Annual Report 2011

Swine **Innovation** Porc

Swine Innovation Porc

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The Canadian Swine Research and Development Cluster is established within the Growing Canadian Agri-Innovation Program – Canadian Agri-Science Cluster Initiative of Agriculture and Agri-Food Canada (AAFC).

Canadian Pork Council
Conseil canadien du porc

Swine Innovation Porc is a corporation of the Canadian Pork Council.

Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada

Canada

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Claude Miville
Chair

MESSAGE FROM THE CHAIR

2011: A YEAR OF CONSOLIDATION...

In 2010, together with 22 private partners we launched an ambitious research program involving no fewer than 100 researchers from 14 universities and 13 research centres.

The year 2011 that is ending, was employed to the best advantage in consolidating our research program. The management team has grown in experience and honed all the follow-up mechanisms for the research projects already underway, so as to deliver the results of the research on time.

The addition of a transfer manager completed the management team and this person has been in the position at the Prairie Swine Centre for some months now. The ability to transfer the results of the research work quickly, in the right form and to the appropriate targeted partners is key if our producers are to be the first to benefit from the research results we have achieved. A transfer strategy is currently being prepared and the necessary funding should be granted in 2012, enabling us to maximize our effectiveness and reap the benefits of this research.

... AND STRATEGIC POSITIONING

2011 was also a pivotal year in terms of the strategic positioning of Swine Innovation. The corporation was originally designed as a virtual company with a lightweight and flexible structure that would enable it to manage a major research program within the framework of a specific program, such as the Growing Canadian Agri-Innovations Program of Agriculture and Agri-Food Canada.

Our strategy requested assistance from our established partners, the Centre de développement du porc du Québec inc. and the Prairie Swine Centre, to mobilize the resources rapidly without creating a new unwieldy structure.

A series of strategic meetings conducted last fall helped to establish Swine Innovation definitely as a key player in innovation in pork production which includes both our partners and Agriculture and Agri-Food Canada. Among these meetings were notably those with Mr. Pierre Lemieux, Parliamentary Secretary to the federal Minister of Agriculture, together with the members of The House of Commons Standing Committee on Agriculture and Agri-Food, with those of the Board of Directors of The Canadian Pork Council (CPC) as well as the meeting that took place on the occasion of the semi-annual meeting of the Canadian Pork Council.

The Canadian Swine Research and Development Cluster, now known as **Swine Innovation Porc**, was mandated to support strategic planning by the Canadian Pork Council on aspects of applied research and innovation. This planning will be unfurled starting in 2012.

In addition, the different meetings we took part in have convinced us that there is unanimity among all the Canadian partners concerning the strategic importance of extending the Growing Canadian Agri-Innovations Program for the period 2013–2018. Swine Innovation anticipates its playing a leading role in this.

CHALLENGES FOR 2012

Of the objectives that the board fixed in 2011, certain ones have been only partially achieved. Thus, implementation of the communication plan that was to highlight the signing of research agreements with various Canadian universities experienced some delay. We were hoping in this way to endorse the visibility of Swine Innovation and our strategic position to the industry and the policy makers. Furthermore, our strategic planning process for establishing our research priorities and mobilizing our partners and the researchers in the planning of a new portfolio of research projects is not yet complete.

Therefore in 2012, we will concentrate our efforts on defining our research program for 2013-2018. This program will be determined through a series of consultations conducted with our partners over the course of the next few months.

But that does not mean the management team will slow their efforts to ensure that the 14 research projects currently underway are completed between now and December 2012 and that the results transferred effectively to our partners.

Therefore in 2012, we will concentrate our efforts on defining our research program for 2013-2018.

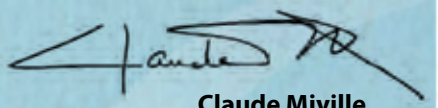
ACKNOWLEDGEMENTS

On the recommendation of the Board of Swine Innovation, the Canadian Pork Council adopted a policy concerning the appointment of directors that accords provincial pork producer organizations supervisory power over the nomination of directors.

Four directors, who have been with Swine Innovation right from its inception, bowed out in 2011. They are Messrs. Ben Woolley, pork producer, appointed by Alberta Pork; Gary Desmarais, pork producer, appointed by the Fédération des producteurs de porcs du Québec; Harvey Wagner, permanent employee of Saskatchewan Pork Development Board and Rory MacAlpine, appointed by the Pork Value Chain Roundtable.

Their contribution has been crucial to the success of Swine Innovation and we extend to them our deepest gratitude.

Thanks also go to the Swine Innovation management team who put all their enthusiasm into achieving the results set by the members of the board.



Claude Miville
Chair

Pierre Falardeau
General Manager

MANAGEMENT REPORT 2011

I am pleased to present the second management report of Swine Innovation Porc, the new brand name of the Canadian Swine Research and Development Cluster (CSRDC).

We have had a very busy year, devoted mostly to implementing the research program. At the end of this second year, all the projects are running smoothly.

The management team has been busy managing the financial, legal and human resources side of the research program, along with directing the affairs of the secretariat of the governance structure of the corporation.

RESEARCH PROGRAM

Our research program is now officially underway. We have a total of 40 signed agreements with research organizations and financial contributors, and work is being undertaken toward improving production costs and differentiation of products in the pork sector.

Reporting was one of our main tasks. The management team prepared and submitted four Quarterly Activity Reports along with an Annual Report to Agriculture and Agri-Food Canada (AAFC) for the period 2010-2011.

HUMAN RESOURCES

The addition of a secretary in November rounded out the management team. Swine Innovation has only two full-time employees; a Secretary and a Research Coordinator. The General Manager, Corporate Secretary, Accountant and Assistant Accountant are all part-time positions.

The necessity of working closely with 100 researchers from 27 different research organizations rapidly exposed the need for additional resources. A part-time consultant joined the team in September 2010, as Research Coordinator - Western Canada.

SECRETARIAT

The Management team ensured the preparation and the coordination of one Annual General Assembly, five Board of Directors meetings, along with a number of committee meetings: one Audit, one Executive, two Finance, and one Management Support.

The secretariat also coordinated three Priority Setting committee meetings and a reception which brought together Board members from Swine Innovation, researchers, financial contributors and collaborators.

COMMUNICATION

The research program aims to provide the means of reducing cost of production and to differentiate Canadian pork meat from others in the market place. As such, the Board members are of the opinion that communication must be rapidly established with the pork producers of Canada and collaborators of the industry. A corporate website went online at the end of the year. The site can be viewed at **www.swineinnovationporc.ca**.

To clearly identify the Swine Cluster, a logo was designed and approved by the Board members. This striking logo symbolizes swine research conducted through a cluster dynamic.

Swine **Innovation** Porc

Used in conjunction with the logo, the corporate name can be used in both languages and definitely refers to the Swine Cluster. We introduced the name, Swine Innovation Porc (Swine Innovation in English and Innovation Porc in French), to avoid confusion and to clearly identify the corporation since both research program and corporation previously went by the same name: Canadian Swine Research and Development Cluster.

Throughout the upcoming year, we will continue to support the researchers in their goal of completing their projects on time.

CONCLUSION

The research program is on schedule, although finishing everything before March 31, 2013 remains a great challenge. Throughout the upcoming year, we will continue to support the researchers in their goal of completing their projects on time.

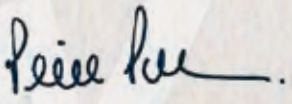
Emphasis will now shift to the technology transfer activities. Our objective is to have measurable results on the farm by March 2013.

The Board members are already looking forward to the renewal of AAFC's Canadian Agri-Science cluster initiative. We anticipate that the team will be requested to collaborate in the preparation of the next research program.

I would like to personally thank each member of the management team. Without your dedication and hard work, we would not have accomplished as much in so short a period of time.

On behalf of the team members, I would also like to express our appreciation to the Board of Directors for their commitment and support. A special mention goes to our Chair, Claude Miville for his availability and leadership.

The entire Management team will continue to make every effort necessary to guarantee the continued success of Swine Innovation.



Pierre Falardeau
General Manager


RESEARCH
PROJECTS

THE USE OF TOOLS RELATED TO MOLECULAR CHARACTERIZATION, SYSTEMIC ANALYSIS OF STAKEHOLDERS AND GEOMATICS FOR IDENTIFICATION OF THE PRINCIPAL VECTORS AND CONTAMINATION SOURCES BY BACTERIA AND VIRAL INDICATORS AT FARM AND SLAUGHTERHOUSE LEVEL

PROJECT LEADER

Ann Letellier, Research Chair in Food Safety, University of Montreal, Faculty of Veterinary Medecine.

PROJECT OBJECTIVE

To identify vectors and microbial contamination sources among herds and slaughterhouse using geomatic, systemic and genomic tools.

SUMMARY OF THE PROJECT

Scientific literature contains very little information concerning sources of contamination outside the farm. In this project, we propose an intervention on the route from farm to slaughterhouse as a first step to better understanding sources of contamination and the relationships between stakeholders with regard to contamination. This first step will assist the industry to improve biosecurity measures not only at the farm level but also at every stage in the food chain. Improving biosecurity is a guaranteed means of improving long-term industry profitability and sustainability. Effective biosecurity at the farm and industry level is extremely important in mitigating the risk of introducing and/or spreading animal diseases.

The design of the project is such that the anticipated results will be very useful to the Canadian pork industry because we aim to identify main movements and traffic related to farms and slaughterhouses within a specific area. Using microbial indicators, geospatial data (GPS) and analysis and characterization of interactions between stakeholders, we also intend to identify the main sources of contamination and the stages or practices and attitudes related to an increased risk of contamination. At the end of the project, we propose to inform every level of the pork industry food chain (in a confidential manner) of the impact that each of their sectors has on the spread of contamination, suggest recommendations to reduce the risk and ask them to become involved in the food safety process as a primary requirement for maintaining marketability and competitiveness.

SIGNIFICANT ACHIEVEMENTS

Based on a literature review of risk factors associated with farm and slaughterhouse contamination by microbes, all researchers implicated in the project elaborated together, the list of criteria to be considered for the selection of major stakeholders. First of all, we had to limit the study to a specific level by selecting only the finishing barn to focus on a more precise picture between farms and the slaughterhouse. We also agreed that with the timeframe of the project and the budget alotted for the project, we had to restrict the number of stakeholders. To be sure that we will have enough information related to most important stakeholders, we decided to choose fewer stakeholders but to select the most significant in a single cooperative network.

The protocol was elaborated and validated by the team members. After many efforts to obtain industry collaboration, one slaughterhouse was identified: Olymel in Princeville, Québec. With the veterinarian, we started discussions to identify a network of farms (cooperative) and related transportation networks. We discussed with the veterinarian of the cooperative about the project. Based on the willingness for participation of producers in the project, the veterinarian identified 10 farms in the cooperative, according to specific criteria (salmonella history, E.coli disease, fattening farm...). In the end, the most important stakeholders were retained. To date, the network includes one slaughterhouse, farms, delivery trucks, feed supplier, veterinarian, technicians, and meat salvager. Periodic samplings was on-going during a one year period to isolate indicator microorganisms (Salmonella, E.coli and viruses). The frequency of specific sampling will be determined by the specific scenario of movements of stakeholders on an annual basis.

The next step was to analyze by means of management practices the dynamics of inter-relationships and the various concerns or issues of the stakeholders. This is on-going with a complete questionnaire for interviews and will be followed by illustration and description of types of inter-organisational relationships seen in the field.

To complete the picture, spatio-temporal data collection devices was installed on selected stakeholders equipment and machinery in 10 farms associated to one slaughterhouse to provide data for geostatistical analyses. Geospatial analysis tools have been set up to correlate the main risk factors in space and time and provide an integrated and systemized view of the phenomenon. Sophisticated geostatistical approaches (spatial data warehouse, data mining, spatial autocorrelation, etc.) will be combined to overlay microbiology data with macro elements such as terrain topology, flow and transit of stakeholders and material.

The tools, techniques and expertise from different areas (data management, technical knowledge, ethics, etc.) will be integrated to support traceability, monitoring, and decision-making in the context of continuous risk assessment related to possible latent crises. Based on mobile technologies and extended communication networks, this element of the proposal aims at detecting early signs of an emerging crisis and at networking the actors to quickly resolve the situation prior to the occurrence of the crisis rather than mitigate the effects of an actual crisis occurrence.

SOW HOUSING: RISK FACTORS AND ASSESSMENT TECHNIQUES FOR LAMENESS, PRODUCTIVITY AND LONGEVITY IN GROUP AND INDIVIDUALLY HOUSED GESTATING SOWS

PROJECT LEADERS

- **Nicolas Devillers, Agriculture and Agri-Food Canada (AAFC), Sherbrooke, Québec**
- **Laurie Connor, Dept. of Animal Science, Faculty of Agricultural and Food Sciences, University of Manitoba, Winnipeg, Manitoba**

PROJECT OBJECTIVE

Assessment of risk factors affecting the productivity and longevity in gestating group housed sows, and over a variety of management systems, with a special focus on lameness.

SUMMARY OF THE PROJECT

In the transition to group housing of gestating sows, the ability to identify the risk factors affecting sow welfare and longevity in the herd becomes increasingly critical for assurance of animal well-being and economic viability. The research proposed herein will use conventional and new technologies to identify factors, such as social rank, lameness, nutrient balance and early reproduction management that impact sow welfare and longevity in the herd. By assessing the relationships of these factors to lameness and longevity, reliable tools for early identification of lameness and temperament traits can improve animal selection for particular housing conditions, provide valuable data for validation of a sow investment longevity model and thereby contribute to economic viability of the pork sector.

SIGNIFICANT ACHIEVEMENTS

Data collection training workshop was held at University of Manitoba. Meeting participants, forming a multi-disciplinary and multi-institutional team, included researchers, research technicians, post-doc students and research assistants. Participants were from Prairie Swine Centre, University of Guelph, AAFC and University of Manitoba. Protocols have been developed for each sub-project: longevity, social and temperament factors and lameness assessment. Testing of new equipment (kinematics and accelerometer), and setting up of test areas at each site. Development of the protocol to incorporate comparison of infrared technology (IRT) to other lameness scoring systems is progressing. A data sharing systems has been set up across research sites. Studies investigating the impact of gilt selection and breeding methods as well as a retrospective study on age of gilt selection are underway. A preliminary experiment completed for the calcium and phosphorus balance studies, concluded that pQCT estimation of muscle cross sectional area can use frozen limbs, however, muscle density, if determined using this methodology, must be done using fresh tissue.

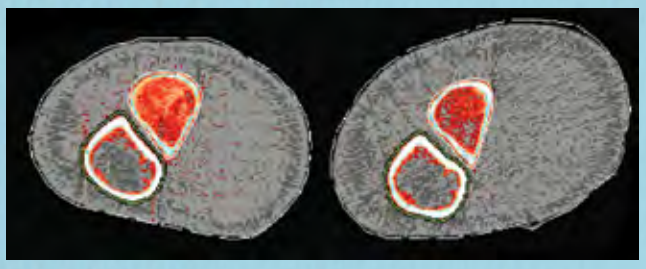
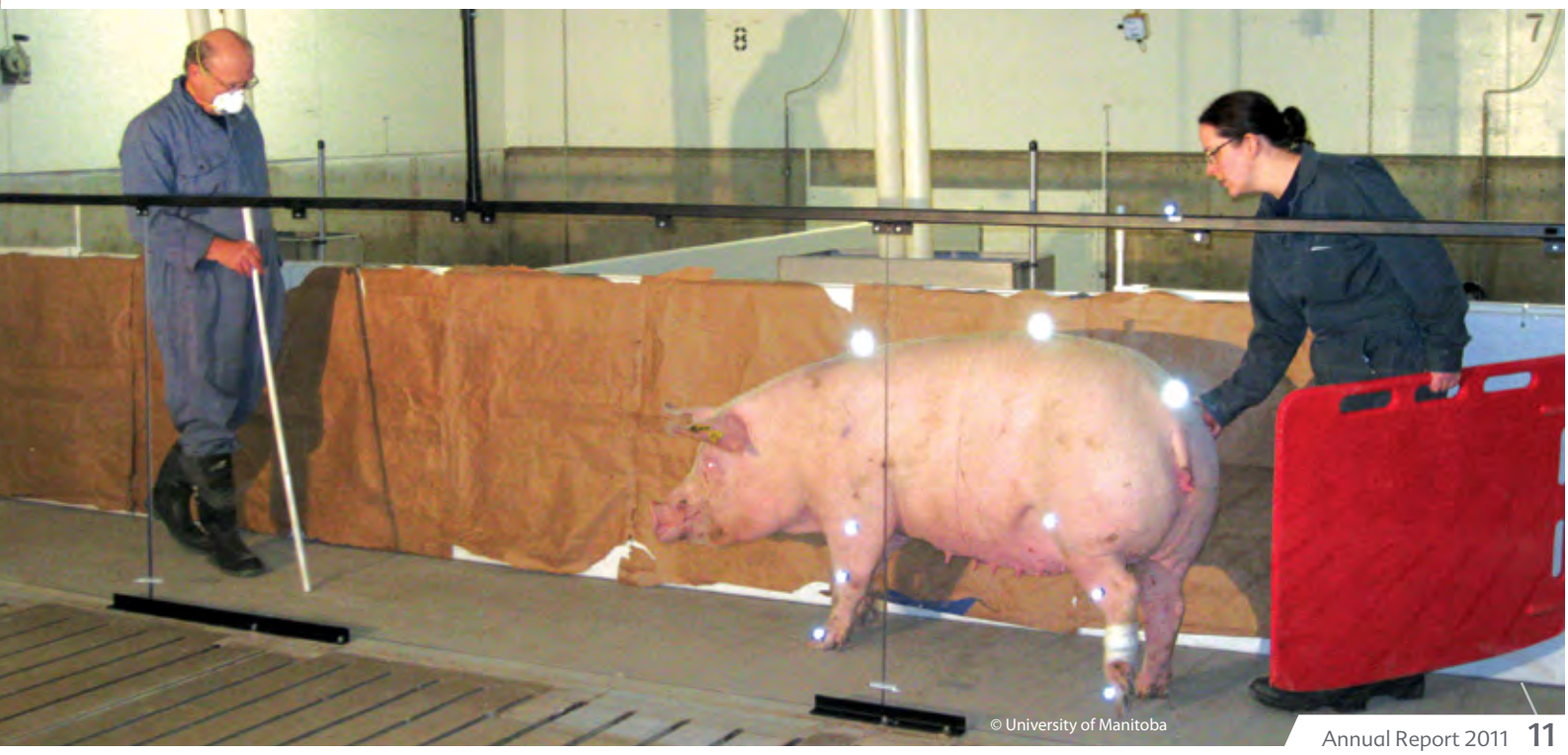


Figure 1. pQCT images of fresh (left) and frozen (right) swine forelimb



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A STUDY ON THE EFFICIENCY OF WATER SPRINKLING IN THE TRUCK AFTER LOADING AND PRIOR TO UNLOADING AT TWO DIFFERENT ENVIRONMENTAL TEMPERATURES ON CORE BODY TEMPERATURE AND CARCASS AND MEAT QUALITY IN PIGS

PROJECT LEADER

Luigi Faucitano, Agriculture and Agri-Food Canada (AAFC), Dairy and Swine Research and Development Centre, Sherbrooke, Québec

PROJECT OBJECTIVE

The main objective of this project is to provide the pork industry with a clear procedure to employ on the truck in warm conditions, with the aim of limiting animal losses during transportation and improving pork quality.

SUMMARY OF THE PROJECT

This study proposes to evaluate the efficiency of water misting in a stationary vehicle on core body temperature and carcass and meat quality in pigs and, by assessing the temperature and humidity variation inside the truck, to identify the most appropriate average temperature (between 15 and 25°C) to obtain the maximum efficiency. In addition, the following aspects are also to be examined: ammonia level variation, core body temperature variation in pigs, stress indicators in blood at exsanguination, the behavioral response of pigs in the truck (at unloading and in lairage) and carcass and meat quality.

SIGNIFICANT ACHIEVEMENTS

The data collection at the farm, on the truck and at the slaughter plant in this study was completed in mid-September 2011. During the transport trials, ambient temperature ranged from 11.6 to 28.5°C. According to the preliminary results, the increase in ambient temperature and the application of water sprinkling after loading and before unloading reduced lactate levels in blood at exsanguination, resulting in higher pH at 1 post-mortem (pH1) in the loin muscle. However, the better post-mortem muscle acidification rate only resulted in higher water exudation in this muscle at higher ambient temperature, regardless of water sprinkling in the truck. The effects of water sprinkling were different according to the compartment location inside the trailer, with better pork quality in the loin and ham being especially recorded in sprinkled pigs located in the middle front compartment starting from 18°C ambient temperature. Water sprinkling also reduced exsanguination lactate levels in pigs transported in the middle front and rear compartments, starting from 15 and 22°C ambient temperature, respectively.

A COMPARISON OF THREE ANIMAL WELFARE ASSESSMENT PROGRAMS ON CANADIAN SWINE FARMS

PROJECT LEADERS

- **Tina Widowski, University of Guelph, Guelph, Ontario**
- **Penny Lawlis, Ontario Ministry of Agriculture and Rural Affairs (OMAFRA), Woodstock, Ontario**

PROJECT OBJECTIVE

- Compare three on-farm animal welfare programs (Canada's Animal Care Assessment™ (ACA), USA's Pork Quality Assurance® (PQA) Plus, EU's Welfare Quality® Assessment) as they pertain to Canadian farms.
- Determine inter-observer reliabilities for different measures included in each of the assessments.

SUMMARY OF THE PROJECT

This project involves the collection and analysis of data from Canadian swine farms across Canada (Ontario, Quebec, Manitoba and Saskatchewan) in order to identify the practical implications of applying each of three animal welfare assessment programs on Canadian swine farms. Results of this project will allow us to determine the concordance (agreement) among the different programs in ranking of farms and to investigate the repeatability among observers for different measures that may be included in the Canadian ACA. The project will also provide baseline data with respect to the status of Canadian farms and their compliance with all three on-farm animal welfare assessment programs.

SIGNIFICANT ACHIEVEMENTS

A team of assessors for the Ontario trials has been recruited and trained for the ACA™, Welfare Quality® and PQA®. Data collection aimed at determining inter-observer reliability for various measures included in the assessments has begun on Ontario farms.

USE OF NON-PENETRATING CAPTIVE BOLT FOR EUTHANASIA OF NEONATE, SUCKLING AND WEANED PIGLETS UP TO 9 KG

PROJECT LEADERS

- **Tina Widowski, University of Guelph, Guelph, Ontario**
- **Suzanne Millman, Iowa State University, Iowa, USA**

PROJECT OBJECTIVE

Investigate the effectiveness of the modified design of the non-penetrating captive bolt for euthanasia of neonatal piglets as well as older piglets.

SUMMARY OF THE PROJECT

The project aim is to determine the maximum weight of suckling pigs that the Zephyr non-penetrating captive bolt effectively induces rapid loss of consciousness, determine the maximum weight of suckling pigs that the Zephyr non-penetrating captive bolt effectively achieves death quickly and consistently and develop restraint techniques that support use of the Zephyr for piglets up 9 kg.

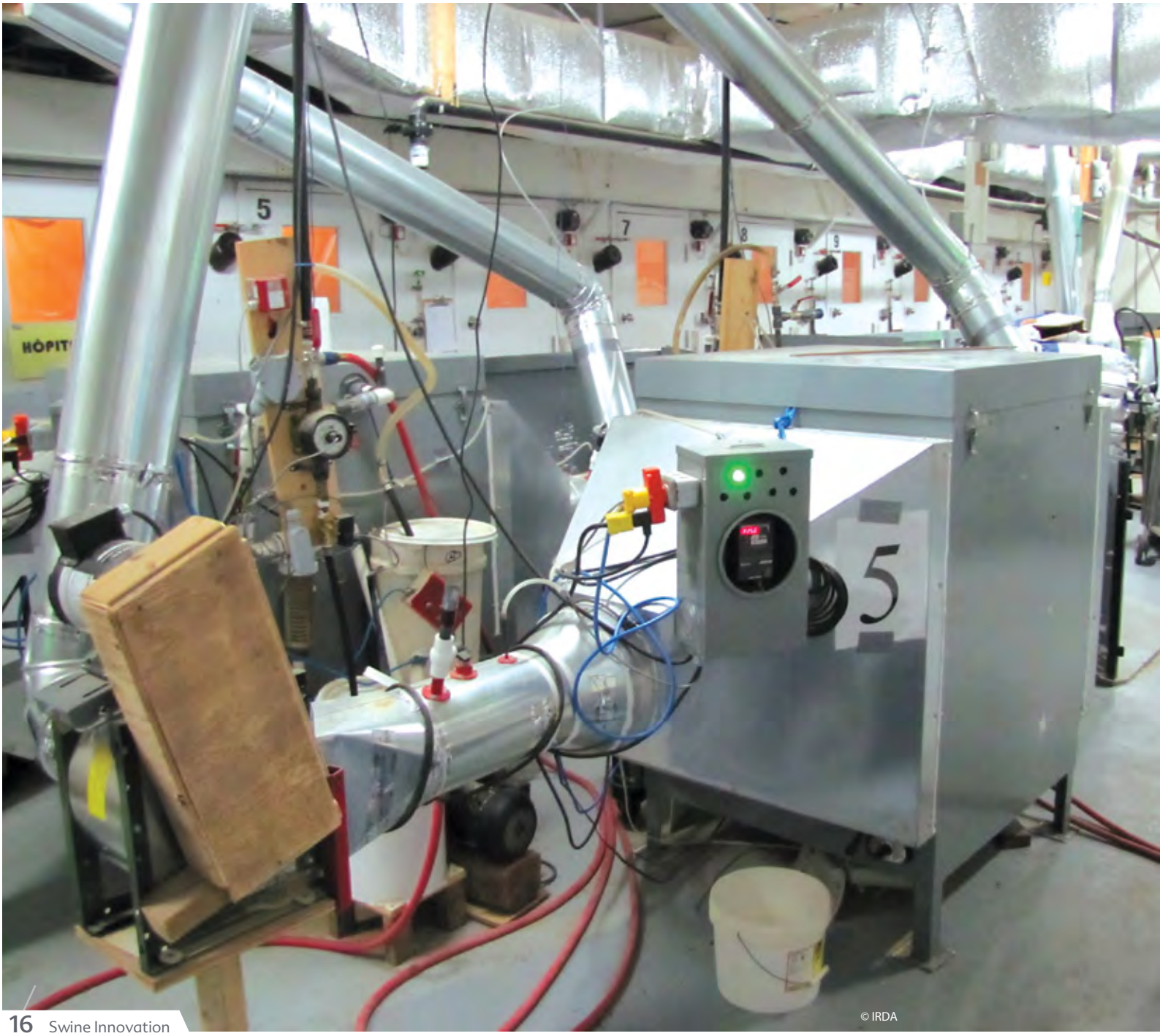
SIGNIFICANT ACHIEVEMENTS

To date, two of the three trials were completed.

TRIAL 1: Test the effectiveness of the NPCB (non-penetrating captive bolt) on 100 suckling piglets that were less than 3 days of age.

TRIAL 2: Test the degree of brain lesions and time to death following application of the NPCB for on a total of 20 anethetized piglets (5 for each of the 4 weight classes).

In both trials, the degree of brain damage was determined by macroscopic scoring of damage at gross necropsy, microscopic scoring of sectioned and stained samples of brain tissue and by CT scans performed by a veterinary pathologist and radiologist, respectively. In trial 1 data collected from live observations following application of the device by 10 stock people (10 piglets each) across four different farms indicated that the NPCB was 100% effective at causing rapid insensibility and 95% effective at causing cardiac arrest within minutes. Post-mortem data from trial 2 confirm that continuation onto the next stage of the project is warranted. The next stage of research will focus on testing the effectiveness of the NPCB on conscious piglets (up to 9 kg).



DEVELOPMENT OF AN INNOVATIVE AIR CLEANING SYSTEM FOR SWINE BUILDINGS

PROJECT LEADER

Stéphane P. Lemay, Institut de recherche et de développement en agroenvironnement (IRDA), Québec

PROJECT OBJECTIVE

The overall objective of this project is to improve the acceptability of swine facilities in rural areas by reducing their potential environmental impacts.

SUMMARY OF THE PROJECT

This project is designed to develop air cleaning technology that will reduce the offensiveness of the exhaust air from a swine grower-finisher facility. This technology should improve the mutual acceptability among residents and production facilities. More specifically, the project will measure reductions in odour, gases and pathogens (including a model pathogen) obtained with a laboratory-scale air treatment unit (ATU) under various operating conditions.

Three empty bed residence times, two types of biotrickling filter media and two liquid solution flow rates will be tested. This will lead to the design of an ATU able to reduce odour, gas and pathogen emissions exhausted from commercial-scale swine buildings while providing low capital and operating costs, minimum maintenance, and which can be adapted to new and existing buildings. Researchers will also measure reductions in odour and gas emissions from the combination of the ATU with a biofiltration treatment using the optimised ATU operating conditions. The ideal ATU configuration will then be tested in a commercial-scale swine facility.

SIGNIFICANT ACHIEVEMENTS

The air treatment unit (ATU) construction and experimental set-up for phase 1 was completed at the end of 2010 and has been operating since then. The six ATU were pre-tested over three months. The experimental setup was ready in March 2011, to date, four of the six replicated experiments were finished and the fifth one is underway.

DEVELOPMENT OF AN INNOVATIVE PRECISION FARMING SYSTEM FOR SWINE

PROJECT LEADER

Candido Pomar, Agriculture and Agri-Food Canada (AAFC), Sherbrooke, Québec

PROJECT OBJECTIVE

To acquire the required scientific knowledge to feed pigs individually with daily tailored diets for optimal management of feeds and animals and establish the numerical procedures needed for the development of a commercial fully automated precision feeder system for swine.

SUMMARY OF THE PROJECT

This project will provide useful information and significant insights about the nutrition of pigs and the benefits of precision feeding techniques realized through the automation and intelligent management of feeding and animals. Animal studies will be performed to modify actual feed formulation programs for the simultaneous optimization of premixes, including:

- Environmental constraints
- Study of individual feed intake patterns for early identification of diseases
- Updating the actual model for real-time prediction of feed intake, weight gain and predicting nutrient requirements

The model will be calibrated for optimal formulation of lysine and other essential amino acids as well as for phosphorous and calcium. Finally, the project will evaluate the technical, economic and environmental impact of precision feeding systems in commercial conditions.

To achieve these objectives, a number of activities will be undertaken:

1. Model the metabolism of phosphorus and calcium and develop a system approach to estimate each pig's individual daily requirements.
2. Modify actual feed formulation programs for simultaneous optimisation of two premixes with environmental constraints and optimal nutrient density.
3. Study the individual feed intake patterns for early identification of diseases.
4. Update the actual model for real-time prediction of feed intake, weight gain and predicting nutrient requirements.
5. Calibrate the model for optimal formulation of lysine and threonine.
6. Evaluate the economical and environmental impact of precision feeding systems.

SIGNIFICANT ACHIEVEMENTS

One experimental trial has been completed in which the digestive and metabolic dietary P, Ca and phytase interactions have been studied and integrated into a mathematical model simulating the fate of dietary P and Ca in pigs from weaning to slaughter. This model will be used by the automated precision feeder system for swine (AIPF) to estimate individual daily P and Ca requirements. A second project has been initiated to develop a feed formulation method able to estimate the composition of two premixes simultaneously which combined in varying proportions can meet the requirements of pigs during the entire growing-finishing period while minimizing simultaneously feed cost, and nitrogen and phosphorus excretion. A third numerical study on the individual feed intake patterns for early identification of diseases is in its first stages. The first prototype of a mathematic model used to estimate in the AIPF the daily nutrient requirements of individual growing-finishing pigs has been completed. The model includes empirical and mechanistic model components. The empirical component estimates ADFI, BW and ADG based on individual pig information collected in real-time. Based on ADFI, BW and ADG estimates, the mechanistic component uses classic factorial equations to estimate the optimal concentration of amino acids that must be offered to each pig to meet its requirements. This model is under evaluation and will be further calibrated using the data of an ongoing project studying the minimal level of lysine at which growing-finishing pigs between 25 and 50, and between 85 and 120 kg bodyweight, will support maximal body growth or protein retention.

EVALUATION AND DEVELOPMENT OF STANDARDS FOR SWINE PRODUCTION SYSTEMS

PROJECT LEADERS

- **Lee Whittington, Prairie Swine Centre, Saskatoon, Saskatchewan**
- **Bernardo Predicala, Prairie Swine Centre, Saskatoon, Saskatchewan**

PROJECT OBJECTIVE

- To develop a methodology for analyzing the cost/benefit of system optimization and standardization that can be applied to commercial swine farms.
- To ensure that concepts identified in this project can be translated to the farm, providing a competitive advantage to Canadian pork producers.

SUMMARY OF THE PROJECT

The project will evaluate existing standards developed in other industries and estimate the value these bring to their respective industries. Can these approaches to standardization be applied to (and pork producers benefit from) the lessons learned in other industries?

Benchmark current systems in operating swine barns (i.e. ventilation & heating) to determine operating efficiency and cost of operation, and identify strategies to improve the operation. For example, benchmarking will lead to strategies to improve energy use, which preliminary research suggests varies by a factor of 4 in utility cost per pig shipped between highly efficient and less efficient operations.

Existing standards for livestock barns and codes of practice for swine production will also be evaluated. More specifically, the impact of major changes over the past 20 years in pig genetics (body weight, growth rate, reproductive capacity, etc.), management practices (stocking density, space allowances, etc.), technology (building materials, barn equipment, etc.) and welfare demands, among others. Also, the adequacy of the existing standards and codes, many established decades earlier, will be examined to determine if they still satisfy the requirements of modern pig production.

Next, opportunities for system standardization and optimization within the pig barn will be investigated too. This will involve development of a methodology that allows evaluation of an operation to identify systems that are not fully optimized, which is particularly important with so many different types of production systems in Canada.

Finally, recommendations for the development of new or modified standards and/or codes of practice that reflect the current environment under which modern pig production occurs will be developed.

SIGNIFICANT ACHIEVEMENTS

A literature review of standards used in non-agricultural industries (example: military, manufacturing, medicine, sports) was begun. The improving value or benefit of implementing this standard to their respective industry was identified. Also, a literature review of standards used in livestock production in the USA and selected European countries is in progress. Sources identified include ASABE, where 38 standards were identified for further review. In addition, 8 other sources were identified; ANSI, ASHRAEA, ASCE, ASME, ASTM, AMCA, IES, MWPS. Within this group, an additional 55 standards identified warranted further investigation. Codes of practice included a total of 55 regulations identified for Canada, 20 for the USA and 8 for EU that apply directly to pigs.

NOVEL SWINE FEEDING PROGRAMS TO ENHANCE COMPETITIVENESS AND PORK DIFFERENTIATION: THE CANADIAN FEED & PORK VALUE CHAIN

PROJECT LEADERS

- **Ruurd Zijlstra, University of Alberta, Edmonton, Alberta**
- **Kees de Lange, University of Guelph, Guelph, Ontario**
- **Eduardo Beltranena, University of Alberta, Alberta**
- **Andrew Van Kessel, University of Saskatchewan, Saskatoon, Saskatchewan**

PROJECT OBJECTIVE

To develop knowledge to support a unique Canadian feed management strategy and feed ingredient database for optimum productivity that also considers nutrient excretion, reduced antibiotic use during the growth phase, and pork quality. This unique database combines digestibility and bioavailability trials and novel feedstuff analyses.

SUMMARY OF THE PROJECT

In this research program, underlying mechanisms of nutrient absorption, energetic efficiency, and nutrient interactions will be explored to **1)** support growth performance; **2)** produce uniform and consistent carcass quality; and **3)** support opportunities for product differentiation based on pork quality, reduced environmental footprint, reduced antibiotic use, etc. Collected data on feedstuff characteristics will be integrated into a growth model, and will be validated using performance trials in commercial swine facilities.

1. Feedstuff data
Novel feeding programs require novel feedstuff information. Reaching a predictable growth and carcass composition starts with a credible feedstuff database for feed formulation. New knowledge on digestible and net energy is required about the new co-products that have become available recently to reduce feed costs and control quality of pork products. Furthermore, starch digestion and fiber fermentation kinetics and the impact on intestinal microbiota, gut health, and environment (zoo-pathogens/nutrients) should be defined.

2. Model
New knowledge of nutrient digestibility and utilization in growing pigs described in mathematical equations will be integrated into an existing biological and dynamic pig growth model. This model demonstrates principles of nutrient utilization in growing pigs and evaluates the environmental and economic impact of alternative pig management strategies that reflect variation in feeding levels, feed ingredient composition, pig performance potentials and carcass grading schemes. Relationships between dietary fatty acid composition and pork fatty acid profiles will be represented.

3. Validation
Live animal performance and carcass and pork quality are the best validation tools available for assessing the effects of changing the feedstuff composition and formulation strategy of pig diets. To confirm that novel feeding programs result in unique pork quality and other value-added attributes, validation trials will be conducted with grower-finisher pigs under research and, ultimately, commercial conditions.

SIGNIFICANT ACHIEVEMENTS

FEEDSTUFF DATA

1. Co-product digestibility and enzymes
(Leader: Ruurd Zijlstra)
Co-product samples have been collected and screened for macro-nutrient profile. Samples of the first co-product, distillers dried grain plus solubles (DDGS) was subjected to enzyme treatment during in vitro fermentation. The matrix of the feedstuffs and residues was analyzed using microscopy.

2. Starch digestion and fiber fermentation
(Leader: Ruurd Zijlstra)
A feedstuff data set was collected for in vitro starch digestion kinetics.

3. Intestinal microbial composition
(Leader: Andrew Van Kessel)
A first experiment in pigs using a high protein "challenge" and combining with a fermentable fibre was completed. Analysis of colonic mucosa and digesta samples indicate that diets containing heat treated soybean meal as a model low quality protein promote protein fermentation in the colon increasing the abundance of putatively toxic fermentation products such as ammonia and biogenic amines. Protein fermentation was associated with increased expression of inflammatory markers in the colonic mucosa, which was not reduced by dietary inclusion of wheat bran and sugar beet pulp.

4. Liquid feeding of grower pigs – in vitro steeping and fermentation studies
(Leader: Kees de Lange)
A series of in vivo studies has been completed to establish optimum levels of fiber degrading enzymes and microbial inoculants to enhance the nutritional value of wheat shorts and DDGS. Some of these combinations are now being explored in pig performance studies (see 8.)

MODEL

5. Liquid feeding of grower pigs - Model development
(Leader: Kees de Lange)
An extensive review of the literature has been completed on amino acid and phosphorus requirement studies to further develop the representation of nutrient utilization in growing pigs. A least cost feed formulation system has been integrated in the biological pig growth model to allow for more effective assessment of the nutritional value of pig feed ingredients.

VALIDATION

6. Validation of the net energy value of wheat distillers dried grain with solubles (DDGS) for growing-finishing pigs under commercial scale conditions
(Leaders: Ruurd Zijlstra, Eduardo Beltranena)
Activity scheduled to begin autumn of 2011.

7. Increasing dietary inclusions of yellow-seeded, expeller-pressed, juncea canola meal on pig growth performance, carcass characteristics and lipid composition of pork grown under commercial scale
(Leaders: Ruurd Zijlstra, Eduardo Beltranena)
Activity scheduled to begin autumn of 2011.

8. Liquid feeding - pig performance studies
(Leader: Kees de Lange)
In liquid fed pigs, we observed limited response in using enzymes to enhance the nutritional value of wheat shorts. In contrast we observed positive and additive effects of fiber degrading enzymes and microbial inoculants for enhancing the nutritional value of corn DDGS for liquid fed growing-finishing pigs.

NOVEL NUTRITIONAL STRATEGIES FOR OPTIMUM SOW AND PIGLET PRODUCTIVITY

PROJECT LEADERS

- **Martin Lessard, Dairy and Swine R&D Centre, AAFC, Sherbrooke, Québec**
- **Kees de Lange, Department of Animal and Poultry Science, University of Guelph, Guelph, Ontario**
- **Ron Ball, Department of Agriculture, Food and Nutritional Science, University of Alberta, Edmonton, Alberta**

PROJECT OBJECTIVE

The ultimate goal is to develop unique Canadian feeding management strategies for optimum sow and piglet productivity, taking into consideration production efficiencies, including pig performance up to market weight, food safety, pig welfare and use of antibiotics. We shall investigate underlying mechanisms so that we capitalize on potential synergies between the different sow and piglet feeding strategies that are evaluated. Secondary goals are to further stimulate interactions among multidisciplinary (physiology, immunology, microbiology, nutrition) Canadian swine researchers in nutrition.

SUMMARY OF THE PROJECT

In this research project, various dietary means will be explored to:

1. Best meet the nutrient requirement of sows during gestation and early lactation,
2. Stimulate the development and health of the gut, immune function and productivity of nursing and newly-weaned piglets, and
3. Determine the long-term impact of post-weaning feeding strategies on growth performance and disease resistance up to market weight, as well as carcass and meat quality.

To achieve these objectives, a number of activities will be undertaken in several different provinces:

1. **The importance of in utero vs post-natal transfer of some vitamins and minerals in pig**
   Activity leader: Jacques Matte and Martin Lessard, AAFC, Sherbrooke, Québec.
   This activity is designed to evaluate the importance of in utero and post-natal transfer of some vitamins of the B complex and minerals such as Zn and Cu.
2. **Development of novel feeding strategies aiming to improve gut development, defense functions, health and performance of piglets**
   Activity leader: Martin Lessard. AAFC, Sherbrooke, Québec.
   This activity is designed to evaluate the influence of administering nutraceuticals (vitamins, trace minerals, nucleotides, essential fatty acids) and functional feed ingredients (cranberry, milk by-products, yeast-derived products, probiotics, prebiotics) during lactation and the peri-weaning period to best meet piglets needs according to their stage of development.

3. **Biomarkers to relate management of piglets post-weaning to subsequent growth performance, carcass and meat quality**
   Activity leader: Kees De Lange, University of Guelph, Ontario.
   This activity is designed to identify of the relationship of diet quality and use of antibiotics with starter pig performance, on performance up to market weight, carcass and meat quality, and response to an immune challenge. Also, this could help to develop of simple test on blood or selected tissues (biomarkers) that could be used to predict the impact of starter pig management on productivity of growing-finishing pigs, including susceptibility to disease challenges.

4. **Sow nutrition during gestation**
   Activity leader: Ron Ball, University of Alberta, Alberta.
   This activity is designed to obtain information on 1st, 2nd, 3rd and 4th limiting amino acids for sows and discreet values for the requirement of 3rd limiting amino acids for gestating sows. Also, this activity could help in identifying information on appropriateness of the phase feeding program and prepare a recommendation to the industry.

SIGNIFICANT ACHIEVEMENTS

1. **The importance of in utero vs post-natal transfer of some vitamins and minerals in pig**
   The animal phase of this project was completed in June 2011. The laboratory phase is in progress and completed at about 30%.

2. **Development of novel feeding strategies aiming to improve gut development, defense functions, health and performance of piglets**
   Animal experimentation is underway at the Dairy and Swine Research Centre (DSRC) as well as in a commercial condition. Animal experimentation in commercial conditions, lead by Frédéric Guay, will be completed by the end of December 2011. In this experimentation, animal performances are measured and blood and tissue samples are taken to evaluate the influence of dietary treatments on markers related to inflammation and oxidative status, integrity of intestinal mucosa and activity of digestive enzymes. The laboratory phase is also in progress. Overall, the project is completed at about 30%. The other sub-project realized at the DSRC and lead by Mr. Lessard, the animal phase is completed at about 50% and will be terminated by April 2012. Gut samplings and blood samples are taken to evaluate influence of treatments on intestinal bacterial populations and immune response in weanling pigs. Overall, the project is completed at about 25%.

3. **Biomarkers to relate management of piglets post-weaning to subsequent growth performance, carcass and meat quality**
   Feeding rather simple, corn and soybean meal based diets to nursery pigs reduced post-weaning growth performance, but had no long-term effect on growth performance in the growing-finishing phase, days from weaning to market and carcass characteristics. Therefore, a reduction in feed costs may be obtained in the nursery phase by feeding less complex diets without compromising subsequent growth performance and carcass value. Further research is underway to explore the impact of nursery feeding program on measures of gut development, changes in gut microflora, and bio-markers (blood metabolites and gene expression). These aspects of animal physiology may be used to estimate the impact of nursery feeding program on short and long-term changes in pig growth performance.

4. **Sow nutrition during gestation**
   The experimental determination of the order of amino acid limitation in late pregnancy is completed. Reducing dietary threonine by 60% compared to an adequate control diet increased indicator amino acid oxidation and reduced plasma free threonine more than deletions of lysine, tryptophan or branched-chain amino acids. This suggests that in late pregnancy threonine is likely the first limiting amino acid, and that diet formulation needs to consider threonine as well as lysine.

   The determination of the requirement for the third-limiting amino acid, tryptophan, in early and late gestation is in progress. The animal work has been completed and preliminary results indicate that late gestation requirement is 50% greater than early gestation requirement.

EFFICACY OF FEED ADDITIVES TO MITIGATE THE NEGATIVE IMPACTS OF MYCOTOXIN CONTAMINATED FEED ON THE PERFORMANCE AND HEALTH OF PIGLETS

PROJECT LEADERS

- **Frédéric Guay, Laval University, Québec, Québec**
- **Martin Lessard, Agriculture and Agri-Food Canada (AAFC), Sherbrooke, Québec**
- **Younès Chorfi, University of Montréal, Faculty of Veterinary Medecine, St-Hyacinthe, Québec**

PROJECT OBJECTIVE

Develop a protocol to evaluate the efficacy of feed additives available in Canada to attenuate the toxicity of naturally contaminated grains that may contain more than one mycotoxin and to mitigate the negative impact of mycotoxins on pig immune and intestinal functions.

SUMMARY OF THE PROJECT

The project aims to develop quick indicators of mycotoxin exposure that allow early detection of mycotoxicosis in live animals by the way of a simple blood or urine sample. The effects of mycotoxin contaminated feeds on immune and vaccinal responses in weaned piglets will be evaluated together with an in vitro and in vivo study of the effects of mycotoxins on viral replication of PCV2 and PRRS in connection with the mycotoxin exposure. Researchers will also evaluate the effects of mycotoxin contaminated feeds on: **1)** barrier integrity and function of the intestine, including digestive enzyme activities; **2)** digestibility and retention of nutrients. Finally, a protocol will be developed to evaluate the efficacy of feed additives available in Canada to attenuate toxicity of naturally contaminated grains that may contain more than one mycotoxin and to mitigate the negative impact of mycotoxins on pig performances.

SIGNIFICANT ACHIEVEMENTS

Animal experimentation is underway in order to determine effects of vomitoxin (DON) contaminated feed on susceptibility to viral infections (circovirus, PRRSV) and on immune response in piglets. Furthermore, total of two (2) in vitro experiments were carried out by the University of Montreal research team. These experiments are precursors to the actual in vivo experiments. Another experiment began in September 2011 to assess the effect of DON and different "binder" of mycotoxins on digestion and nutrient retention in piglets. The experiment was conducted with five groups of 12 piglets and was completed in December 2011. So far, we have collected various blood, faeces and urine samples and note the different growth parameters (ADG, ADFI, G:F). Analyses of these samples began and the first results should be available in May 2012.

MYCOTOXINS CONTENT EVALUATIONS OF CORN HYBRIDS ADAPTED TO QUÉBEC GROWTH CONDITIONS

PROJECT LEADERS

- **Gilles Tremblay, CEROM, Saint-Mathieu-de Beloeil, Québec**
- **Sylvie Rioux, Centre de recherche sur les grains inc. (CEROM), Québec, Québec**

PROJECT OBJECTIVE

The main objective of this research is to determine, under natural disease pressure, whether there are any differences between hybrids (Genotype effect, G) in grain content levels of four different mycotoxins (Deoxynivalenol, fumonisin, zearalenone and T-2 toxin) in 3 different environments (Environment effect, E). G x E interactions will also be evaluated.

SUMMARY OF THE PROJECT

In collaboration with Réseau grandes cultures du Québec (RGCQ), corn trial managers will collect representative samples of grain corn at harvest and dry the samples before submitting them to the laboratory for analyses. After that, the relationship between mycotoxin contents and physiological maturity of the hybrids will be determined using the method developed by Tremblay et al. (2008).

The effectiveness of a fungicide application on mycotoxin grain content among 24 different hybrids will also be evaluated. This test will be carried out on 2 sites for the next 2 years. This test has been done before, in 2009. Grain samples from the 2009 plots are available and mycotoxin analyses on these grains will be of particular interest because climatic growing conditions in 2009 were highly conducive to the development of the fungi that eventually lead to mycotoxin contamination.

Because the weather in 2009 was conducive to the development of many diseases, it will be interesting to perform analyses on grain corn from that particular RGCQ harvest. The crop will be analyzed for mycotoxin content.

SIGNIFICANT ACHIEVEMENTS

A total of 1486 samples have been collected and analysis of the four (4) toxins (DON, FUM, ZEN and T-2) was performed for a total of 4058 analyses. Toxin analysis of 24 genotypes was performed for the 384 samples and the statistical analysis performed for 3 of 4 sets (288 samples). RGCQ corn samples collected in 2009 at Princeville site and St-Mathieu-de-Beloeil have been analyzed for the four (4) toxins and statistical analyses performed; no genotype effects were observed. Results of the 2010 experiment showed a significant genotype effect on DON at St-Mathieu-de-Beloeil trial and for DON, ZEN and T-2 at the Princeville trial.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CAPTURING GENETIC MERIT IN DIFFERENTIATED PORK PRODUCTION SYSTEMS THROUGH GENOMICS

PROJECT LEADER

George Foxcroft, University of Alberta, Edmonton, Alberta

PROJECT OBJECTIVE

Demonstrate that alignment of the excellent genetic potential of Canadian dam-line sows with management strategies that recognize the origins of major variation in phenotypic traits of terminal line litters and provides major competitive advantages to Canadian pork producers.

SUMMARY OF THE PROJECT

There will be collaboration with production systems and their genetic suppliers to collect large phenotypic datasets on crossbred sows (commercial genotypes) to characterize the repeatability of the G x E interaction driving differences in litter birth weight over successive parities. This project will provide the basis for establishing "High vs. Low" sow populations that allow, **1)** estimates of achievable differences in production efficiency and product differentiation, and **2)** linkages between phenotype and genotype to be understood through new generation genomic applications.

The key objectives of the project are:

1. To investigate if litter birth weight is a repeatable phenotypic trait in commercial sows.
2. To investigate effects of high versus low birth weight litter of origin on piglet lean growth performance in the nursery and grow-finish periods, and estimated carcass value.
3. To develop effective phenotypic traits and in vitro measures of the immune status of birth litters.
4. To describe the component biological traits of sows in early gestation that are functionally linked to a predicted High/Low litter birth weight phenotype, and to use ovarian, embryonic, placental, and endometrial tissues from these sows to explore the genetic and epigenetic basis for phenotypic variation

SIGNIFICANT ACHIEVEMENTS

Data collection and data analysis from two populations of commercial sows confirmed that litter birth weight is a repeatable phenotypic trait in commercial sows. Preliminary analysis of effects of high versus low litter birth weight on piglet lean growth performance in the nursery and grow-finish periods and estimated carcass value confirms negative effects of low litter birth weight on growth performance, particularly at the nursery and grower stages of production.

DEVELOPMENT OF NEW GENOMIC TOOLS TO IMPROVE MEAT QUALITY TRAITS AND PRODUCTION EFFICIENCY IN PIGS

PROJECT LEADERS

- **Brian Sullivan, Canadian Centre for Swine Improvement Inc (CCSI), Ottawa, Ontario**
- **Mohsen Jafarikia, Canadian Centre for Swine Improvement Inc (CCSI), Ottawa, Ontario**

PROJECT OBJECTIVE

Develop new genomic tools to improve meat quality traits as well as enhance product differentiation and efficiency of pork production.

SUMMARY OF THE PROJECT

Canadian Centre for Swine Improvement (CCSI) and Canadian swine genetic organizations are collaborating to evaluate a new genomic tool that has been available to the Canadian swine industry since January 2009 – the 60K SNP (single nucleotide polymorphism) panel. The SNP panel and its practical application are being evaluated in major Canadian swine breeds. Two station-test trials were conducted: Test 27 (April 2010) and Test 28 (November 2010). Pigs entering the test station were evaluated for growth, feed conversion, feeding behaviour, conformation and extensive meat quality measurements, as well as genotyped using the 60K SNP panel. Associated biochemical measures were also collected. Additionally, on-farm phenotypic data measured on relatives of station-tested pigs (more specifically: sires, dams and full-sibs) and DNA samples were and will continue to be collected by participating breeders to increase the size of the resource population and provide additional data for further genomic analyses.

This is a unique opportunity provided by the Swine Science Cluster initiative to build a work team focused on developing new genomic tools to improve meat quality traits, enhancing product differentiation and improving the efficiency of pork production. This will be especially useful for traits that are difficult and/or expensive to measure such as meat quality.

SIGNIFICANT ACHIEVEMENTS

Over 6900 tissue samples were collected in-station and on-farm. This includes: 706 blood samples, 1280 ear tags, 314 semen samples and 4622 tail tags that were sent to DNA LandMarks for storage in the 'DNA repository'. The 60K genotypes of the 631 station-tested pigs and 81 sires and dams of station tested pigs were loaded into the CCSI database for analysis. Individual monitoring of pigs from the nursery phase to the end of the growing phase via electronic IDs was performed during station tests. A total of 671 animals had growth and feed intake collected during the station tests.

Data records from 635 station-tested animals were included in subsequent analyses and a total of 635 animals were slaughtered in batches over a 6-week period. Carcass and meat quality traits were recorded at the plant. The carcass traits included: reconstituted half carcass weight, loin eye area, half carcass length, leg weight, loin weight, shoulder weight, belly weight, leg yield, loin yield, shoulder yield and belly yield.

Conformation scores for the following traits were recorded on station-tested pigs at Deschambault: Number of functional teats, number of total teats, locomotion, scores for feet and legs including pasterns and toes as well as ham and loin conformation scores. In total, more than 15 traits related to conformation were evaluated. A total of 194 Duroc,

196 Landrace and 246 Yorkshire pigs had conformation scores collected at the test station (total of 636 pigs). A total of 1592 relatives of station-tested pigs had teat count records collected on farms.

Sow productivity data was collected on dams, full-sisters and half-sisters of station-tested pigs. A total of 29323 litter records collected on 5060 on-farm female relatives (dams, half-sibs and full-sibs) were loaded into the CCSI database. The number of litters for dams, full-sibs and half-sibs is expected to continue to accumulate throughout the project.

Meat quality measures on 622 station tested pigs were collected at the plant and loaded in the CCSI database. AAFC collected muscle tissues on carcasses at the plant within 48 hours after slaughter. The parameters measured at FRDC are: muscle glycolytic potential, citrate synthase, lactate dehydrogenase and malic enzyme activities, myofibrillar fragmentation index, shear force, water loss as well as proximal analyses for humidity, fat and protein. The analyses on meat samples for pigs from test 27 (n=329) were completed for all parameters listed above. Meat sample analyses from test 28 pigs (n=295) are underway. Shear force and glycolytic potential analyses were completed. The myofibrillar fragmentation index was measured on 133 pigs. The proximal analyses for humidity fat and protein have been completed for 115 of the 295 pigs from test 28 and enzymatic activities analyses were started recently started (n=10 out of 295). Muscle fiber typing (I, IIA, IIX, IIB) was completed for 78 pigs identified as candidates for gene expression analyses.

The genotyping of eight SNPs in the ADIPOQ, ADIPOR1 and ADIPOR2 genes of 622 station-tested pigs were received at CCSI and were loaded into the CCSI database.

Station-tested pigs were genotyped for known markers (CAST, PRKAG3, MC4R, CPT1A, ESR, CCR7, HMGA1 and IGFBP1) and the results were loaded into the CCSI database in July 2011.

Preliminary data analyses on SNPs from the 64K SNP panel were carried out. Minor allele frequencies of SNPs, Hardy-Weinberg equilibrium as well as linkage disequilibrium between SNPs in the breeds under study were investigated.

Approaches on genomic evaluation were investigated and preliminary association analyses in backfat on the Yorkshire breed were carried out using SNP data collected from the current project and from previous ones as well. Additional preliminary analyses were carried out in the Yorkshire breed with regards to number of piglets born.

TECHNOLOGY TRANSFER REPORT

The objective of the technology transfer activities is to ensure research results are adopted at the farm level and that the benefits of this research are clearly demonstrated. The Prairie Swine Centre and the Centre de développement du porc du Québec inc. are in charge of the technology transfer activities.

Throughout the past year, the technology transfer strategy has focused on the development and preparation of the communication plan, including identifying preliminary results for research projects.

COMMUNICATION STRATEGY

The primary goal of the Technology Transfer program is to increase adoption of research results by pork producers through effectively communicating research results. Therefore, an individualized communications plan will be developed for research projects, each highlighting the near-market application to the pork industry.

A communication strategy was developed and approved by the Board of Directors. The basics of the strategy are outlined below:

- The strategy is based on a number of communication goals: efficient corporate communication, communicating research results, ensuring that some of the technology developed is implemented at the farm level and that the work done by Swine Innovation is recognized by industry, government and the general public.
- All communication channels will be used: face to face meetings, electronic and printed material.
- To encourage adoption, several target audiences have been identified. In order of importance, they are: the pork producers, feed mills, veterinarians, genetic specialists, government, and service organizations that support the pork industry.

The effectiveness of the Technology Transfer plan will be measured through the number of communication activities initiated, the level of involvement for activities, and the level of adoption of projects throughout the pork industry (measurable benefits at the farm level).

2010-2011 ACTIVITIES

FACE TO FACE AT CONFERENCES

It was felt that Swine Innovation should increase its visibility at certain activities taking place across Canada. A schedule of events was prepared. Ten conferences, seminars and congresses have already been included in the schedule.

ANNUAL SEMINAR

Starting in 2012, Swine Innovation will hold an annual seminar where available research results will be presented to the industry. The first annual seminar is to take place at the Banff Pork Seminar in January 2012. The nutrition workshop will feature three funded projects and provides an opportunity to highlight Swine Innovation's research program. The topics of the workshop will be related to lowering production costs and focusing on nutrients to meet changing requirements.

ELECTRONIC

Two domain names were created: swineinnovation.ca and innovationporc.ca. The preliminary steps in building the website were completed. Functionalities and technical specifications have been identified.

While the official website is being set up, two temporary corporate websites have been built and are now online. These sites can be viewed at: **www.swineinnovation.ca** (English) and **www.innovationporc.ca** (French).

PRINTED

Two pull-up banners, featuring Swine Innovation, its mission and objectives, were designed in each of the two official languages. The banners will be displayed at all major industry gatherings from fall 2011 to spring 2013.

A corporate brochure, describing the location of all the research organizations and the private partners participating in our research program, was created. This brochure also includes a list of the projects funded by our research program.

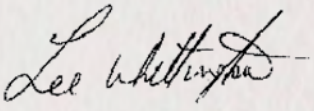
A summary of each of the 14 research projects was prepared explaining the content and potential practical outcome of each project. Two poster-type documents were produced illustrating the successes of our program.

CONCLUSION

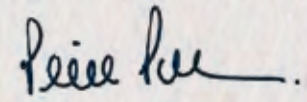
In the past year, a manager-technology transfer joined the team. The addition of this professional will ensure that the early research results are efficiently transferred to the farm.

A key piece of our strategy is the preparation and implementation of the Lead User Program. This program is designed to demonstrate the results of certain funded technologies along with their returns on cost of production and/or product differentiation.

Lastly, the new website will be available soon and will be central to our communication plan as the primary means of transmitting pertinent information from researchers to producers.



Lee Whittington
President & CEO
Prairie Swine Centre



Pierre Falardeau
General Manager
Centre de développement du porc du Québec inc.

TECHNOLOGY TRANSFER TEAM

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Manager – Technology Transfer
Swine Innovation

ABIDA OUYED
Research Coordinator
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PIERRE FALARDEAU
General Manager
Swine Innovation

LEE WHITTINGTON
President & CEO
Prairie Swine Centre

SUSAN JOYAL Research Coordinator – Western Canada, Swine Innovation *(absent)*

OUR RESEARCH PROGRAM

AROUND THE WORLD

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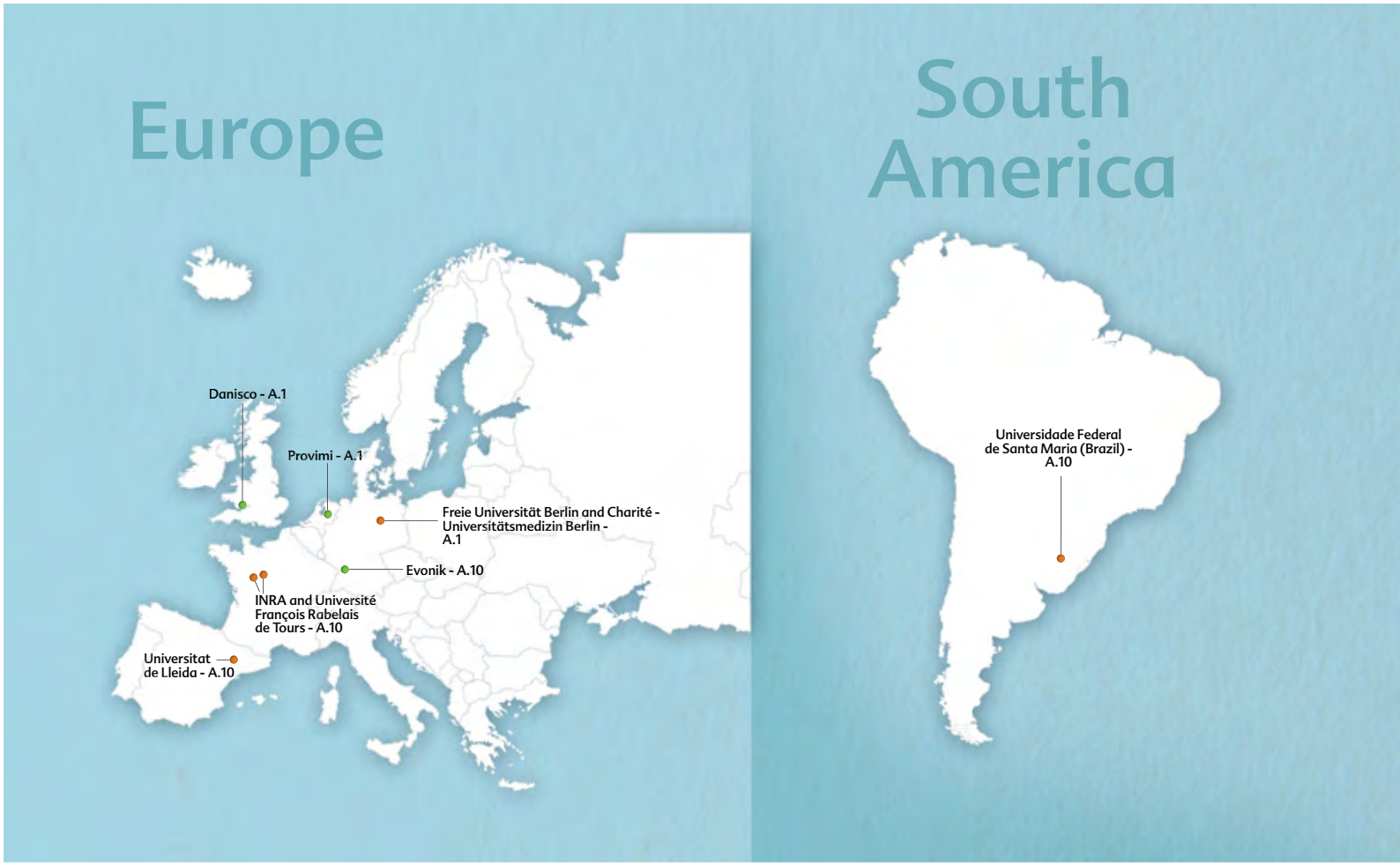
- Universities and Research Centres
- Agriculture and Agri-Food Canada
- Financial Contributors

Canada



ABBREVIATIONS

AAFC: Agriculture et Agri-Food Canada
CCSI: Canadian Centre for Swine Improvement Inc.
CDPQ: Centre de développement du porc du Québec inc.
CÉROM: Centre de recherche sur les grains inc.
CFIA: Canadian Food Inspection Agency
CRIQ: Centre de recherche industrielle du Québec
FPPQ: Fédération des producteurs de porcs du Québec
INRA: Institut national de la recherche agronomique
IRDA: Institut de recherche et de développement en agroenvironnement
OMAFRA: Ontario Ministry of Agriculture, Food and Rural Affairs
PAMI: Prairie Agricultural Machinery Institute
PIC —North America: Pig Improvement Company

The Canadian Swine Research and Development Cluster was officially incorporated without share capital under Part II of the Canada Corporation Act. Its objectives are to facilitate research, technology transfer and commercialization initiatives designed to enhance the competitiveness and differentiation of Canada's pork industry; it is aligned with the four pillars of the Canadian Pork Value Chain Strategic Framework. The Canadian Swine Research and Development Cluster is funded through the Growing Canadian Agri-Innovations Program — Canadian Agri-Science Clusters Initiative and also receives financial support from the private sector and other provincial government organizations. Our program comprises 14 research projects focused on reducing the cost of production and product differentiation and also includes three technology transfer initiatives.

SUB-PROJECT A: INCREASING CANADIAN PORK INDUSTRY COMPETITIVENESS

A.1: Novel swine feeding programs to enhance competitiveness and pork differentiation: The Canadian feed & pork value chain (R. Zijlstra et al.)

A.2: Novel nutritional strategies for optimum sow and piglet productivity (M. Lessard et al.)

A.3: Efficacy of feed additives to mitigate the negative impacts of mycotoxin contaminated feed on the performance and health of piglets (F. Guay et al.)

A.4: Mycotoxins contents evaluations of corn hybrids adapted to Québec growth conditions (G. Tremblay et al.)

A.5: Capturing genetic merit in differentiated pork production systems through genomics (G. Foxcroft et al.)

A.6: Development of new genomic tools to improve meat quality traits and production efficiency in pigs (B. Sullivan et al.)

A.7: Evaluation and development of standards for swine production systems (L. Whittington et al.)

A.8: Sow Housing: risk factors and assessment techniques for lameness, productivity and longevity in group and individually housed gestating sows (L. Connor et al.)

A.9: A study on the efficiency of water sprinkling in the truck after loading and prior to unloading at two different environmental temperatures on core body temperature and carcass and meat quality in pigs (L. Faucitano et al.)

A.10: Development of an innovative precision farming system for swine (C. Pomar et al.)

SUB-PROJECT B: INCREASING CANADIAN PORK INDUSTRY DIFFERENTIATION

B.11: A comparison of three animal welfare assessment programs on Canadian swine farms (T. Widowski et al.)

B.12: Use of non-penetrating captive bolt for euthanasia of neonate, suckling and weaned piglets up to 9 kg (T. Widowski et al.)

B.13: Development of an innovative air cleaning system for swine buildings (S. Lemay et al.)

B.14: The use of tools related to molecular characterization, systemic analysis of stakeholders and geomatics for identification of the principal vectors and contamination sources by bacteria and viral indicators at farm and slaughterhouse level (A. Letellier et al.)

SUB-PROJECT C: IMPLEMENTATION OF TECHNOLOGY TRANSFER STRATEGIES

C.15: Annual technical seminar and mycotoxin forum

C.16: Development of a Canadian Swine Research and Development (CSRDC) website

C.17: Knowledge and technology transfer activities

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Mr. Laforest is a physiologist and Chairman of the Science Advisory Body with research interests that include meat quality and swine production.

M. Laforest est physiologiste et président du comité de révision scientifique; ses intérêts de recherche comprennent la qualité de la viande et la production porcine.

RON BALL
Professor / *Professeur* University of Alberta

Mr. Ball is involved in swine nutrition research. He also worked at the University of Guelph for 16 years. He leads research on meat quality and is member of the Boards of the National Institute of Health (NIH) and the Natural Sciences and Engineering Research Council (NSERC).

M. Ball est impliqué dans la recherche sur l'alimentation des porcs. Il a également travaillé à l'Université de Guelph pendant 16 ans. Il mène des recherches sur la qualité de la viande et, de plus, est membre des conseils de National Institutes of Health (NIH) et du Conseil de recherches en sciences naturelles et en génie du Canada (CRSNG).

BILL BALLANTYNE
Consultant

Mr. Ballantyne holds a PhD in Food Science from Michigan State University and is presently a consultant for the pork industry. As well, he has been involved with Maple Leaf Foods for a number of years.

M. Ballantyne est titulaire d'un doctorat en sciences alimentaires du Michigan State University et est actuellement consultant pour l'industrie du porc. En outre, il travaille avec les Aliments Maple Leaf depuis de nombreuses années.

STEVE DRITZ
Professor / *Professeur* Kansas State University

An accomplished veterinarian, Mr. Dritz holds a PhD in swine nutrition and has been a professor for the past 15 years. He is one of the leading researchers dedicated to increasing weaning age in piglets in the United States.

Vétérinaire accompli, M. Dritz est titulaire d'un doctorat en nutrition porcine et est professeur depuis quinze ans. Il est l'un des chercheurs qui est dévoué à l'augmentation de l'âge au sevrage des porcelets aux États-Unis.

SYLVAIN FOURNAISE
Vice-President / *Vice-président*
Food Safety and Technical Services / *Sécurité alimentaire et services techniques* Olymel

Mr. Founaise is a veterinarian who also obtained his M.Sc. in Food Science from Université Laval. He has been working for Olymel for the past 12 years and is responsible for food safety, quality management and regulations. He also manages collaborative research projects between Olymel and third-party university scientists and research centres.

M. Fournaise est un vétérinaire ayant également obtenu une maîtrise en sciences alimentaires de l'Université Laval. Il travaille chez Olymel depuis 12 ans et est responsable de la sécurité alimentaire, de la gestion de la qualité et des règlements. Il gère également des projets de recherche en partenariat avec des tiers tels que des scientifiques universitaires et des centres de recherche.

JOHN F. PATIENCE
Associate Professor / *Professeur agrégé*
Iowa State University

Mr. Patience worked many years at the Prairie Swine Centre but now resides in the United States. He has served on Natural Sciences and Engineering Research Council (NSERC) panels.

M. Patience a travaillé de nombreuses années au Prairie Swine Centre, mais réside maintenant aux États-Unis. Il a siégé à de nombreux panels du Conseil de recherches en sciences naturelles et en génie.

SERGE POMMIER
Technical Account Manager / *Gestionnaire de compte technique* PIC

Mr. Pommier has been a technical account manager for PIC (Eastern Canada) for the past 16 years. He holds a PhD and for several years before joining PIC, he worked at the Meat Science Centre of Agriculture and Agri-Food Canada.

M. Pommier est gestionnaire de compte technique de PIC (Est du Canada) depuis 16 ans. Il détient un doctorat et, pendant plusieurs années avant de rejoindre PIC, il a travaillé au Centre de recherche sur la qualité du produit d'Agriculture et Agroalimentaire Canada.

JOHN WEBB
Director of Genetics and Science / *Directeur de la génétique et de la science* Les Aliments Maple Leaf Inc.

Mr. Webb obtained his PhD at Edinburgh University in Scotland and worked for a number of years in swine research at the Roslin Institute of the same university. He is presently Director of Emerging Science at Maple Leaf Foods and is also involved in the Pork Value Chain Roundtable.

M. Webb a obtenu son doctorat à The University of Edinburgh en Écosse et a travaillé pendant plusieurs années en recherche porcine au Roslin Institute de cette même université. Il est actuellement directeur des sciences émergentes chez Les Aliments Maple Leaf Inc. et est également impliqué au sein de la Table ronde sur la chaîne de valeur du porc.

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PARTENAIRES FINANCIERS

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