which allows breeders to see all the information on an individual pig with the simple click of an icon. To see the family tree, click on the tree icon. To see ultrasonic measurements, click on the ultrasound machine. To see carcass measurements, click on the pork chop. The number of possible icons a pig can have continues to increase as more data is recorded. There are more than 15 different icons and it is common for individual pigs to have 6 or more depending on what information is recorded. Another example is the ability report on groups of pigs by selecting various options, such as all the active boars or all the pigs with an IGF2 test, or by creating a group of your own choosing to give total flexibility on what animals to include. There have also been many enhancements to eFarm and to query tools based on feedback from clients, but especially from a group of clients which are getting a reputation as power-users. Many members of the staff at CCSI are involved with the web site from time to time, but Jim Groves our computer services manager and Li Li are to be especially congratulated for these developments.

Along with the services to regional centres and swine breeders participating in the Canadian Swine Improvement Program, a strong research and development program is a very important business activity. It is important to acknowledge that we have received good financial support from various levels of government to help with the cost of this research. The contribution of much time and effort from breeders and staff at other organizations has also been critical and we don't take that for granted. Pramod has been the lead person in putting together successful funding applications for swine genetics research, and is to be congratulated for this. The support we have received from other industry organizations for CCSI to take on this role for the industry is also an important factor, and we look forward to continuing to work with you to build on our past success. The role of other staff in securing the funding and in ensuring that the projects are successfully completed is also important to note.

In many cases, there is a direct link from the research to applications that can be added to the Canadian swine Improvement Program. I will just touch on a few of these developments, and you can read more about many of these projects in the Chief Geneticist's Report. As mentioned above, senior technicians have been working on standards for measuring intramuscular fat (IMF) on live pigs in the past year. This effort is part of a larger research project which will result in genetic evaluations for this important meat quality trait. The ability to control the level of IMF will help the industry in higher value markets where this trait is especially important. Another project is looking at genes that relate to pork colour, which is another important trait in certain high value markets. Yet another project is looking at methods to evaluate and genetically improve natural resistance to disease. The project is considering both traditional selection methods based on phenotypic measurements related to immune response as well as new molecular genetic tests.

Molecular genetic tests are already starting to play a bigger role in the program, particularly for the IGF2 gene. In the past year there were 9456 progeny from sires that were genotyped for IGF2 and 597 progeny where the dam has been genotyped for IGF2. The IGF2 gene has large effects on carcass leanness in market hogs and on sow productivity in the commercial sow. There are a number of other molecular tests related to genes currently being evaluated at CCSI which affect performance, efficiency, carcass leanness and meat quality. More will be coming at a faster and faster pace as the technology evolves. I would like to congratulate our Chief Geneticist, Pramod Mathur for his leadership efforts in this area. You can see in the Chief Geneticist's Report that we are leading and in partnership with others on many developments and on-going research projects dealing with molecular genetics. I would also like to welcome our newest geneticist to the CCSI team. Dr. Mohsen Jafarikia is originally from Iran and has recently completed his PhD at the University of Guelph. His area of expertise is in the use of molecular information in genetic improvement programs. Mohsen is currently working with Laurence on the integration of IGF2 gene test results into our genetic evaluation programs. This is the start of much more of this type of work to come as new genetic tests come available to Canadian breeders.

CCSI also provides a number of other services that help support the business. One very important service is the management of the Canadian Swine Breeders Association. This service not only provides a revenue source to CCSI, but since almost all of the breeders using CCSI services are also CSBA members, it offers a better and more efficient service for both organizations. It also gives a common voice for the genetics sector in Canada. The services to CSBA include:

1. General administrative and office support services, including bookkeeping, billing and collections, file management and storage, and management of correspondence;
2. Web-site hosting and web-site maintenance;
3. Intake, management of and response to inquiries from and issues raised by Canadian Livestock Records Corporation (CLRC); and,
4. Attendance on behalf of CSBA at meetings of the National Pork Value Chain Round Table, government consultation forums, National Health Committee, Canadian Pork Council, Canada Pork International, provincial swine breeder associations, and such other meetings as we may from time to time agree.

We also provide specialized services to some of the breeders and companies on the program. Examples include genetic evaluations for a composite breed, genetic evaluations for uniformity of individual piglet birth weight as well as on-going consulting services. We have also been involved in custom research projects of special interest to some of our clients. Most recently this has even gone international, working with our counterparts at IFIP in France on special projects for breeders and companies that have alliances with Canadian breeders.

Services to other species groups, including goats, bison, sheep and rabbits is becoming more important as well. The services of interest include consulting, genetic evaluation, web-based information services and more general computer services. CCSI has been providing genetic evaluations for goats for many years, and more recently has been providing computer services and developing web-based tools for the Canadian goat industry. We recently launched the **GoatGenetics.Ca** web site which has quickly become very popular as the source for goat genetics information in Canada. For bison,



we developed a pilot web-based information sharing system for a bison marketing company based in Calgary. We host the web site at [www.bisonvaluechain.com](http://www.bisonvaluechain.com) where cow calf operators, feedlots, vets, the marketing company and even the packing plants can login to enter data and share information with the whole chain. We are now working on a pilot genetic evaluation service for rabbits and helping the sheep industry to establish a national improvement centre. I would like to acknowledge the contributions of Tracy-Lynn Reside to the goat programs at CCSI and for the goat industry more generally. Tracy-Lynn has been instrumental in generating a lot of interest in the industry for a common effort to have a strong genetic improvement program. We see a bright future for the goat industry in Canada and genetic improvement will be a key component of the success.

International activities are also an important area for CCSI. In part this is to keep on top of research developments internationally, since we and our clients are working in a global environment more and more. It is also an opportunity to exchange information and collaborate with similar organizations and research institutions. The other part is to help in the promotion of Canadian genetics internationally. Canadian genetics are well recognized around the world as being among the best available, and it is important to the decision makers in other countries to hear directly from CCSI staff about the technology and programs behind the genetics. The genetic product is the result of a good national program that has been used effectively for many decades by Canadian breeders. Their success in exporting Canadian genetics in record numbers in recent years is an indicator of the success of the breeders and of our ability to communicate the quality of the program. We have worked closely with the Canadian Swine Exporters Association in this area and very much appreciate the support that they have given to us over the years.

There is also increasing opportunities internationally for CCSI services. Buyers of Canadian genetics are often in need of technology, and naturally have expressed interest in Canadian technology that helped to build these genetics. Because we have web-based services, it has become very cost-effective and practical to offer this to breeders anywhere in the world. Some of our Canadian clients are already using the service in herds in the US and China, and there is interest in several other countries. One key development in the past year was an infrastructure change to make our web programs multi-lingual. This allows us for the ability to quickly translate pages into any language, including special characters. Many pages have already been translated by Li Li into Chinese for example.

As I draw to a close, I would like to welcome our newest staff member to CCSI. Stefanie Wyss joined us this past December as a technical assistant. She has a good science background, experience in research projects and grew up on a farm just outside of Ottawa. She is fluent in both English and French, not to mention Swiss German. Stefanie is helping in the area of grant applications and day to day management of research projects. I would also like to thank Francine Roy, our Office Manager, for all of the things she just quietly takes care of every day. Francine, your contributions are very much appreciated. Finally, I want to thank our Chair John Vande Glind and all the members of the Board for their effort and support. It has been an incredibly challenging year for swine producers and everyone involved in the swine industry, and your dedication particularly in such times is admirable.

CCSI has come a long way since it was created in 1994. It was a huge change to take over a government service where breeders were paid to test their pigs to one that is today in a sustainable financial position. This change has come from a combination of managing costs carefully, while at the same time identifying and building revenue sources. Investing in research and development has also been critical and will remain a key part of our success going forward. If we had continued to only do what the government programs offered back in 1994, there wouldn't be much interest in CCSI's services today. The same will be true 5 and 10 years from now. We do need to keep investing to enhance the services and to respond to industry needs and opportunities.

CCSI has put in place an updated strategic plan in this past year. The plan puts a clear focus on value for member breeders and producers, alignment with the entire pork value chain and ensuring that we remain a progressive organization. I look forward to activities in support of these strategies in the coming year and for many more.

Brian Sullivan  
General Manager



## 4.2 Chief Geneticist’s Report

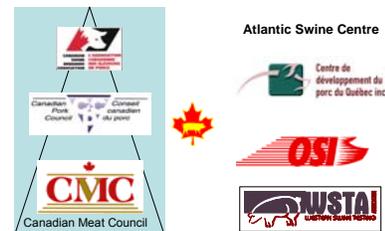
The pork industry has faced its share of challenges in the past year; the high Canadian dollar, soaring feed costs, low pork prices are some of the factors that have contributed to major changes in our industry. These events add to the pressures on breeding stock suppliers, creating serious concerns that the Canadian swine industry may lose a substantial portion of valuable genetics with distinct pork quality, production efficiency and disease resistance that has been created through intense selection over many years. Once a top level purebred nucleus herd is lost, it cannot be retrieved. Supporting Canadian swine genetics through these difficult times will be a critical part that will ensure the success of this industry.

It has been forecasted that the demand for pork will increase dramatically in the next 10 years. This surge in demand is expected to result in an increase in pork exportations internationally. Pork prices, although remaining till the later part of 2008 at their current levels, are expected to increase. All these development will be beneficial to the pork industry and its primary contributors – the producers. I am confident that the sun will shine again on the pork industry; we have to wait and persevere while the sun chases the clouds away.

### **Genetics Research Strategy**

CCSI has developed a research strategy for swine genetic improvement in Canada. The strategy is based on Canada’s strength in swine genetics, upcoming challenges, use of new opportunities in genomics, quantitative genetics and bioinformatics and alignment of research priorities with member organisations. The strategy was discussed at CCSI and CSBA directors meetings and was presented to CPC executive committee and at the annual meeting of Manitoba Pork Council in April, 2007.

### **Member Organisations**



### **New strategic and business plan for CCSI**

CCSI has conducted a survey and has developed a strategic plan for its future directions.

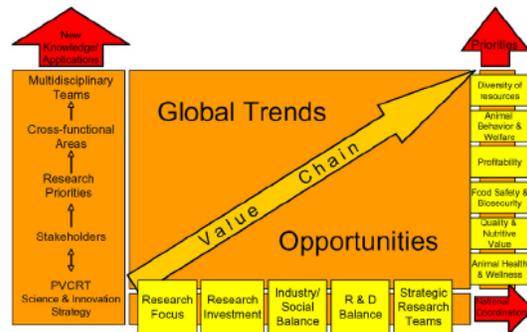
The new strategic plan includes three pillars:

<b><i>Prosperity of member breeders and producers</i></b>	<b><i>Alignment with Pork Value Chain Roundtable</i></b>	<b><i>CCSI as a progressive organization</i></b>
<ul style="list-style-type: none"> <li>• <i>Ensure that the technology developed is used by producers</i></li> <li>• <i>Enhance the leadership in genetic evaluations</i></li> <li>• <i>Provide national representation of swine sector</i></li> </ul>	<ul style="list-style-type: none"> <li>• Link industry needs and science and innovation</li> <li>• Provide means for development and technology transfer</li> <li>• Enhance competitiveness of the Canadian pork sector</li> </ul>	<ul style="list-style-type: none"> <li>• Diversify areas of expertise</li> <li>• Provide services to variety of customer base</li> <li>• Diversify sources of revenue</li> </ul>

More emphasis is given to the development of information material, consulting and training to support member breeders and producers and linking the industry needs to Science and Innovation to enhance the competitiveness of the value chain partner and the industry as a whole. A new Business Plan has been developed to implement the Strategic Plan. A number of activities identified in the business plan are already underway.

 **Science and Innovation Strategy for the pork value chain**

CCSI is participating in the development and implementation of the Science and Innovation Strategy for the pork value chain with input from various industry and research organisations across Canada. The strategy aims at enhancing the competitiveness of the Canadian swine industry in domestic and international markets through science and innovation. The key priority areas include animal health, meat and carcass quality, food safety and bio-security, productivity and efficiency, environmentally responsible production, animal welfare and bio diversity to enhance industry’s ability to compete and adapt to future changes. The strategy emphasizes the need for transferring research results into actual tools that producers can use. The strategy will be implemented by assisting the necessary development for effective use of the research results by industry members.

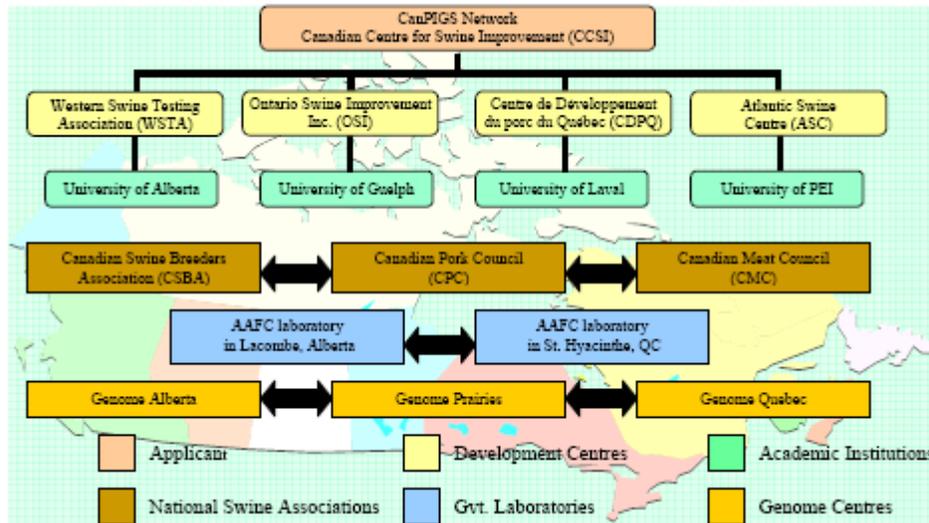


 **Canadian Pig Improvement through Genomic Science (CanPIGS)**

Human genome has been sequenced and so has the bovine genome. There has been some progress made by other countries in sequencing the swine genome. Canada needs to step up and make use of the fast developments in genomics for the Canadian swine industry. To address this issue, a Genome Canada - Industry Swine Genomics Workshop was held in Toronto on May 4, 2007. The workshop was sponsored by Genome Canada’s Science and Industry Advisory Committee (SIAC) and was held in partnership with the Canadian pork industry through CCSI. A report from the workshop has been presented to SIAC and Genome Canada with proposed next steps. This was followed by a series of meetings and conference calls.

CCSI has recently submitted a proposal for the Business led Network Centres of Excellence Competition. The goal of the proposed Canadian Pig Improvement through Genomic Science (CanPIGS) network is to conduct research into strategic priority areas identified by the Canadian Pork Value Chain Roundtable and the swine genomics community to strengthen the competitive position of the Canadian swine industry. The members of the CanPIGS network include: CCSI, regional swine development centres (WSTA, OSI, CDPQ and ASC), academic institutions (U. of Alberta, U. of Guelph, U. of Laval and U. of P.E.I.), national swine associations (CSBA, CPC and CMC) and federal research laboratories (in Lacombe, AB and St. Hyacinthe, QC). The network proposal is supported by breeding companies as well regional genome centres. If successful, the

CanPIGS Network would include post doctoral fellows, Ph.D. students as well as a number of researchers from different universities from Canada and abroad.



 **Genetic Improvement trends**

The trends of rapid genetic improvement in purebred pigs have continued during the last year. In fact, genetic gains expected at the commercial level were significantly higher during the last year compared to previous five years in a majority of traits, assuming a Durocx(YorkshirexLandrace) crossbreeding system is utilized. There were especially higher gains in loin eye area, feed conversion and lean depth while there was a smaller increase in the number of piglets born.

Trait	Unit	Gain In 2001-2006	Gain In 2007
<b>Age</b>	days	-1.26	-1.88
<b>Lean Yield</b>	%	+0.10	+0.15
<b>Loin Eye Area</b>	sq cm	+0.26	+0.42
<b>Feed Conversion</b>	kg/kg	-0.018	-0.027
<b>Backfat</b>	mm	-0.21	-0.23
<b>Lean Depth</b>	mm	+0.23	+0.36
<b>Number Born</b>	Pigs/litter	+0.29	+0.14

*Based on genetic gains in selection herds active in 2007.*

Genetic evaluations for new traits recently added to the national program (meat quality, conformation of feet and legs, number of teats and other sow productivity traits such as piglet survival, weaning weight and farrowing interval) are now available for selection and will be part of the Canadian sire and dam line indices.

Genetic change in purebred pigs and market hogs for different traits are given in Appendix 4. The improvement trends have continued in growth, backfat, litter size and

carcass quality traits. There is also continued differentiation of Duroc as a terminal sire line while Yorkshire and Landrace are dam lines. Long-term genetic improvements for key economic traits are given in Appendix 5.

#### **Standard sessions and accreditation of technicians**

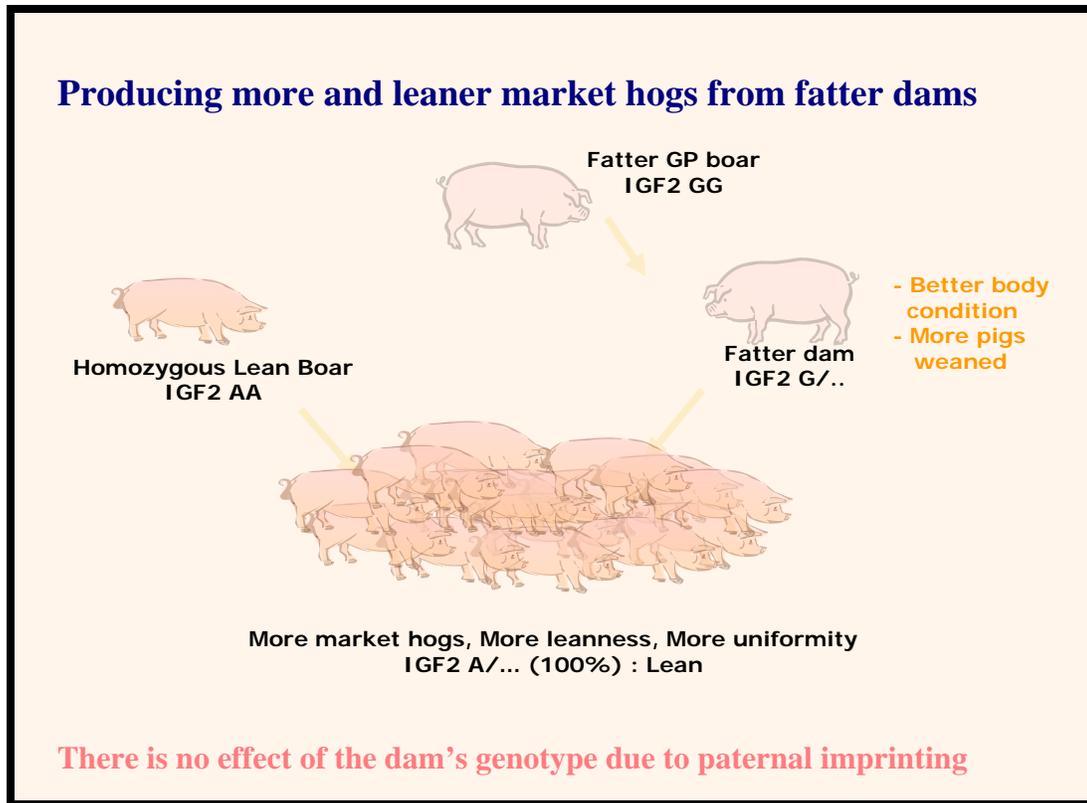
The national accreditation process has recently been updated. In April 2007, a national accreditation session was held in Deschambault test station, allowing the certification of eight level II technicians. Several regional and on-farm accreditation sessions also took place, providing accreditation to a total of 27 technicians across Canada for submitting scanning data to CCSI. New traits such as feet and legs scoring are being included in the accreditation process. This year, a national standards session was held at Deschambault test station from April 23-25, 2008.

#### **Research projects**

In 2007, several projects dealing with meat quality have been started. These include project on pork colour and marbling. Improving pork colour by means of a DNA test is currently being investigated in Western Canada. More recently, a new project to validate the use ultrasound technology and a specific image analysis software to measure intramuscular fat in the loin of live pigs has begun. This project is conducted through close collaboration between CCSI and CDPQ and is supported by AAFC. A total of 1,000 Duroc pigs will be scanned across Canada and the data will be used to build a database to develop genetic evaluation programs for desired level of marbling and leanness. An attempt will be made to study genetic resistance to diseases like PMWS through another research project recently approved for support by AAFC. The project involves recording mortality rates and disease incidence, analyzing SDR (Swine Disease Resistance) in-vitro test results, haematological tests and DNA test results. The research in selected sire families in different breeds, across Canada will help select specific lines of pigs with higher general immune capacity and disease resistance.



Testing and research for the IGF2 gene known to have favourable effects on leanness and uniformity has been ongoing for the past three years. More recently, it was also suggested that the 'fat' allele could have favourable impacts on sow productivity. A project in collaboration with Western Swine Testing Association is underway to test the magnitude of IGF2 effect on Sow productivity. This project provides the unique opportunity of selecting the terminal sire line such as Duroc homozygous for the lean allele (AA) and the maternal grand parental lines homozygous for the fat allele (GG). This will enable the sire lines to provide lean terminal boars while the dam lines produce females with higher number of piglets weaned. Even if females carrying the G allele from the sire have slightly more fat, market hogs will remain uniformly lean as the allele from the dam is not expressed due to paternal imprinting. More information about the IGF2 gene tests is available at CCSI's webpage [www.ccsi.ca/IGF2](http://www.ccsi.ca/IGF2) or by contacting the CCSI office.



**A DNA based test for pork colour**

Meat colour is one of the most important visual characteristics of pork affecting the choice of consumers domestically and internationally. Darker pork usually has lower cooking loss and better tenderness, but the color preferences vary among different markets. Comparative mapping with human and pig genome has indicated that the SLC44A3 gene may be associated with meat color. This provides an opportunity for genetic evaluation of pork colour on live pigs using a blood sample, tissue such as ear notch or even hair root. If the gene has favourable effects in major pig breeds used in Canada, the gene test can be used to select pigs and adapt the meat colour to the desired levels. Therefore, the project is designed to estimate the frequency and effects of the gene on pork colour in Canadian pigs. In addition to pork color a number of other meat quality characteristics are being evaluated in Canada in collaboration with Western Swine Testing Association and Lacombe Research Centre in Alberta.



**International Activities**

CCSI has positioned itself at an international level in swine genetics and genomics. CCSI has participated in the International Workshop on Genetic Evaluations for Swine and offered the possibility of developing international genetic evaluation system for pigs with several countries. CCSI continues to participate in the European meetings and strengthen research partnerships with European countries such as France and Germany. CCSI is also represented at the International Swine Genome Sequencing



Consortium. Other participating countries include France, UK, Denmark, China, Korea, Japan, Holland, Taiwan and the US. These workshops have clearly demonstrated the usefulness of molecular genetics in genetic selection methods. There is good recognition of the work done at CCSI.

#### ***New genes and markers***

DNA markers to improve the genetic performance of swine breeding herds originally developed and patented at Iowa State University, are now available for Canadian breeders and producers. Markers are SNP (single-nucleotide polymorphism) based and allow for screening of many traits. Testing services are provided by DNA Landmarks for the following tests that can be run in combination.

The Melanocortin-4 receptor (MC4R) is associated with growth, feed intake, backfat and lean meat yield. Allele G is associated with leaner growth, less back fat and lower feed intake whereas Allele A is associated with increasing average daily gain and a shortened number of days to market. Breeders can select either lean growth or fast growth depending on the market demands or line characteristics. A new allele (A) on the protein Kinase Adenosine Monophosphate Activated  $\gamma$ 3-Regulatory Subunit (PRKAG3) segregates in all commercial breeds. This allele is associated with lower glycogen content, higher ultimate pH, lower drip loss and favorable meat color in ham and loin. The CAST test monitors two genetic variations impacting the calpastatin gene. The A alleles for the two SNPs result in improved meat quality including increased juiciness and tenderness and reduced chew score and cooking loss. Many factors may influence animal performance including genetic background and environment factors such as animal nutrition and management in addition to the effect of these markers. More markers have been added to the list of tests provided by DNA Landmarks.

I would like to take this opportunity to extend my sincere thanks to the staff of the regional centres and industry member organizations, ultrasound specialist and CCSI's staff members. A list of reports on some of the activities during the year 2007 is given in Appendix 8. These reports are available on CCSI's website at: [www.ccsi.ca/reports/](http://www.ccsi.ca/reports/).

**Pramod Mathur**  
**Chief Geneticist, CCSI**  
**June 2008**

### **4.3 Computer Services Manager's Report**

#### **1. Infrastructure**

There have been significant investments in the CCSI computer services over the course of the last year that will position CCSI to provide more services to a greater client base. Network hardware has been upgraded to allow faster connections between the servers. Every server has been replaced with new hardware, and in most cases, updated software.

This includes the main evaluation / database server, allowing for the continued growth in data, both performance and research, and the ability to publish evaluations in a timely manner. The evaluations, barring no problems, can now be done in one business day. It is also the first time in CCSI history that we have had a second server that can act as backup / recovery / development machine for the main server. Previously, at up to \$100,000 for each machine, a second for such purposes was not financially possible. Now, using open source software and commoditized hardware, more frequent upgrades are financially possible, which frees up older servers to be utilized in different ways.

In addition, the email server, network control server, and web server were also replaced. One obvious benefit is that performance will increase in virtually all services. Another less obvious, but just as important, is the reliability. As computers age, you can wait for them to fail, or you can proactively replace them.

#### **2. Website Stats and Facts**

As always, the main face to the CCSI computer operations is the website and the Member Services. There have been several significant additions to the website over the course of the last year that will allow our members to do ever more, and allow new opportunities for CCSI.

eFarm continues to be a major focus. Data entry screens are available for all events required for genetic evaluations, and work is continuing to capture information for management reasons as well. There are new management reports available including things like Pregnancy Check, Sows due to Farrow, Sows due to Wean, Farrowing Rate Report, Herd Performance Monitor, and more. Pigs On The Web has been changed to show all pigs from a herd, filtered by things like sex, breed, and pig status.

From the beginning, CCSI has strived to have a fully bilingual site for our French members. That focus has been expanded to have a site available in any language. Changes have been made that allow storing of any language in the database. This allows a page to be translated without actually changing the application. Initial work is required on a page to make it multi-lingual, but once done, new languages can be added through an application on the website. This is tremendously powerful because the only work required is the actual translation, not any computer



programming. Various parts of the website are already translated into Chinese, with virtually all of eFarm done.

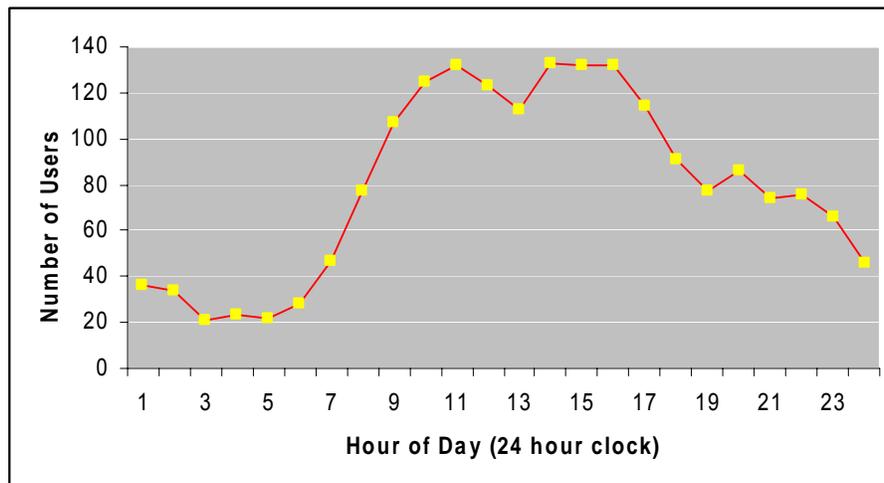
CCSI recently added the ability to upload PigCHAMP data into the CCSI database. The data is stored separately from the CCSI data with a cross reference done between the two, if possible. You can query the PigCHAMP data and see all of the sow events. It is a way to backup PigCHAMP data, and a first step to importing PigCHAMP data into eFarm.

There is now the ability to create “groups” of pigs. This allows a user to group pigs together and work with the group instead of the individual pig. For example, you can export a group of pigs to Excel or register a group of pigs. The types of things you can do with groups will be expanded on in the future.

CCSI continues to receive and report on slaughter data from any breeder that sends it, and we now have close to 600,000 records!

Extensive effort has been put into the general usability of the website, including the ability to have custom menus for individuals, an online help section, and modifications to applications and reports based on user feedback.

The graph below shows the number of users that were active on the website at a particular hour during the 2007 calendar year. You would expect that the late morning / early afternoon would be the busiest time for the website, but it is interesting to note the off peak hours. There is never a time that someone does not want to use the website. Even at 2 or 3 in the morning, there have been 20-30 users that have used our services. It is truly a 24/7 website!



Jim Groves, Computer Services Manager, CCSI

## **5. Appendices**

**Appendix 1. Members of the Board of Directors**

**Appendix 2. People at CCSI**

**Appendix 3. Genetics Committee Members and Participants**

**Appendix 4. Genetic change in purebreds and market hogs**

**Appendix 5. Genetic Improvement trends**

**Appendix 6. Home Test Summary for Backfat and Age at 100kg**

**Appendix 7. Sow Productivity Summary (2007)**

**Appendix 8. Reports on Activities**

**Appendix 9. Breeders Participating In the National Program**

**Appendix 10. Participating A.I. Centres**

***Appendix 1. Members of the Board of Directors, 2007-2008***

Pierre Falardeau, Québec Centre for Swine Improvement Inc.

John Gough, Ontario Swine Improvement Inc.

Lyse Grenier-Audet, Québec Centre for Swine Improvement Inc.

Madeleine Hayeur, Canadian Swine Breeders Association

Dan Hurnik, Atlantic Swine Centre

Donald MacDonald, Atlantic Swine Centre

Stephen Moffett, Canadian Pork Council

Phil Smith, Ontario Swine Improvement Inc.

John Vande Glind, Western Swine Testing Association

Alfred Wahl, Western Swine Testing Association

John Webb, Canadian Meat Council

## **Appendix 2. People at CCSI**

Brian Sullivan, General Manager

Pramod Mathur, Chief Geneticist

Francine Roy, Secretary and Office Manager

Jim Groves, Computer Services Manager

Laurence Maignel, Geneticist

Li Li, Programmer/Analyst

Tracy-Lynn Reside, Researcher, Dairy Goat Genetics

Mohsen Jafarikia, Geneticist

Stefanie Wyss, Technical Assistant



Seated from left to right: Laurence Maignel, Francine Roy, Stefanie Wyss, Li Li, Tracy-Lynn Reside.  
Standing from left to right: Brian Sullivan, Mohsen Jafarikia, Pramod Mathur, Jim Groves.

***Appendix 3. Genetics Committee Members***

Name	Organization
Frédéric Fortin, Chair	Centre de développement du porc du Québec inc
Andy Robinson	University of Guelph
André Fortin	Agriculture and Agri-Food Canada
Brian Sullivan	Canadian Centre for Swine Improvement
Charles Rodrigue	Alliance Duroc
Claude Robert	Laval University
Dave Vandebroek	Ontario Swine Improvement
David Trus	Agriculture and Agri-Food Canada
Jim Groves	Canadian Centre for Swine Improvement
Jon Meadus	Agriculture and Agri-Food Canada
Laurence Maignel	Canadian Centre for Swine Improvement
Madeleine Hayeur	Société des Éleveurs de Porcs du Québec
Margaret Quinton	University of Guelph
Mohsen Jafarikia	Canadian Centre for Swine Improvement
Muriel Power	Atlantic Swine Centre
Murray Duggan	Fast Pigs Inc.
Nicole Dion	Sogéporc
Pramod Mathur	Canadian Centre for Swine Improvement
Rob Gribble	Swine Genetics Ontario
Roger Cue	McGill University
Shu Chen	Lab Services Division, University of Guelph
Wim Van Berkel	Western Swine Testing Association

**Appendix 4: Genetic change in purebreds and market hogs for active herds in 2007**
**Yorkshire**

Trait	2001		2007		Average annual gain (2001-2007)	Gain in 2007
	#pigs	EBV average	#pigs	EBV average		
Sire Line Index (points)	20335	59	37606	105	7.67	+ 11 pts
Dam Line Index (points)	20335	43	37606	105	10.33	+ 7 pts
Lean Yield (%)	20335	-0.28	37606	0.05	0.06	+ 0.11 %
Loin Eye Area (cm <sup>2</sup> )	20335	-0.51	37606	0.19	0.12	+ 0.38 cm <sup>2</sup>
Age (days)	20335	6.6	37606	-0.7	-1.22	- 1.6 days
Feed Conversion (kg/kg)	20335	0.087	37606	-0.01	-0.016	- 0.022 kg/kg
Backfat (mm)	20335	0.46	37606	-0.04	-0.08	- 0.16 mm
Lean Depth (mm)	20335	0.42	37606	0.08	0.08	+ 0.38 mm
Number Born (piglets/lit)	20335	-1.76	37606	0.16	0.32	+ 0.12 pigs
Sire Line Index (\$)	20335	-18.9	37606	2.4	3.55	+ \$4.90
Dam Line Index (\$)	20335	-31.8	37606	2.7	5.75	+ \$3.90

**Landrace**

Trait	2001		2007		Average annual gain (2001-2007)	Gain in 2007
	#pigs	EBV average	#pigs	EBV average		
Sire Line Index (points)	12930	63	25178	107	7.33	+ 11 pts
Dam Line Index (points)	12930	42	25178	105	10.50	+11 pts
Lean Yield (%)	12930	-0.42	25178	0.05	0.08	+ 0.11 %
Loin Eye Area (cm <sup>2</sup> )	12930	-0.76	25178	0.27	0.17	+ 0.45 cm <sup>2</sup>
Age (days)	12930	5.5	25178	-1.1	-1.10	- 1.6 days
Feed Conversion (kg/kg)	12930	0.078	25178	-0.015	-0.016	- 0.023 kg/kg
Backfat (mm)	12930	1.03	25178	-0.12	-0.19	- 0.21mm
Lean Depth (mm)	12930	-0.92	25178	0.35	0.21	+ 0.5 mm
Number Born (piglets/lit)	12930	-1.23	25178	0.05	0.21	+ 0.15 pigs
Sire Line Index (\$)	12930	-17.5	25178	3.4	3.48	+ \$5.10
Dam Line Index (\$)	12930	-24.2	25178	2.1	4.38	+ \$4.40

**Duroc**

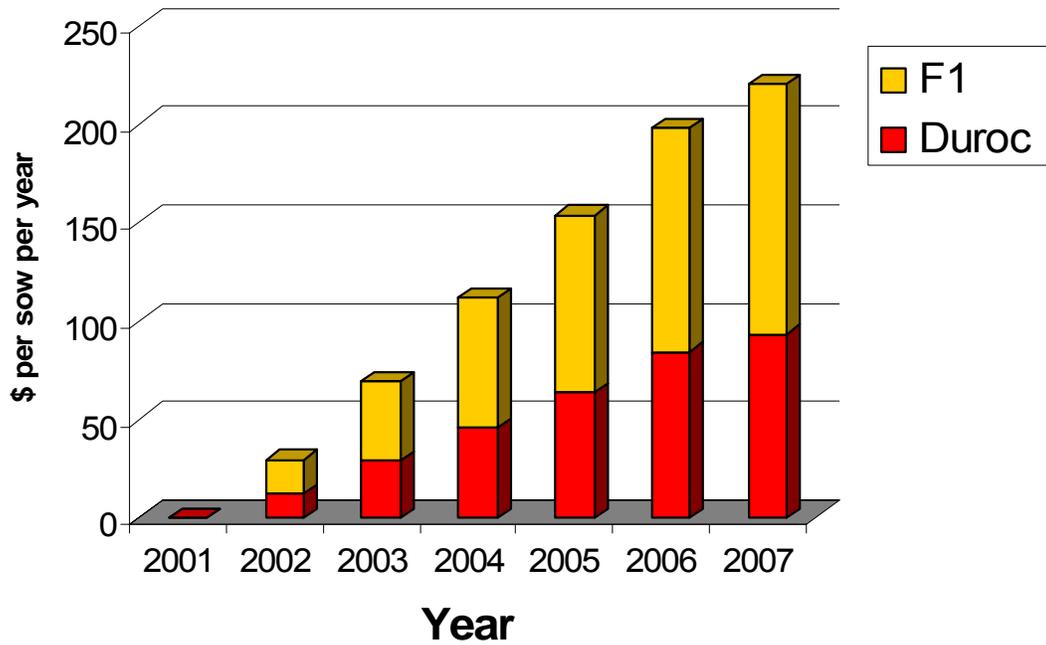
Trait	2001		2007		Average annual gain (2001-2007)	Gain in 2007
	#pigs	EBV average	#pigs	EBV average		
Sire Line Index (points)	9116	44	9762	105	10.33	+ 13 pts
Dam Line Index (points)	9116	49	9762	108	10.00	+ 10 pts
Lean Yield (%)	9116	-0.91	9762	-0.01	0.15	0.2 %
Loin Eye Area (cm <sup>2</sup> )	9116	-2.32	9762	0.28	0.43	+ 0.61 cm <sup>2</sup>
Age (days)	9116	7.9	9762	-1.4	-1.55	- 1.9 days
Feed Conversion (kg/kg)	9116	0.12	9762	-0.016	-0.023	- 0.028 kg/kg
Backfat (mm)	9116	2.15	9762	-0.01	-0.35	+ 0.3 mm
Lean Depth (mm)	9116	-2.15	9762	0.45	0.43	+ 0.54 mm
Number Born (piglets/lit)	9116	-0.17	9762	0.16	0.06	+ 0.02 pigs
Sire Line Index (\$)	9116	-36.1	9762	3.4	6.58	+ \$8.20
Dam Line Index (\$)	9116	-17.1	9762	2.9	3.33	+ \$3.50

**Change in Commercial Sows (F1s) and Hogs  
due to genetic improvement in Canada from 2001 to 2007**

Trait	Sire Line Duroc	Dam Line			Market Hogs
		Yorkshire	Landrace	F1s	
Sire Line Index (points)	62				
Dam Line Index (points)		62	63	62	
Lean Yield (%)	0.91	0.33	0.47	0.40	+ 0.65%
Loin Eye Area (cm <sup>2</sup> )	2.60	0.70	1.03	0.87	+ 1.73 cm <sup>2</sup>
Age (days)	-9.3	-7.3	-6.6	-7.0	- 8.1 days
Feed Conversion (kg/kg)	-0.137	-0.097	-0.093	-0.095	- 0.116 kg/kg
Backfat (mm)	-2.1	-0.5	-1.15	-0.83	- 1.46 mm
Lean Depth (mm)	2.6	0.5	1.27	0.89	+ 1.74 mm
Number Born (piglets/lit)		1.93	1.28	1.6	
Sire Line Index (\$)	\$39.50				
Dam Line Index (\$)		\$34.50	\$26.30	\$60.18	



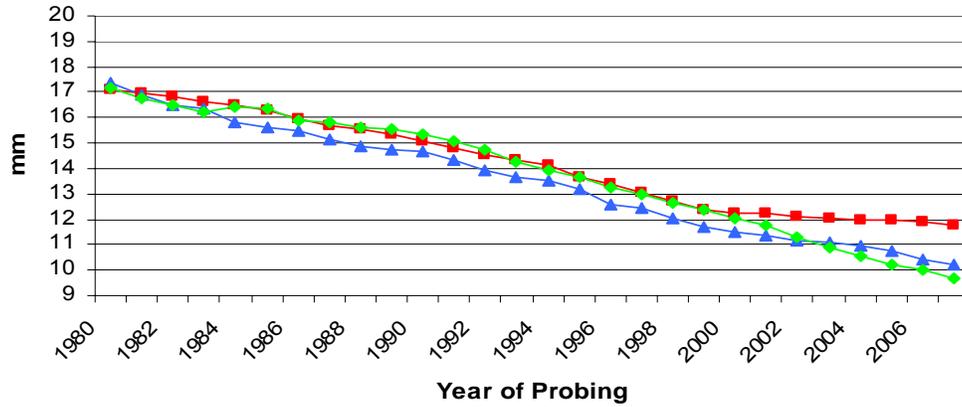
## Economic Value of Genetic Improvements



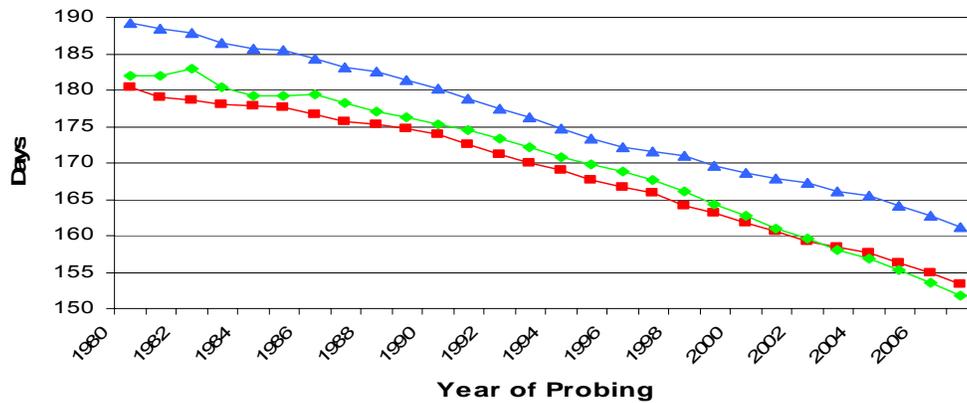
Sows are about \$202 per year more productive today than 6 years ago due to genetic improvements in growth, feed efficiency, lean yield and litter size.

**Appendix 5: Genetic Improvement Trends for active herds in 2007**

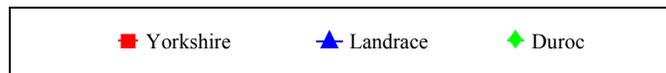
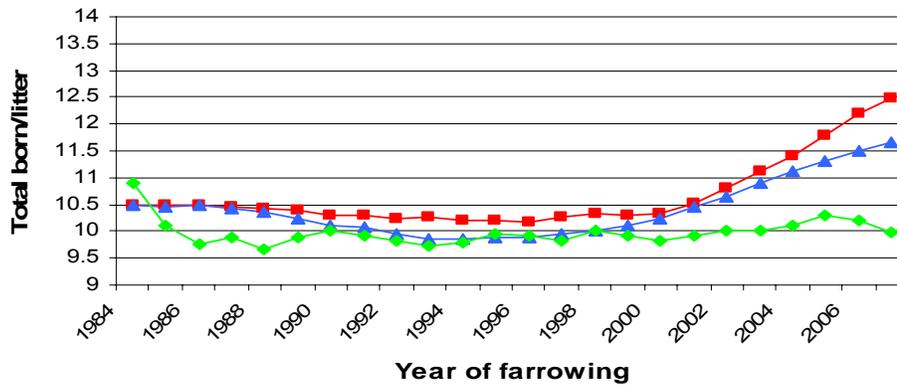
**Genetic Trends for Backfat at 100kg**



**Genetic Trends for Age at 100kg**

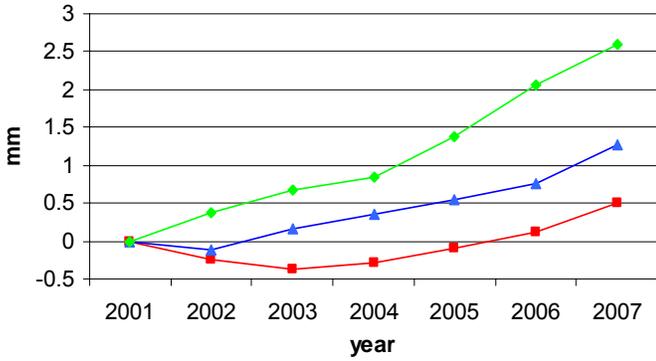


**Genetic Trends for Litter Size**

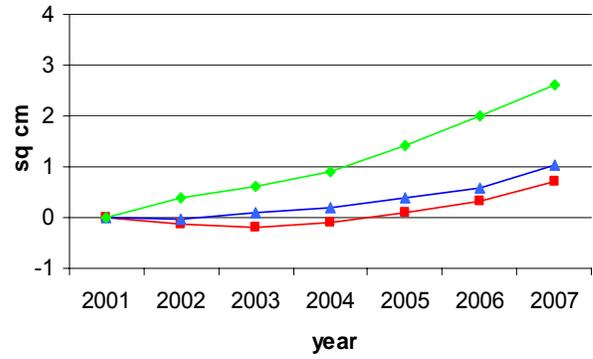




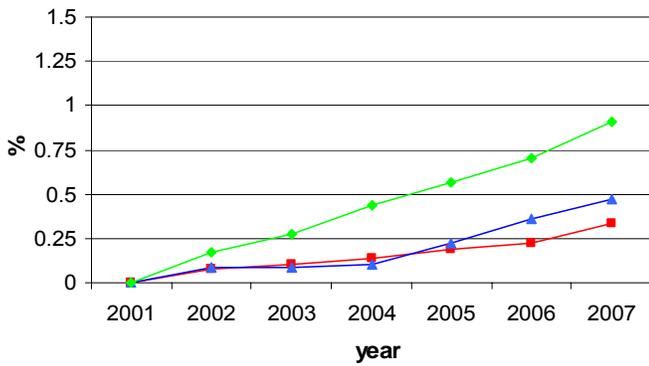
Lean Depth at 100kg



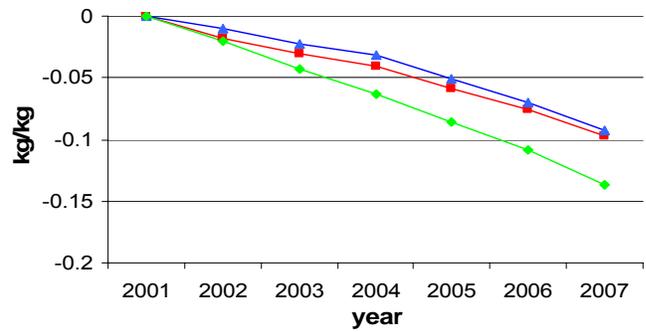
Loin eye area



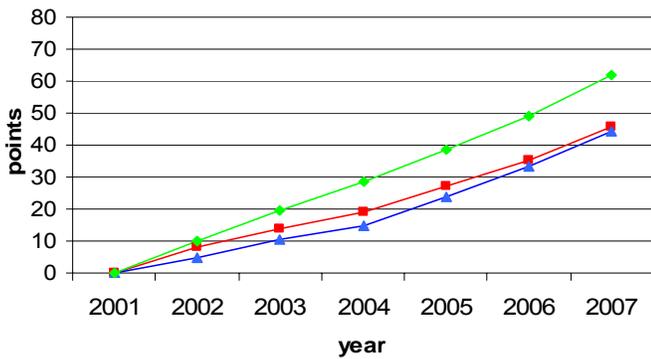
Lean Yield



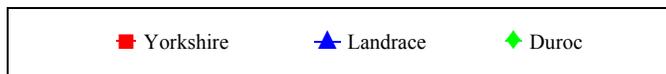
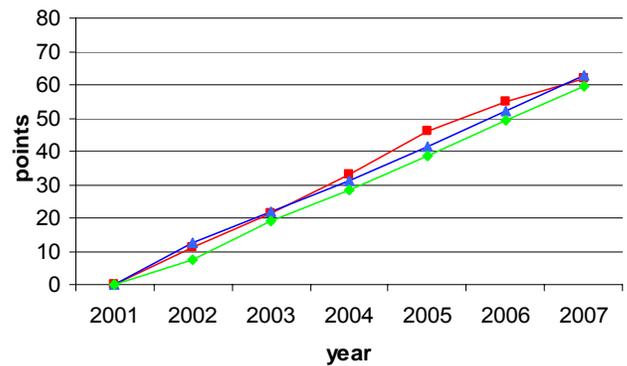
Feed Conversion Ratio



Sire Line Index



Dam Line Index



**Appendix 6. Home Test Summary for Backfat and Age at 100 Kg**

April 1, 2007 to March 31, 2008

		#herds	#pigs tested	male averages			female averages		
				#boars	backfat (mm)	Age (days)	#gilts	backfat (mm)	Age (days)
Atlantic	Yorkshire	3	2177	656	10.4	150	1521	11.0	157
	Landrace	3	712	228	10.0	152	484	10.4	157
	Duroc	3	518	184	10.4	154	334	11.1	158
	All 3 breeds	3	3407	1068	10.3	151	2339	10.9	158
Québec	Yorkshire	34	10707	3024	9.9	145	7530	10.2	153
	Landrace	30	8727	2582	9.8	145	6043	9.8	151
	Duroc	19	4676	2079	9.6	144	2532	9.9	150
	All 3 breeds	39	24110	7685	9.8	145	16105	10.0	152
Ontario	Yorkshire	26	7305	1281	11.2	149	6020	11.8	157
	Landrace	22	4000	688	11.0	148	3310	11.6	154
	Duroc	18	2409	1063	11.0	149	1344	11.6	153
	All 3 breeds	28	13714	3032	11.1	149	10674	11.7	156
West	Yorkshire	20	17468	3296	10.7	141	14147	11.5	152
	Landrace	13	12435	3144	10.3	140	9281	10.8	146
	Duroc	12	2913	1600	10.3	153	1313	10.4	163
	All 3 breeds	20	32816	8040	10.5	143	24741	11.2	150
Canada	Yorkshire	83	37657	8257	10.5	145	29218	11.2	153
	Landrace	68	25874	6642	10.2	143	19118	10.6	149
	Duroc	52	10516	4926	10.2	148	5523	10.5	154
	All 3 breeds	90	74047	19825	10.3	145	53859	10.9	152

Note 1,339 animals from other breeds were also tested on the program over the period

**Appendix 7. Sow Productivity Summary (2007)**

	Parity	#herds	total pigs born		pigs born alive		pigs weaned	
			N	Average	N	average	N	average
Yorkshire	1	87	7983	12.2	5074	10.4	7404	9.9
	2	83	6379	12.5	4020	11.1	5932	10.2
	3	80	5619	13.2	3766	11.7	5104	10.1
	4	75	4164	13.4	2719	11.6	3881	10.0
	5	73	3295	13.4	2024	11.6	3037	9.8
	6	70	2278	13.0	1302	11.1	2121	9.5
	7	72	3049	12.3	1460	10.5	2797	9.3
	<b>ALL</b>	<b>94</b>	<b>32767</b>	<b>12.8</b>	<b>20365</b>	<b>11.1</b>	<b>30279</b>	<b>9.9</b>
Landrace	1	73	5935	11.5	4174	10.2	5357	9.8
	2	71	4944	11.4	3540	10.3	4631	9.9
	3	70	4139	12.0	3054	10.9	3732	9.9
	4	66	3229	11.9	2404	10.7	2855	9.8
	5	64	2465	11.8	1700	10.6	2134	9.6
	6	62	1709	11.5	1092	10.3	1499	9.6
	7	61	1881	11.0	1045	9.7	1609	9.3
	<b>ALL</b>	<b>77</b>	<b>24302</b>	<b>11.6</b>	<b>17009</b>	<b>10.5</b>	<b>21817</b>	<b>9.8</b>
Duroc	1	46	1176	9.5	640	8.2	1001	8.2
	2	47	685	10.1	406	9.0	629	8.5
	3	42	473	10.6	328	9.4	402	8.2
	4	37	321	10.4	270	8.9	276	8.4
	5	28	197	10.9	165	9.4	158	8.3
	6	17	100	9.4	85	8.2	72	7.6
	7	11	52	10.3	44	9.1	32	7.8
	<b>ALL</b>	<b>50</b>	<b>3004</b>	<b>10.0</b>	<b>1938</b>	<b>8.8</b>	<b>2570</b>	<b>8.3</b>
All 3 breeds	1	97	15094	11.7	9888	10.2	13765	9.7
	2	93	12008	11.9	7966	10.6	11192	10.0
	3	94	10231	12.6	7148	11.3	9238	10.0
	4	87	7714	12.7	5393	11.1	7012	9.8
	5	86	5957	12.7	3889	11.1	5329	9.7
	6	83	4087	12.3	2479	10.7	3692	9.5
	7	80	4982	11.8	2549	10.1	4438	9.3
	<b>ALL</b>	<b>101</b>	<b>60073</b>	<b>12.2</b>	<b>39312</b>	<b>10.7</b>	<b>54666</b>	<b>9.8</b>

Note: 821 litters from other breeds were born over the period

**Appendix 8: Reports on Activities**

1. Science and Innovation Strategy: National Pork Value Chain Roundtable
2. Genome Canada - Industry Swine Genomics Workshop
3. Genetic Variability Indicators on the Web (IWGES-Germany)
4. Diminishing Diversity in Canadian Swine
5. Conversion of US genetic evaluations into Canadian equivalents
6. Accreditation Process for Swine Technicians
7. Effect of breed and sex on growth, carcass and meat quality traits
8. Update of weight adjustment factors for fat and lean depth (information note)
9. Use of ultrasound technology to measure intramuscular fat
10. Genetic selection of pigs for their resistance to disease like PMWS (summary)
11. A DNA based test for evaluating and improving pork colour in Canadian pigs
12. A major gene for specific selection in sire and dam lines (presented by Dr. Buys)
13. Iowa State University now makes available three gene markers for genetic improvement in the pig
14. 58th Annual Meeting of European Association for Animal Production (EAAP-Ireland)
15. eFarm: Web Tools for Genetic Improvement (IWGES-Germany)
16. Effect of breed, sex and slaughter weight on performances of Canadian purebred pigs (abstract)
17. Use of IGF2 gene tests for carcass quality and sow productivity in Canadian pig populations (abstract)
18. International comparison of genetic evaluations (IWGES-Germany)
19. Report on 39th Swine Research Days (JRP-France)

These reports are available on CCSI's website at: [www.ccsi.ca/reports](http://www.ccsi.ca/reports)

**Appendix 9. Breeders Participating In the National Program**

<b>Atlantic Swine Centre</b>	
Apple Valley Farms Reg & Donald MacDonald Box 43 Mount Stewart, PE C0A 1T0	International Genetics PEI Ltd. Box 43 Mount Stewart, PE C0A 1T0
Topline Swine Kenny Mutch RR #3 Earnscliff, PE C0A 2E0	
<b>Centre du développement du porc du Québec</b>	
Cie 2427 3963 Québec inc. 2693, boulevard Labelle, C.P. 484 Prévost J0R 1T0	La Porcheteck inc. 462, 2e Rang est Saint-Simon J0H 1Y0
Ferme Agral & fils inc. 160, route 363 Lac-aux-Sables G0X 1M0	Ferme C.-M. Labrecque enr. 1580, rang Saint-Étienne nord Sainte-Marie-de-Beauce G6E 3A7
Ferme Claude Forget inc. 841, 4e Rang Saint-Ambroise-de-Kildare J0K 1C0	Ferme Clauvie-Porcs (2002) inc. 202, rang 6 est Saint-Donat G0K 1L0
Ferme Cogeporc inc. 404, Saint-François Saint-Narcisse-de-Beaurivage G0S 1W0	Ferme Denis Vadnais inc. 3320, Chemin Tourville St-Nicéphore J2A 3Y8
Ferme du Laurier 167, rang de la Montagne Saint-Gervais-de-Bellechasse G0R 3C0	Ferme du Murier inc. 137, route Soucy, C.P. 154 Saint-Édouard de Lotbinière G0S 1Y0
Ferme F. Pilote et fils enr. 410, rang Saint-Pierre Saint-Irénée G0T 1V0	Ferme Géni-Porc inc. C.P. 1378 Bedford J0J 1A0
Ferme Grenier Pouliot inc. 2515, chemin Lehoux, R.R. 3 Coaticook J1A 2S2	Ferme J.P. Dion et fils inc. 154, rang Charlotte Saint-Liboire J0H 1R0
Ferme J.R. Raby senc 4222, rang de la Colline Adstock G0N 1S0	Ferme Jacques Ouellet 223, 6e Rang est Saint-Joseph-de-Kamouraska G0L 3P0
Ferme Liloporc inc. 414, rang Saint-Pierre Saint-Irénée G0T 1V0	Ferme Lorix-Québec enr. 841, chemin Tomifobia Stanstead J0B 3E0
Ferme Luc & Estelle Forget inc. 2553, rang Saint-Jacques Saint-Jacques J0K 2R0	Ferme Maguy enr. 810, St-Pierre Laurierville G0S 1P0
Ferme Perfo-Porcs inc. 1735, rang 10 Notre-Dame-du-Bon-Conseil J0C 1A0	Ferme Pleinchamps inc. 460, rang Saint-Pierre Saint-Anselme-de-Dorchester G0R 2N0



Ferme Porasseny inc. 16, des Prairies Saint-François G0R 3A0	Ferme porcine DAJO senc 135, rue Principale Saint-Simon J0H 1Y0
Ferme Porcine de Beauce inc. 1640, rang Saint-Gabriel sud, R.R. 2 Sainte-Marie-de-Beauce G6E 3A8	Ferme porcine Jagari inc. 6330, route 112 Garthby G0Y 1B0
Ferme Raymond Coutu et fils senc 1861, route 158 Saint-Thomas J0K 3L0	Ferme Rechamakayajo enr. 507, rue Desjardins Mandeville J0K 1L0
Ferme René Gauthier inc. 404, rang Saint-Pierre Saint-Irénée G0T 1V0	Ferme Rouslay s.e.n.c. 954, rang La Ferme Sainte-Perpétue J0C 1R0
Ferme des Domaines inc. 167, chemin de la Montagne Saint-Gervais-de-Bellechasse G0R 3C0	Ferme Ste-Catherine enr. 404, rue Saint-François Saint-Narcisse-de-Beaurivage G0S 1W0
Ferme Triporc inc. 3251, Haut-de-la-Rivière Sainte-Elizabeth J0K 2J0	Ferme Victorien Fortin inc. 1346, rang Sainte-Anne Métabetchouan-Lac-à-la-Croix G8G 1A3
Groupe Dynaco Coopérative agroalimentaire 41, route 287 sud Saint-Philippe-de-Neri G0L 4A0	Hybrilia SEC 156, rue Grenier Laurierville G0S 1P0
J. & R. Perreault inc. 184, Saint-Jacques Saint-Patrice-de-Lotbinière G0S 1B0	Lemieux, Jean-Marc 76, rang 2 est Saint-Gervais-de-Bellechasse G0R 3C0
Élevage Auger (9150-0561 Québec inc.) 850, chemin des Acadiens Yamachiche G0X 3L0	Les élevages Technos ltée 2080, rang 8 sud Adstock G0N 1S0
Les Porgreg inc. 8795, Chemin du Rapide-Plat Sud Saint-Hyacinthe J2R 2A6	S.C.A. Disraëli 815, avenue Champlain Disraëli G0N 1E0
Ferme Almilard inc. 188, route 204, C.P. 39 Sainte-Justine G0R 1Y0	Sogéporc inc. - Filière des Érables 1025, rang Saint-Pierre Notre-Dame-de-Lourdes G0S 1T
Sogéporc inc. - Filière des Marées 60, chemin du Cenellier La Trinité-des-Monts G0K 1B0	



Ontario Swine Improvement	
BMR Genetics Rod deWolde 12 Huston Street Millbrook, ON L0A 1G0	Bodmin Swine Genetics George Procter R.R. #5 Brussels, ON N0G 1H0
Clarion Swine Genetics Clare and Kent Martin R.R. #2 Drayton, ON N0G 1P0	Dietrich Farms Inc. Don and Paul Dietrich R.R. #1 Shakespeare, ON N0B 2P0
Dora Lee Genetics Ross and Betty Small R.R. #3 Harriston, ON N0G 1Z0	Lone Willow Farm Bill and Sheila Collins R.R. #5 Kincardine, ON N2Z 2X6
Monoway Farms Wayne and Paul Fear R.R. #4 Brussels, ON N0G 1H0	Novastar Genetics John & Enid Gough R.R.#3, 7959 Falconbridge Mt. Brydges, ON N0L 1W0
PSP Farm Genetics George Socket R.R. #3 Wingham, ON N0G 2W0	Pureline Swine Unit 1 Mike and Lisa O'Brien RR#4 Rockwood, ON N0B 2K0
Pureline Swine Unit 2 c/o Jim Whitehouse R.R. #4 Guelph, ON N1H 6J1	Ribanwood Yorkshires Bancroft, Peter R.R. #1 Newton, ON N0K 1R0
SGO Inc. Embro Division R.M. Matheson R.R. #3 Embro, ON N0J 1J0	SGO Inc. Monkton Division Joe Kolkman R.R. #2, 6439 Line 49 Logan Monkton, ON N0K 1P0
University of Guelph – Arkell Swine Research Tom Parker R.R. #2 Guelph, ON N1H 6H8	Vista Villa Farms Ltd. Bob and Scott Robinson R.R. #4 Walton, ON N0K 1Z0



<b>Western Swine Testing Association</b>	
Acadia Breeders Ltd. R.R. #3 Lacombe, AB T0C 1S0	Bloomsbury Farms Ltd. Walter Preugschas General Delivery Bloomsbury, AB T0G 0G0
Edulia Farms Herman Simons R.R. #1 Tees, AB T0C 2N0	Evergreen Colony Box 247 Oakville, Manitoba R0H 0Y0
F&S Farms Box 1795 Camrose, Alberta T4V 1X7	Fast Genetics Inc. #2-2175 Airport Drive Saskatoon, SK S7L 7E1
Five Lakes Farms Jurgen Preugschas Box 537 Mayerthorpe, AB T0E 1N0	Gwynne Vista Farms Keith Rathmeson R.R. 2 Gwynne, AB T0C 1L0
Huvenaars Farms Ltd. Box 142 Hays, Alberta T0K 1B0	Jakubec Farms Box 557 Viking, Alberta T0B 4N0
Morinville Colony R.R. #2 Morinville, AB T8R 1P5	Outlook Pork Box 186 Nobleford, AB T0L 1S0
PEAK Swine Genetics #217 - 5904B - 50 ST. Leduc, AB T9E 6J4	Pembina Hog Farm General Delivery Darlingford, Manitoba R0G 0L0
Sand Ridge Farm Ltd. Box 216 Neerlandia, Alberta T0G 1R0	

**Appendix 10. Participating A.I. Centres**

<b>Participating A.I. Centres</b>	
Alberta Swine Genetics Co. c/o Gregory Lebowa, Manager Box 3310 Leduc, AB T9E 6M1 Tel: (780) 986-1250 Fax: (780) 986-6523 Email: <a href="mailto:asgc@oanet.com">asgc@oanet.com</a>	OSI Swine A.I. Centre P.O. Box 400 Innerkip, ON N0J 1M0 Tel: (519) 469-3010 Fax: (519) 469-8692 Email: <a href="mailto:mgingerich@osi.org">mgingerich@osi.org</a> <a href="http://www.osi-inc.on.ca">www.osi-inc.on.ca</a>
CIPQ inc. (St-Lambert) a/s Ronald Drapeau 1486, rang St-Aimé Saint-Lambert, PQ G0S 2W0 Tél: (418) 889-9748 Fax: (418) 889-8210 Email: <a href="mailto:cipq@cipq.com">cipq@cipq.com</a>	CIPQ inc. (Roxton) a/s Ronald Drapeau 2100, Rang 6 Roxton Falls, PQ J0H 1E0 Tél: (514) 375-9977 Fax: (514) 375-2077 Email: <a href="mailto:cipq@cipq.com">cipq@cipq.com</a>
Cobiporc Québec (St-Patrice) a/s Sébastien Leclerc 2537, rang St-Jacques, C.P. 2030 St-Jacques-de-Montcalm (Québec) J0K 2R0 Tél: (450) 839-7844 Fax: (450) 839-2992 Email: <a href="mailto:info@cobiporcQuébec.com">info@cobiporcQuébec.com</a>	Magnum Swine Genetics Box 1514 Fort Macleod, AB T0L 0Z0 Tel: (403) 553-4844 1-888-553-4844 Fax: (403) 553-4845 Email: <a href="mailto:sales@magnumswine.com">sales@magnumswine.com</a> <a href="http://www.magnumswine.com">www.magnumswine.com</a>
National Swine Genetics 8817 Glengyle Drive Strathroy, ON N7G 3H3 Tel: (519) 245-6868 Fax: (519) 245-4884 <a href="http://www.sgo.on.ca">www.sgo.on.ca</a>	International Genetics PEI Ltd. Box 43 Mount Stewart, PE C0A 1T0 <a href="http://www.peipork.pe.ca/quality/aiunit">www.peipork.pe.ca/quality/aiunit</a>