

Ontario Pork Research

Jean Howden, Ontario Pork

Ontario's pork producers invests 20 cents from each hog marketed into research equaling approximately one million dollars a year. The research committee is made up of producers, veterinarians and industry representatives that are active in our industry.

The committee reviews millions of dollars in research proposals each year. They recommend funding to only those proposals with merit to producers and the industry, while not duplicating other research initiatives.

Projects funded by Ontario's pork producers have improved our understanding of animal husbandry, the environment, nutrition, genetics and reproduction, as well as food safety and meat quality.

For the past three years, Ontario Pork has published a magazine called Pigs, Pork and Progress which highlights the research and results producers have funded. This has been mailed with Better Pork to all pork producers. Results are also available on the Ontario Pork website and in the Ontario Pork newsletter.

Research serves as the fundamental building block for the advancement of our industry and is the cornerstone of the industry's success.

A complete list of funded research is available at www.ontariopork.on.ca/issues/research/index.htm

Funded Projects

Primary Priority: Animal Welfare

Project No.06/02 Researcher: Harold Gonyou

Title: Effects of handling procedures at loading and of the transport vehicle design on the welfare of meat quality of pigs

Synopsis: This is a collaborative project involving multiple research groups in major pork producing provinces focusing on handling stress and transport conditions on trucks, their effects on animal welfare and pork quality. Alternative methods of handling and transport design will be developed and assessed.

Project No.: 06/01 **Researcher:** Kathy Zurbrigg

Title: Pressure lesions: The use of human pressure measurement systems to determine the type of farrowing crate flooring that promotes fewer sow shoulder lesions

Synopsis: Sows will be placed in the farrowing crate with a specific type of flooring (one of the following: solid cement, solid rubberized cement, cast iron, tri-bar slats) for one- 24 hour period and the pressures exerted on the bony prominence of the shoulder bone while lying laterally will be measured and recorded. On the second day a 2'x2' rubber mat (3/4" - 1" thick) will be installed over the flooring and another 24 hour period of pressure measuring will be recorded. A video camera will record the sow's resting behaviour during the 24 hour period. Pressures will be measured using a pressure mapping system that is used in human medicine for the prevention of pressure ulcers.

Project No.: 06/54 **Researcher:** Lee Whittington

Title: Livestock Issues Resource Centre

Synopsis: Bringing order and accessibility to the large and growing body of information available on key issues facing the future of the pork industry. This is accomplished through summarizing of peer reviewed papers, conference proceedings and popular press articles, condensed into 250-

500 word summaries and available on line through an easy to use searchable database.

Primary Priority: Environment

Project No.: 06/57 **Researcher:** David Rudolph

Title: Monitoring of Selected Hog Farms to Assess the Impacts of Implemented BMPs Resulting from the Nutrient Management Act - Phase II

Synopsis: The objectives of the research is to evaluate the effectiveness of BMPs in reducing impacts on water quality with respect to land applications of swine manure. To instrument and investigate three selected farm sites to provide the baseline hydrogeological and water quality data necessary to evaluate recent and future changes in nitrate concentrations in the subsurface soils and groundwater. The focus is on a farm where half of a field receiving manure has received only commercial fertilizer since the 1990's and so represents a unique opportunity to evaluate the side-by-side impacts of nitrate on a shallow aquifer used for a drinking water well. The Nutrient Management Act may require the use of BMP's for land application of manure to improve the environment but there is a lack of long-term field studies to evaluate how quickly and to what extent we can expect the improvements. This study will help answer those questions and provide a basis for better and more cost effective monitoring protocols and strategies by recommending the type of and frequency of monitoring

Project No.: 06/46 **Researcher:** TieQuan Zhang

Title: Agronomic and Environmental Evaluation of Nutrients in Low-Phosphorus Manures

Synopsis: Excessive excretion of phosphorus in pig manure is a leading nutrient management and environmental issue facing the Ontario pork industry. New technologies of diet supplemental phytase and phytase Enviropig™ offer unique approaches to enable pork farms to maintain and even increase the pig production without affecting or even with reducing the impacts of the industry

on environment and on the rural community. It is essential to characterize and evaluate the agronomic and environmental impacts of low-P manure nutrients from pigs treated with these new technologies for efficient use of manure nutrients with minimal pollution. Part of our studies conducted in the past indicate that Enviropig™ manure 1) reduces both immediate soil P loss after application and long-term soil P build-up; 2) is more suitable to meeting crop nutrient needs due to a better N:P ratio; 3) increases soil water use efficiency and enhances plant growth and dry matter production.

Project No.: 06/55 **Researcher:** Bill Van Heyst

Title: Environmental Characterization of Dead Animal Disposal Methods

Synopsis: This is the second year of a two year study to assess the environmental impact of on-farm cremation and deadstock composting. The fate of sulfa-based drugs during the composting process will be determined. The project will provide sound scientific results for the environmental impact of on-farm cremation and deadstock composting that can be used for policy decisions by stakeholders

Project No.: 06/52 **Researcher:** Bonnie Ball-Coelho

Title: Manure Application Systems for Corn

Synopsis: This project addresses Ontario Pork's research priority on improving handling of liquid manure to avoid possible contamination of the environment by evaluating, developing or improving techniques for applying manure. Specific objectives are: 1. Compare the agronomic value, nitrogen use efficiency and environmental impact of liquid hog manure application systems (zone injection, surface application, surface application followed by incorporation, manure injection @ 75cm spacing, manure injection @ 37cm spacing, Aerway system, and side-dress injection) across differing soil types, and times of application (late summer, fall, and spring). 2. Determine the influence of pre and post manure application tillage on the transport of E. coli, nitrogen and phosphorus in surface and ground water, and survival of pathogens in the soil, groundwater and tile drainage systems.

Project No.: 06/47 **Researcher:** Simon Yang

Title: Remote Monitoring and Analyzing Pork Farm Odour Using Wireless Sensors and an Odour Dispersion Model

Synopsis: This project will conduct both theoretical and practical investigation of odour monitoring and odour reduction for Ontario pork production, by developing a wireless sensor network, and developing an odour dispersion model based on farmstead factors and meteorological data of Ontario pork farms. A software will also be developed to give suggestions on possible odour control strategies, and predict the resulted odour impact area.

Primary Priority: Food Safety

Project No.: 06/07 **Researcher:** Robert Friendship

Title: Tetracycline residue in pig bones causing yellowing

Synopsis: The research is to determine: whether the yellow colour of bones is a predictor of the level of tetracycline present in bone or other tissues & further to determine the

risk factors associated with the yellowing of bones. One experiment will involve providing pigs to a variety of tetracycline exposures, varying the drug, the dosage and the length of administration and then analyzing the tetracycline level in bones and tissue and the degree of yellowness of the bones. Samples will also be obtained from abattoirs if animals with unacceptable bone discoloration are found. A survey of tetracycline use and risk factors will also be conducted

Project No.: 06/08 **Researcher:** Jerome del Castillo

Title: Effects of age, dose and treatment duration on the accumulation of chlortetracycline in bones of growing pigs

Synopsis: Objectives of the Research 1. To compare bone accumulation of feed-administered chlortetracycline in growing pigs, as a function of age at the onset of the dosing regimen, dose, and dosing duration. 2. To compare the time-course of chlortetracycline fluorescence in bone of pigs after cessation of drug therapy, as a function of age at the onset of the dosing regimen, dose, and dose duration. 3. To develop imagery method for the non-invasive assessment of chlortetracycline accumulation and depletion in bone in growing pigs. Addressing the first two objectives of this project will help identify whether there exists a critical age, dose or treatment duration that increases significantly the risks of unacceptable bone stains. This new information will improve on short term the design of dosing regimens with in-feed tetracyclines, from which a majority of pork producers will benefit. The third objective of this study will provide a tool for repeated-measure assessments of tetracycline accumulation, which will enable on mid term the investigation of dietary or environment factors that affect the load of tetracyclines in the bone.

Project No.: 06/06 **Researcher:** Keith Warriner

Title: Bacteriophage based interventions to reduce the dissemination of Salmonella in pork production

Synopsis: To develop and evaluate the efficacy of bacteriophage based treatments to eliminate Salmonella from pig housing environments. Salmonella infecting bacteriophage will be isolated from Ontario pig farms. The host-range of isolated phages will be assessed in addition to the ability to replication and survival in the pig environment. The success of phage treatment will be assessed using pigs artificially infected with Salmonella.

Primary Priority: Herd Health

Project No.: 06/09 **Researcher:** Julang Li

Title: Production of epidermal growth factor expressing Lactococcus Lactis and its potential for enhancing early-weaned piglet growth

Synopsis: The objective of the project is to generate Lactococcus Lactis that secrete epidermal growth factor and to test their potential for enhancing early-weaned piglet growth. Diarrhea and the associated reductions in growth rates during the period immediately after weaning is one of the major problems in nursery pig management. Developing a diet to stimulate intestinal development of early weaned pigs may help to optimize their performance in this critical stage. Epidermal growth factor (EGF) is known to stimulate the development of intestine and its supplementation into

formulas was shown to facilitate the recovery of intestines in piglets from rotavirus infection. We hypothesized that locally deliver EGF to the GI tract using food-grade *Lactococcus Lactis* may be beneficial for improving early-weaned piglet performance. We will use a genetic engineering approach to generate *Lactococcus Lactis* that secretes epidermal growth factor and test if including these EGF delivering bacteria into feed enhances piglet intestinal development, and thus, early-weaned piglet performance.

Project No.: 06/11 **Researcher:** Tony Hayes

Title: Defects in innate disease resistance genes in Ontario swine

Synopsis: To identify defects in genes responsible for increased susceptibility of young pigs to various common economically important infectious diseases. The researchers are developing genetic (DNA) tests for defects (mutations) in six innate resistance genes that normally help to protect young pigs from various important infections. These studies will determine if particular genotypes have better health and production due to lower frequency or severity of common respiratory, gut or systemic infections.

Project No.: 06/13 **Researcher:** Andrew Peregrine

Title: Evaluation of the prevalence of coccidia in Ontario suckling piglets and identification of a preventive treatment

Synopsis: The objectives of the research are: • To determine the proportion of suckling piglets that is infected with coccidia and the impact of coccidia on piglet health. • To identify an effective and practical preventive treatment for coccidia in piglets. The importance of coccidia will be determined on 20 farms with a diarrhea problem in suckling piglets at greater than 7 days of age by examining feces and monitoring growth rates of piglets. Swine veterinarians will be surveyed for the preventive treatment they recommend for coccidia. The most practical regimen will be evaluated in a clinical trial.

Project No.: 06/15 **Researcher:** Robert Friendship

Title: Case-Control Study of Porcine Circovirus Type 2 - associated disease outbreaks in Ontario

Synopsis: This project will be designed as a case-control observational study using 25 farms with a history of clinical Porcine Circovirus type 2 (PCV2) associated disease in the past year and 25 matched control farms without a diagnosis of PCV2 disease problems. A survey will be conducted to examine for risk factors and samples will be taken in order to test for concurrent diseases as well as to determine the PDR-RFLD type of circovirus present

Project No.: 06/16 **Researcher:** John Pasick

Title: Development of a rapid test for detecting serum antibodies to classical swine fever virus

Synopsis: Development of an antibody test for classical swine fever will be developed using recombinant DNA and monoclonal antibody technologies. The test will be validated using a library of serum samples collected from pigs experimentally infected with various classical swine fever viruses. If the test is successful it will be transferred to member laboratories of the Canadian Animal Health Surveillance Network.

Project No.: 06/17 **Researcher:** Hugh Cai

Title: Development of a microarray-based assay for rapid and simultaneous detection and molecular typing of multiple swine respiratory pathogens

Synopsis: Porcine respiratory disease complex is a major concern for pork producers in Ontario and is caused by various combinations of porcine reproductive and respiratory disease syndrome virus (PRRSV), swine influenza virus (SIV), and *Mycoplasma hyopneumoniae*, and usually is complicated by type 2 circovirus (PCV2) and other bacteria. The current individual based tests (culture, PCR, or IHC) are time consuming and labor intensive. The researchers propose to develop a microarray-based diagnostic assay for the detection of multiple swine respiratory viral pathogens simultaneously, which can be expanded to cover other respiratory bacterial pathogens in future projects

Project No.: 06/53 **Researcher:** Aiming Wang

Title: Development of a Plant-Based, Low Cost, Orally Administered Vaccine Against PRRSV

Synopsis: This is funding for the second year of a three year project to develop a plant-based, low-cost, orally administered vaccine against PRRS. The results of the three year study could provide the development of a novel, safe, low cost, convenient and uniform, edible vaccine for clinical use to protect Ontario pigs from PRRS. It could also be a model for the control of other animal infectious diseases.

Primary Priority: Nutrition

Project No.: 06/35 **Researcher:** Q Wang

Title: Essential oils as alternatives to dietary antibiotics: Microencapsulation for effectively delivering the oils to pig guts

Synopsis: Our previous studies have demonstrated the potential of some essential oils as a substitute for dietary antibiotics in controlling both human and swine bacterial pathogens and the requirement of effectively delivering these oils to pig guts to maximize their antimicrobial activity. The proposed research tests various encapsulation and emulsification techniques with regard to their efficiency in protection of oil antimicrobial activity and the cost feasibility for commercial or field application. The efficiency will first be assessed by in vitro assays.

Project No.: 06/37 **Researcher:** Paul Luimes

Title: Investigation into the metabolic status of sows during lactation

Synopsis: The health of the sow herd may be compromised by metabolic disease. This research will establish an understanding of the level of ketosis in sows during lactation. This disease is not an "on or off" disease. Missed diagnosis means missed potential. Thus, it is important to find out the degree to what this disease may be affecting sows.

Project No.: 06/41 **Researcher:** C.F.M. de Lange

Title: Impact of immune system stimulation on nutrient utilization and response to dietary methionine plus cysteine intake in growing pigs

Synopsis: Previous studies in our lab indicate that there are opportunities to manipulate the response of growing pigs during an immune challenge, in order to reduce the negative impact of sub-clinical levels of disease on pork production efficiencies. We hypothesize that the supply of dietary methionine plus cysteine is an important determinant of the pigs' immune and growth response to an immune challenge. Studies are proposed in which pigs are exposed to controlled levels of immune system stimulation (based on repeated injections of increasing doses of LPS) to evaluate its impact on nutrient digestibility, whole body protein growth and utilization of methionine and cysteine, especially as it relates to the production of glutathione.

Project No.: 06/43 **Researcher:** Peter Pauls

Title: Molecular Approaches Toward Improving Fusarium Resistance in Corn

Synopsis: The proposed work is based on previous successes in identifying regions of the corn genome that contain genes for resistance to Fusarium. In the proposed work, genes in these regions will be identified. The genes for resistance can be used as molecular markers in corn breeding programs or might be transferred to high yielding corn inbreds in the future

Project No.: 06/45 **Researcher:** Laima Kott

Title: Development of Fusarium resistant & high lysine corn genotypes for pork production

Synopsis: The protocol entails use of pollen grains that are induced to develop as embryos and plants. During this process pollen is exposed to a mutagen to produce minor genetic changes, and subsequently with in vitro selection novel corn genotypes are identified.

Primary Priority: Other

Project No.: 06/20 **Researcher:** Ken McEwan

Title: Cost of Production Benchmark for Ontario, Manitoba and Iowa

Synopsis: The project will investigate cost of production comparison between Ontario, Manitoba and Iowa for a 1,200 sow farrowing unit and 1,000 head finishing barn.

Primary Priority: Pork Product Quality

Project No.: 06/26 **Researcher:** C.F.M. de Lange

Title: Effective manipulation of fatty acid profiles in value-added pork products aimed at enhancing contribution of pork to human health

Synopsis: To develop strategies for cost-effective production of value-added Ontario pork products that contain predictable and uniform levels of omega 3 fatty acids. To establish the impact of feeding saturated fat following a period of feeding unsaturated fat on the preferential incorporation and retention of omega 3 fatty acids in the various body fat pools (inter-, inter- and subcutaneous) in growing pigs. To enhance the functional food and value added attributes of Ontario pork that yields health benefits to the consumer without compromising carcass and meat quality.

Primary Priority: Reproduction

Project No.: 06/24 **Researcher:** Roy Kirkwood

Title: Influence of gonadotrophic stimulation on gilt estrus, cyclic responses and effect of pre-ovulatory LH surge magnitude on subsequent fertility

Synopsis: To determine the reason e for variable follicular ovarian response to gonatrophins and to examine the relationship between size of the pre-ovulatory LH surge and fertility.

Project No.: 06/22 **Researcher:** Anne Croy

Title: Cellular and Molecular Evaluation of Mechanisms at the Maternal-Fetal Interface that Promote Porcine Fetal Survival

Synopsis: : Overall: To understand and manipulate the processes at the porcine maternal-fetal interface that control fetal survival. Specific: To quantify factors that regulate conceptus growth and development during known times of porcine embryonic/ fetal loss and to assess their alteration upon fertility-enhancing immune stimulation. The researchers will utilize laser capture microdissection of histological specimens followed by realtime PCR to quantify gene expression in maternal and fetal cells in the uterus. Previous work found lymphocyte-promoted angiogenesis differed between living and arresting implant sites from gestation day (gd)20. The study of individual littermates will move to earlier times and new genes to identify onset of dysregulation in the physiological/immunological signals that control fetal survival. With Bioniche Life Sciences, Belleville, gene usage in the same cell types dissected from gilts receiving a pre-conception drug that increase porcine litter size will be studied. This will address uterine actions of their immune stimulant.

Primary Priority: Environment

Project No.: 07/131 **Researcher:** David Rudolph

Title: Evaluating the spatial and temporal effects of tile drains on the partitioning of liquid swine manure constituents between surface-water and ground-water

Synopsis: The objective of this proposal is to provide information to improve Better Management Practices (BMP's) for land application of swine manure and minimize impacts to water quality. The main objective is to understand how macropores (i.e., mud cracks, worm holes and root holes) regenerate after tillage and how they act as preferential flow paths for liquid manure constituents to enter tile drains. A primary goal is to quantify seasonal and spatial variations in macropore generation, infiltration, and tile-water quality and the impact on overall water quality.

Project No.: 07/127 **Researcher:** Ann Huber

Title: Survival of pathogens during storage of livestock manures

Synopsis: The effect of a variety of on-farm manure storage conditions, including seasonal temperatures and static vs dynamic storage, on the survival of indicator organisms and pathogens will be determined; populations of pathogens at typical spreading times will be assessed. The results are expected to provide producers with management options based on cost-effective manure storage practices that reduce the load of pathogens prior to manure

application and thus reduce the risk of subsequent pathogen contamination of surface and ground waters; further, they are expected to provide science-based information to allow for improved flexibility in regulations and protocols.

Schedules A,B,C are not applicable to this project

Project No.: 07/125 **Researcher:** Ron Fleming

Title: Possibilities for Anaerobic Digestion on Ontario Swine Farms

Synopsis: Objectives of Research Proposal: To digest liquid swine manure in 4 typical recipes (i.e. by itself and with 3 organic additions), measuring biogas production and digestate quality; to document logistical considerations for each recipe tested; to calculate gas yields and electrical power costs for the various recipes.

Project No.: 07/122 **Researcher:** Nigel Bunce

Title: Pilot Plant for Electrolytic Deodorization of Liquid Hog Manure

Synopsis: A pilot plant of approximately 1500 L will be constructed and equipped with commercially available electrodes and power supplies. Odour mitigation and bactericidal properties of the technique will be monitored in both short- and longer-term operation. If the technology can be successfully demonstrated at this scale, the way would be open for electrolytic remediation to be applied at full scale on working hog farms.

Primary Priority: Herd Health

Project No.: 07/111 **Researcher:** Douglas Hodgins

Title: Cloning and expression of porcine complement C3d for enhanced vaccines

Synopsis: Improved vaccine additives are needed, especially for use in vaccines for neonatal piglets. C3d, as a vaccine adjuvant, has potential to stimulate early (active) immune responses to maintain protection against pathogens as concentrations of maternal (passive) antibodies decline. Objectives of Research Proposal: a) To clone DNA coding for the porcine C3d protein, and b) express the recombinant protein in a form suitable for subsequent investigations of its enhancing effects in vaccines

Project No.: 07/110 **Researcher:** Tony Hayes

Title: Gene defects that impair resistance to infectious diseases of swine

Synopsis: We are developing tests for mutations in five genes that code for lectins involved in innate resistance to various bacterial and viral infections. Previously, we have identified two mutations that are more frequent in diseased pigs submitted for post mortem diagnosis. The work proposed will determine which tests are useful in identifying breeders whose progeny are less susceptible to health impacts of PRRS, PMWS, and other common infections. We will also determine if any of these defects are associated with reduced growth performance. The substantial impact of PRRS and/or PMWS on production could be more quickly reduced if we can eliminate breeders that carry mutations that increase their susceptibility to illness when exposed to the primary viral infections. Mutations that impair growth by increasing the impact of other infections will also benefit producers whose herds are not exposed to PRRS or PMWS. The development of a

method to bank DNA samples from pigs with confirmed diagnoses will be a resource for future discovery of other mutations that predispose to disease.

Project No.: 07/108 **Researcher:** Scott Weese

Title: Evaluation of the prevalence of methicillin-resistant Staphylococcus aureus (MRSA) colonization in pigs and pig farmers in Ontario

Synopsis: MRSA is a of major concern in human medicine. MRSA is present in the pig population in certain countries and in such cases pig farms and veterinarians are at high risk for MRSA colonization. It is necessary to know the status of MRSA in pigs and pig farmers in Ontario to determine the public health risks. Objective 1. To determine the prevalence of MRSA colonization in pigs in Ontario. 2. To compare the prevalence of colonization from nasal and rectal screening sites. 3. To determine the prevalence of colonization of MRSA in pig farmers. Nasal and rectal swabs will be collected from 450 pigs from 30 farms in Ontario. Nasal swabs will be collected from volunteering farmers. MRSA culture and typing will be performed.

Project No.: 07/107 **Researcher:** Andrew Peregrine

Title: Control of Coccidiosis in pigs

Synopsis: This project will investigate control methods to reduce the effects of coccidiosis and to determine the impact of coccidiosis on post-weaning performance. Ten farms where coccidiosis has been previously diagnosed will be used in this study. They will examine pigs in the nursery to determine the prevalence of coccidiosis and its effect. Field trials will be conducted to evaluate preventative measures. As a result of this work Ontario pig farmers will have a much greater awareness of how important it is to control coccidiosis. Implementing preventive measures should result in increased weaning weights and improved post-weaning performance.

Project No.: 07/103 **Researcher:** Monte McCaw

Title: Are they REALLY PRRSv Negative??? Detection of Very low rates of Infection in Nursery Pig Groups

Synopsis: Objectives of Research Proposal: 1) Evaluate the relative sensitivity and cost of pen-based hanging-chew-rope oral fluids sampling vs random blood sampling of 28 pigs per nursery by PRRSv RTPCR. 2) Determine if there is sufficient virus concentration and quality in oral fluids collected by hanging chew-ropes for accurate PRRSv sequencing. Brief Description of the Project: This project is designed to compare the costs and ability to detect PRRSv infection (sensitivity) in nursery pigs of a novel sampling method (pen-chew-rope oral fluids collection) vs industry-standard random blood-sampling of 28 pigs (95% confidence of detecting > 10% infection rate). We will also evaluate whether these oral fluids samples can be used for accurate PRRSv ORF5 sequencing. The project will be performed in two 2400 sow genetic multiplier herds known to be weaning groups of pigs with < 5.0% infection rate (predictably seen by CoI Harms 8 to 12 weeks following whole-herd homologous wild-type PRRSv inoculation). Their weaned pigs will be sent to single-source single-weaning-group nurseries. Blood samples will be randomly collected from 374 pigs (95% confidence of detecting >

1.0% infection rate) at 4, 7, and 10 weeks of age. Oral fluids samples will also be collected at 4, 7, and 10 weeks of age by hanging cotton chew-ropes in each pen for 60 minutes. Serum and oral fluids will be tested by RTPCR to determine the exact number of PRRSv-infected samples. These data will then be used to compare the relative sensitivity of pen oral fluids sampling vs random bleeding and testing of 28-30 pigs per nursery group by computer modeling. If pen saliva sampling is able to detect infection rates as low as 1%, it will improve detection of nursery PRRSv infection by 10 fold for a per – group diagnostics cost of equal-up-to-double that for RTPCRs on 30 sera run in pools of 5. Several economically critical decisions for herd owners hinge upon the assumption they are producing PRRSv-free nursery pigs. These include: 1) determining initial success of gilt-acclimatization programs, 2) herd PRRSv-elimination attempts, 3) monitoring long-term success of gilt acclimatization (greater confidence weaned / feeder pig groups are PRRSv-free at entry into finisher), 4) PRRSv-elimination, 5) sow herd PRRSv vaccination programs, or 6) early detection of new PRRSv infection. Saliva sampling could also be used to easily monitor groups of developing boars and gilts in PRRSv-free seedstock herds.

Primary Priority: Nutrition

Project No.: 07/137 **Researcher:** C.F.M. de Lange

Title: A decision support tool to evaluate the impact of between animal variability and alternative management strategies

Synopsis: The aim of the project is to modify an existing and well-tested pig growth and nutrient utilization model, as well as simple decision support system, as user-friendly tools for optimization of profits and nutrient use on individual growing-finishing pig units in Ontario. The main refinements of the current versions of these computer programs will be to represent between animal variability and alternative shipping strategies. Two versions of the model will be made available for commercial use: (i) the full-scale biological and dynamic model and (ii) a simplified and very user-friendly decision support system. The latter will allow untrained model users to evaluate financial and environmental impacts of a large number of alternative and previously defined management strategies for individual growing-finishing pig units.

Project No.: 07/136 **Researcher:** C.F.M. de Lange

Title: Production of phytase expressing *Lactococcus Lactis* and its potential for enhancing swine productivity, gut health and reducing environmental loading

Synopsis: The aim of the project is to genetically modify a lactic acid bacteria, for the expression of the enzyme phytase. The resulting modified bacteria will be examined for phytate phosphorus release in swine liquid feed.

Project No.: 07/135 **Researcher:** C.F.M. de Lange

Title: Reducing the negative impact of high dietary potassium levels on growth performance and carcass characteristics of growing-finishing pigs fed large amounts of co-products.

Synopsis: The aim of the project is to (1) establish whether the negative impact of feeding high levels of co-product on growth performance and carcass characteristics of growing-finishing pigs can be attributed to high dietary potassium levels, and (2) reduce negative effects of high dietary potassium levels by increasing dietary chloride levels or adjusting the dietary electrolyte balance.

Primary Priority: Pork Product Quality

Project No.: 07/119 **Researcher:** Peter Purslow

Title: Enhancing the Pork Meat Quality Value Chain

Synopsis: Twenty commercial farms were identified and contacted with the cooperation of a major Ontario packing plant. To date, data have been collected on 23 occasions from 20 farms with a total of 672 pigs sampled. For each farm, genetic, management, nutrition and behaviour information were collected, and 24 pigs were identified and individually marked for tracking from farm through processing. At the plant, video records were used to quantify behaviour during handling, with blood samples collected for analyses of stress parameters. Temperature and pH were recorded over the first 48 hours in the ham and loin, and tissue samples were collected at 1.5 hours postmortem and stored at – 70 oC for analyses of gene expression and biochemistry. Loin and ham samples were also sent to U of G Meats Lab for subjective evaluation of meat quality (colour, marbling, firmness, wetness) and objective determination of colour (L* a* b* scale), pH, drip loss and Warner-Bratzler shear force (an instrumental measure of tenderness). Shear force measurements were conducted on cooked longissimus chops and smoked ham. From the first set of 312 samples statistical analyses were conducted to identify outliers based on drip loss and colour of the loins. Individual farm/day effects were accounted for in the model. Samples from the extremes have been extracted for microarray analysis to determine patterns of gene expression peri-mortem in pigs with differing meat quality parameters.

Project No.: 07/116 **Researcher:** Ira Mandell

Title: Mechanisms affecting pork meat quality in protein-restricted total feed-restricted dietary regimes

Synopsis: This initiative will investigate the potential mechanisms of improved meat quality (increased tenderness, decreased drip) that may be accessed by restricted protein versus restricted total energy dietary regimes, followed by high rates of compensatory growth. The pork industry is seeking a faster growing, leaner pig with good meat quality characteristics. Restricted feeding followed by compensatory growth can achieve target slaughter weights with high feed efficiency. The research aims to find efficient restriction diets that also improve meat quality.