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Prairie Swine Centre turns 20 in 2012, time for thinking outside the box – again

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Prairie Swine Centre is a uniquely Canadian solution, developed in 1992 the Centre links university research pursuit with industry needs and funding to generate near-market science. When first proposed, this business model was a great leap of faith for both the industry and the university. Over the past 20 years new university/industry/government models have evolved in industries as diverse as computing, health care, mining and forestry and areas of joint business schemes between universities and the private sector are now responsible for a broad host of services as varied as language training in the UK and student housing in US universities. In these models typically the university remains responsible for educational quality while the marketing, financing and specialist management experience is provided by the private sector partner. One UK partnership has developed over 21,000 students through a language training program. When I investigated this phenomenon I discovered there were indeed many success stories using these hybrid business models.

In agriculture, in particular the pork industry, the examples are fewer but they do exist, for example the Australian Cooperative Research Centres (Pork CRC), and closer to home universities like Kansas State have long-term business relationships with commercial barns for near-market research purposes. New University/Private/Government partnerships are now common business structures that bring unique skills and assets to the training of young people, generating excitement among researchers and providing reliable return to government support.

During the past 20 years of operation Prairie Swine Centre with its funding partners and research collaborators

(PSC turns 20 ... cont'd on page 11)

Prairie Swine Centre original management team circa 1992. Back Left to Right: Lee Whittington, Kees deLange, Harold Gonyou, Yuanhui Zhang. Front Left to Right: John Patience, Brian Andries

Loading Facilities for Market Hogs: Saskatchewan's Top 10


Harold Gonyou, Ph.D. Jen Brown, Ph.D.

T. Stevens B.Sc.

For swine producers, loading pigs at marketing can be one of the most stressful and time-consuming experiences. Problems at loading also affect the welfare of animals and have a significant economic impact as they may cause death losses, carcass damage and meat quality problems. The objective of this project was to identify components of swine loadouts that have the greatest impact on pig stress and loading time. Ten swine loadouts in Saskatchewan were visited, and the facility design and handling methods at each facility were documented by photographs and video footage. Observations were compared against recommended practice to identify design features and practices that promote good handling in pigs.

Background

Poorly designed loading facilities increase the incidence of prod use and rough handling, and result in longer loading times. Stress associated with loading can also increase the incidence of downer pigs and death losses, as well as having adverse effects on carcass and meat quality. Methods for reducing stress at loading have been identified, however few producers have adopted these changes as construction costs are high and the benefits are uncertain. This project documented loading facilities and handling methods in barns recognized for having good laodouts. The results provide clear suggestions for changes to facilities and management at loading that will facilitate adoption of improved practices to benefit pigs and producers.

> Important design features include wide alleys, even lighting, moderate ramps with cleats or steps and non-slip flooring. Some of the best farms also used dedicated man-ways, pre-loading pens and truck bays.

Experimental approach

Saskatchewan farms with superior loading facilities were identified based on information supplied by pork producers and truckers. Participating farms were selected from locations across the province in order to document a wide variety of loadout designs. Participating farms included large corporations such as Fast Genetics and Big Sky Farms, as well as individual producers. Each visit included a brief questionnaire on the basic housing and management practices, measurements of the loading facility, and observation of the handling techniques used to move pigs at loading.

Loadout measurements included the width, length, and height of pens, alleys and doorways. Light intensity was measured in lux using a light metre placed at pig height at various locations throughout the loadout. Ramp angle was measured and any corners, flooring changes, or obstacles were documented using a digital camera.

For each farm visit, a video camera was either mounted in the loadout, or operated by the producer, to record handling techniques used at loading. For each site, either live observations or video footage of pigs at loading were reviewed to assess handling technique and pig flow. Handling techniques were evaluated on the basis of appropriate/inappropriate use of tools (prods), handler vocalizations, body position, attitude, and factors affecting the flow of animals.

The results of this study were descriptive observations. By examining superior facilities and handling methods, and comparing them with recommended practice, we identified design and handling practices that are effective at reducing stress during loading.

Figure 1. Hydraulic loading ramp with manway (looking down ramp from truck entry).

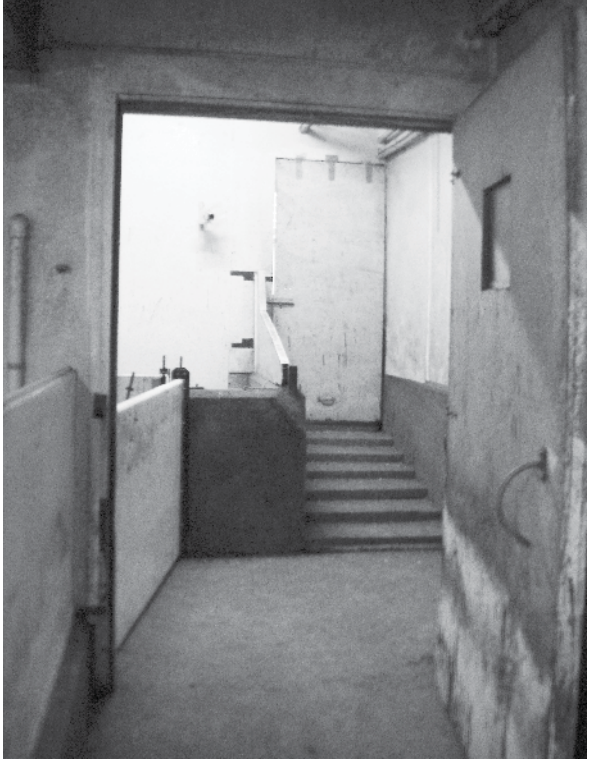


Figure 2. Well lit loadout with concrete steps (30 cm treads).

The results:

The ten farms studied included 6 farrow to finish operations, 3 finishing barns and one farrow to wean operation. Hogs marketed per week ranged from 160 to 1100 animals, with an average of 500 hogs shipped/ week. Loading time needed to fill a standard potbelly trailer (approx 230 pigs) ranged from 30 to 90 minutes (45 min average).

Loadout design

Recommended practice indicates that ramp angles should be less than 20°, that ramps should be fitted with cleats and have a non-slip surface. Ramps observed on all farms met these specifications, with ramp angles ranging from 0 to 11°. Figure 1 shows examples of the ramps observed. The ramp designs varied considerably but all worked well. Some farms had concrete step ramps with 30 cm treads, which the pigs readily negotiated. One farm had an adjustable hydraulic ramp with an attached man way, which was very efficient for moving multiple groups up the ramp. As well, the adjustable ramp was used to load the top deck, which reduced handling stress compared to the steep internal truck ramp. One colony fabricated a ramp extension which was used to reduce the slope of the internal truck ramp, making it easier to load pigs onto the top deck.

Lighting in the loadout area was also examined. It is recommended that loading facilities be well lit, with diffuse incandescent lighting preferred as this reduces contrast and shadows, which may cause animals to balk. Also, when moving into a new area such as the truck, lighting should ideally change from darker to lighter, as animals may balk if required to move into darkness. Lighting levels recorded using a light meter showed a large variation in lighting between farms, ranging from below 100 lux at some facilities to over 1000 lux at others. Lighting during loading was also affected by the time of loading and external weather conditions. Some facilities used an enclosed truck bay, which minimized effects of time of day and weather conditions.

Handling practices

Recommended practices related to group size, distractions and handler technique and attitude were reviewed. In terms of group size, smaller groups (5-10 animals) have been shown to be easier to move. If larger groups are moved, considerations must be made regarding the animals (level of fear and willingness to move), facilities (minimal blockage or distractions), and the handlers abilities. Distractions are known to cause pigs to slow, balk or turn back. One common distraction is too many handlers, or handlers getting ahead of pigs and causing them to turn back.

Handler technique and attitude are very difficult to define and measure, however general recommendations include minimizing prod use, using behavioural principles such as the flight zone and herd behaviour, and maintaining a calm and consistent attitude. Prod use on the farms observed was very low. In fact, the farm with highest prod use had the longest loading time. This is because when the prod is used frequently, pigs become less capable of responding and attempt to turn back. Several examples of good handling were found. In one example, the handler stood well back of a large group as they exited the home pen, providing 'release'. When pigs are moving well a good handler will step back and let the animals move on their own. In another example, groups of 12 pigs were moved with minimal interference from handlers. The pigs exited a pre-loading pen, negotiated a turn and mounted the truck ramp calmly with handlers using boards and minimal prod use.

Presentations to producers

Results from this work were presented to producers at the Red Deer Swine Technology conference on November 2, 2011. Dr. Matt Ritter, a research scientist with Elanco Animal Health, also presented on handling practices at this meeting, emphasising effects of handling on stress and pork quality. The results were also presented on November 3, 2011, at the BC Pork Congress in Chilliwack, BC. Additional presentations will be made in 2012.

Figure 3. External loading ramp allows trucker to assist without entering barn. Note also the ramp extension used to reduce angle of truck ramp to top deck.

The Bottom Line:

There is a large variation in facilities and handling skills across the swine industry, and often little opportunity for producers or barn employees to gain new knowledge. Lighting, flooring, alley and ramp dimensions, and animal handling techniques all have the potential to cause problems when moving pigs through a facility. The best loadouts in Saskatchewan are ones which take these factors into account. Our results highlight the fact that handling of pigs can be improved by a variety of measures, ranging from extensive load-out renovations, to simple changes in lighting and handling techniques.

Acknowledgements

We gratefully acknowledge support from the Saskatchewan Ministry of Agriculture's ADOPT program, the Saskatchewan Pork Development Board and participating producers.

Can Omega-3 Fatty Acids Modulate the Immune Response of Pigs?


L. Eastwood, M.Sc., A.D. Beaulieu, Ph.D.

Introduction:

In the hog industry, weaning is the most stressful time in a piglet's life. The piglets are removed from the sow, mixed with unfamiliar pen mates and begin consuming an unfamiliar diet of solid food. These social, environmental and nutritional stressors contribute to the post-weaning growth lag. This growth lag is characterized by anorexia (for 24-48 hours in some cases), reduced or negative growth rates and increased susceptibility to pathogens. Some piglets undergo an immune reaction triggered by these stresses. Although a certain degree of immune response is beneficial, an over-production of immune cells may become detrimental to the animals, leading to reduced muscle synthesis or even muscle degradation, characteristic of the post-weaning growth lag.

There have been many nutritional strategies implemented with the goal of improving piglet performance at the time of weaning. These strategies may include the use of creep feed, inclusion of highly palatable protein sources, or even the use of novel ingredients, flavours and aromas to stimulate feed intake. The use of omega-3 (n3) fatty acids is becoming a growing area of interest for hog producers due to their known health benefits. Recently, the nutrition group at the Prairie Swine Centre has conducted a set of experiments to determine how nutritional modulation using n3 fatty acids can improve piglet health and performance at weaning.

The n3 and omega-6 (n6) fatty acids are long chain, essential, polyunsaturated fatty acids. Depending on the source (plant or fish), the n3 or n6 fatty acids differ slightly in structure and function. The metabolites of these fatty acids are highly active in the body, and are involved in many processes, including inflammation and immunity. In general, the n6 fatty acid products are considered to be pro-inflammatory (cause inflammation) and the n3 products are anti-inflammatory (prevent inflammation). Typical western hog diets have an n6 to n3 fatty acid ratio of 10:1 or greater. Because of competition between the enzymes required in the conversion of n6 and n3 to these metabolites, the amount of n3 provided in the diet relative to n6 may be important to obtain optimal benefits. In other words, the n3 fatty acids may assist in regulating the body's immune response, and thus may help alleviate the stress-induced immune response generated at weaning, but optimal benefits probably require a specific n6 to n3 ratio.

The objectives of our experiments were to determine the effect of feeding different dietary n6:n3 ratios to (1) sows or (2) piglets post weaning, on the immune responses of piglets when challenged with a bacterial component.

Materials and Methods:

Two experiments, using similar designs, were conducted. In the first trial, experimental diets were fed to sows throughout lactation, and piglets were weaned onto a common commercial starter diet. In the second trial, piglets were weaned from sows fed a common commercial lactation diet, and fed the experimental starter diets post weaning for one week. For both trials, piglets were acclimated in the nursery for 6 days, followed by an immunologic challenge to determine the effects of feeding n3 fatty acids on acute immune responses.

Experiment 1:

Sows consumed 1 of 5 diets with varied n6:n3 fatty acid ratios. The diets consisted of a control (tallow based), plant based ratios of 10:1, 5:1, 1:1, and a fish based 5:1 ratio. Sows remained on these diets for 2 reproductive cycles and piglets weaned from the 2nd cycle (day 26 ± 2 of lactation) were used in the immune challenge study. The fatty acid ratios were 7.5:1, 4.5:1, 1.5:1 and 3:1 in the milk of sows fed the 10:1, 5:1, 1:1 and 5:1 fish diets respectively.

Weanling pigs (n=100), 20 from each diet group, were randomized to a challenge control group (saline injected) or to an E. Coli lipopolysaccharide (LPS) injected group (n=10/challenge/diet). Piglets were given 6 days to acclimate to their new environment prior to the immune challenge. Rectal temperatures were recorded at 0, 1, 2, 3, 4, 5, 6, 12 and 24 hrs post injection and blood samples were collected at 0, 2, 6 and 12 hrs post injection for cytokine analysis (IL-1β, IL-6, Il-8, TNFα). Cytokines are molecules involved in inflammatory and immune reactions, and can be measured to monitor the immune responses of animals.

Experiment 2:

Pigs (n = 120) were weaned on day 26 (± 2) of lactation from sows consuming a common commercial lactation diet and were randomly assigned to 1 of 5 test starter diets. The test diets consisted of a control (tallow based), plant based ratios of 10:1, 5:1, 1:1, and a fish based 1:1 ratio.

Individually housed pigs were acclimated to their new surroundings and diets for 6 days and then randomized to a challenge control group (saline injected) or to an E. Coli lipopolysaccharide (LPS) injected group (n=12/challenge/diet). Rectal temperatures were recorded at 0, 1, 2, 3, 4, 5, 6,

12 and 24 hrs post injection and blood samples were collected at 0, 2, 6 and 12 hrs for cytokine analysis (IL-1β, IL-6, Il-8, TNFα).

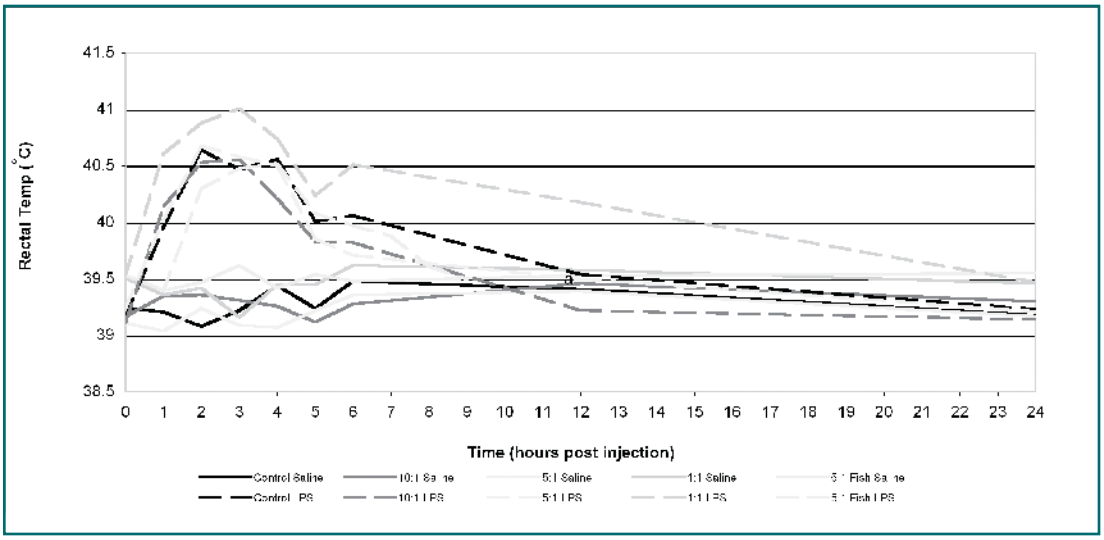


Figure 1: Rectal temperatures of challenged and unchallenged piglets on each dietary treatment group during experiment 1

Results and Discussion:

For both experiments, baseline rectal temperatures and cytokines were similar between treatments ($P > 0.05$). Challenged pigs had decreased ADG and ADFI, increased rectal temperature and increased plasma cytokine concentrations ($P < 0.05$), indicating that LPS elicited an immune response, and our challenge model worked.

In experiment 1, sow diet affected piglet body temperature, where the 1:1 treatment group had the highest maximum temperature ($P = 0.10$) regardless of challenge. Piglets from the 1:1 fed sows had a greater febrile response to the challenge when compared to the other groups ($P=0.01$). Piglets from sows consuming the 1:1 diet had an increase in nearly 1°C when challenged, whereas body temperature increased between 0.5 to 0.7°C for the other treatment groups. Effect of challenge and diet on body temperatures are shown in Fig. 1. Maximal IL-8 production was highest for piglets raised by sows consuming the 1:1 diet group ($P = 0.09$), indicating that the piglets from this diet group had a greater cytokine response to the immune challenge.

In experiment 2, rectal temperature and IL-1β were unaffected by dietary treatment ($P > 0.05$) as shown in Fig. 2. Pigs consuming the 5:1 ratio diet had an increased IL-6 response ($P < 0.01$) and tended to have increased responses for IL-1β ($P < 0.1$) and TNFα($P = 0.1$). Indicating that piglets consuming an n6:n3 ratio of 5:1 had increased immune responses when challenged.

Summary:

Our experiments demonstrated that feeding n3 fatty acids to sows can affect piglet responses to immune challenges at weaning. We also showed that feeding piglets' starter diets with n3's in the nursery can also modulate their inflammatory reactions. Altering the n6:n3 fatty acid ratio in either sow or piglet diets can affect febrile and inflammatory cell responses of piglets when challenged with E. Coli LPS post-weaning.

When sows consumed an n6:n3 ratio of 1:1, their piglets had elevated body temperatures and a greater response to the immune challenge compared to piglets from sows consuming the other diets. When fed to piglets, a ratio of 5:1 n6:n3 tended to increase production of some inflammatory cells, but did not affect body temperature.

The Bottom Line:

Based on these results we hypothesize that either the n6 fatty acids are not as inflammatory as we originally thought; or alternatively, that there is an 'optimal' n6:n3 ratio in the diet. Going below this 'optimal' ratio, the energy required to generate the immune response takes nutrients away from growth and can actually be a hindrance to piglet productivity and health.

Based on our preliminary results, we can recommend that pork producers include plant based n3 fatty acids such as those found in flaxseed, into the diets of lactating sows or newly weaned piglets, but to ensure that the ratio does not go below 5:1 n6:n3. Further experiments are being conducted to determine the consequences of generating immune responses, and the implications on animal health and performance.

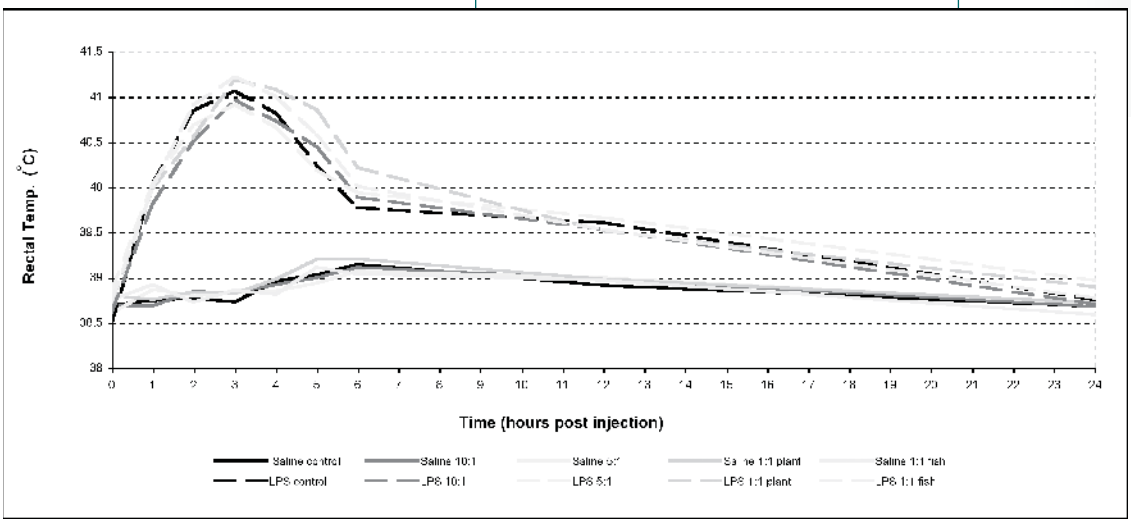


Figure 2: Rectal temperatures of challenged and unchallenged piglets on each dietary treatment group during experiment 2

Acknowledgements:

Strategic program funding was provided by Sask Pork, Alberta Pork, Manitoba Pork Council and Saskatchewan Agriculture and Food Development Fund. Specific funding for this project was provided by the Alberta Meat and Livestock Agency (ALMA).

Developing Strategies for Water Conservation for Producers

Alvin Alvarado, M.Sc. Bernardo Predicala, Ph.D.

and Y. Jin, Ph.D.

Summary

Animal drinking and cleaning are the top uses of water in swine barns. Using water conservation strategies to reduce water use will ultimately lower cost of production and contribute towards a more sustainable environment as less manure slurry is created. In order to find out which water conservation strategy is most effective, experiments were performed using different animal drinkers and cleaning strategies. It was found that about 60% less water wastage was achieved when a trough with side panel and constant water level was used compared to the nipple drinkers. Also, at barn clean up, the use of a conventional nozzle led to lesser time and water consumption during high pressure washing.

Introduction

In swine operations, water is mainly used for animal drinking and cleaning. The rate of water use has an impact on the overall production cost and on the environment. Indiscriminate use of water can increase the volume of waste water and manure slurry generated from the operation leading to added manure handling costs, and improper manure management particularly during land application can potentially lead to degradation of water bodies. Therefore more efficient use of water is essential not only for economic reasons but also for environmental sustainability considerations. This report describes different water conservation practices pertaining to animal drinking and cleaning in an actual barn facility and assesses their effectiveness in reducing overall water use.

Experimental Procedures

Two different experiments were performed. The first experiment involved installing three different drinkers in a grow-finish room to evaluate the overall water use (disappearance), water wastage, and water contamination level, as well as average daily gain and average daily feed intake of the grow-finish pigs. The animal drinkers used included a nipple drinker, a nipple with side panel, and a trough with side panel and constant water level (Figure 1).

The second experiment involved performing two different cleaning strategies in a grow-finish room with partially and fully slatted concrete flooring. The cleaning strategies included 1) water sprinkling (soaking) prior to high pressure washing and 2) use of different high pressure washing nozzles: conventional nozzle, Y-nozzle, water broom, and 4-in-1 nozzle (Figure 2). The water consumed, the time spent during subsequent pressure washing as well as the surface cleanliness were then evaluated.

A modified water trough reduced water wastage by 60% compared to a standard water nipple.

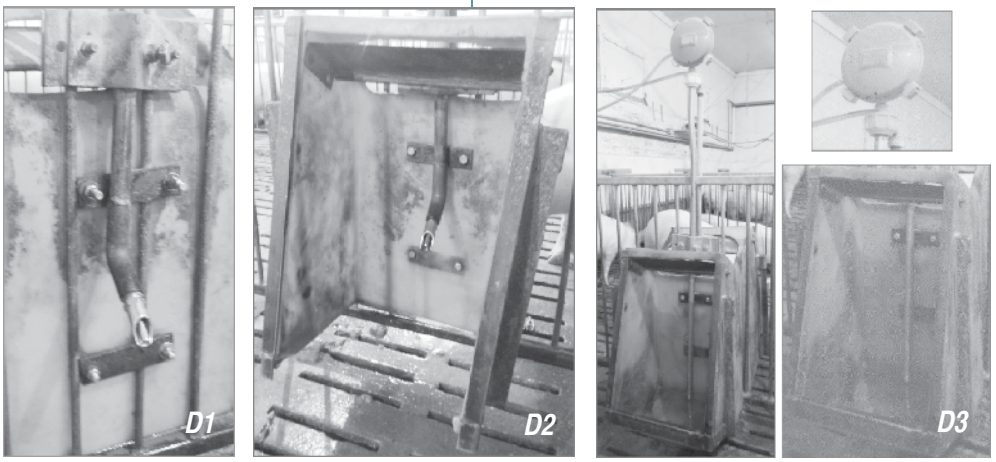


Figure 1. Three types of animal drinkers used: nipple (D1), nipple with side panel (D2) and a trough with side panel and constant water level (D3).

Results

For animal drinking, it was found that about 60% reduction in water wastage was achieved when a trough with side panel and constant water level was used compared to the nipple drinkers (Figure 3). The water intake from all drinkers were within the water intake requirements for grower-finisher pigs. In addition, the use of the trough with side panel and constant water level had no significant effect on average daily gain and average daily feed intake of pigs although the water in the trough had significantly higher microbial ATP (adenosine triphosphate) levels than in nipple drinkers.

Examining the cleaning strategies, it was found that water sprinkling (soaking) in fully and partially slatted concrete flooring resulted in significantly higher water consumption than without sprinkling. However, sprinkling partially offset the washing time. Comparing the different nozzles, the use of the conventional nozzle led to the lowest time spent cleaning and water consumed among all test nozzles (Figure 4). Also, the use of the Y-nozzle or the conventional nozzle achieved the highest significant reduction in microbial ATPs on plastic and concrete surfaces, respectively.

The Bottom Line

The use of the trough with the side panel and constant water level for drinking has the greatest potential for water savings without affecting pig performance. High pressure washing using the rotating turbo nozzle led to lesser time and water consumption during the cleaning process. Also, high pressure washing in fully slatted concrete flooring can be done without prior water sprinkling (soaking).

Acknowledgement

Project funding provided by Saskatchewan Agriculture Development Fund. Strategic funding provided by Saskatchewan Pork Development Board, Alberta Pork and Manitoba Pork Council.

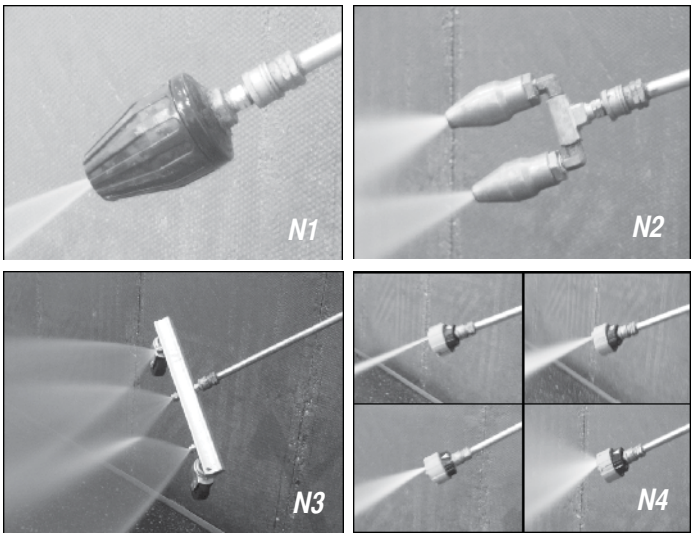


Figure 2. Four different type of power washing nozzles used: conventional nozzle (N1), Y-nozzle (N2), water broom (N3), and 4-in-1 nozzle (N4).

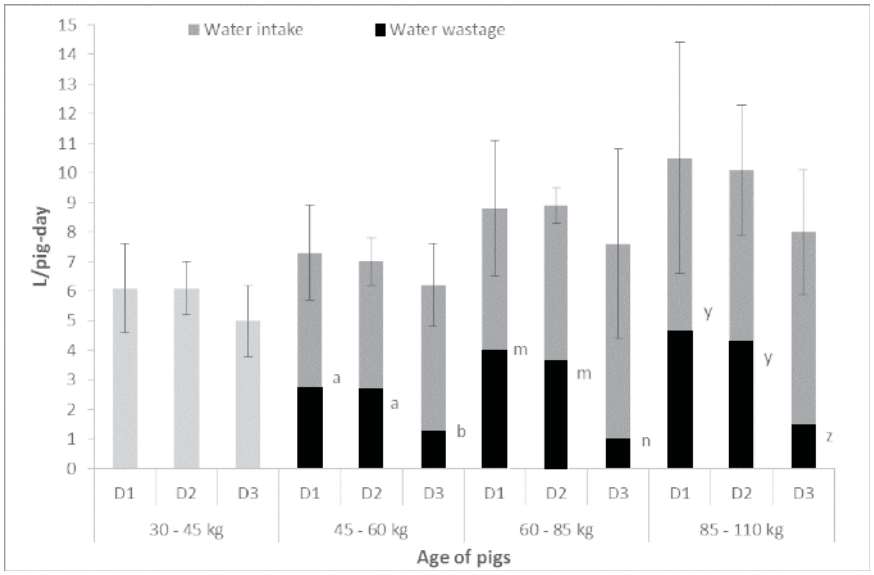


Figure 3. Effect of different types of drinkers on water disappearance, intake and wastage, n=4. Means (water wastage) with the same letters are not significantly different (p>0.05) from each other. D1 – Nipple; D2 – Nipple with side panel; D3 – Trough with side panel and constant water level.

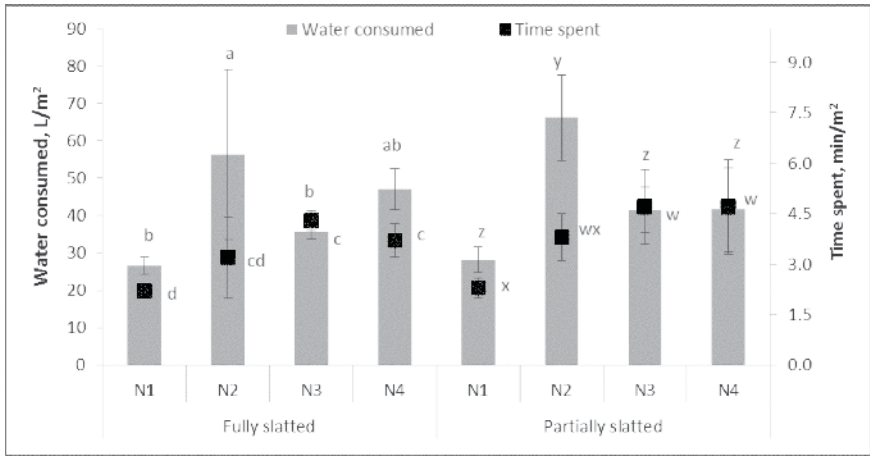


Figure 4. Effect of different types of nozzles on time and water consumption, n=5. Means with the same letters within the same type of flooring are not significantly different (p>0.05) from each other. N1 – Conventional nozzle; N2 – Y-nozzle; N3 – Water broom; N4 – 4-in-1 nozzle.

Swine Innovation. What Does It Mean for Producers?

Ken Engele, BSA.
Manager Information Services

The pork industry is no stranger to change. While the change in the industry has garnered most of the headlines in recent years, Canadian pork producers have always been on the leading edge of incorporating new technologies and management practices that enhance the competitive position of their business. One of the roles researchers play is ensuring producers have all the tools available to remain competitive.

Research is addressing some of the questions of the pork industry through the Canadian Swine Research and Development Cluster. The Canadian Swine Research and Development Cluster rebranded as **Swine Innovation Porc** is a multi-year $9.6 million program established within the Growing Canadian Agri-Innovation Program – Canadian Agri-Science Initiative of Agriculture and Agri-Food Canada, in addition to receiving financial support from private sector and provincial government organizations.

Swine Innovation Porc 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 Canadian Pork Value Chain Strategic Framework and its four pillars:

1. **Competitive Environment:** We facilitate research designed to help reduce the costs of production; hence improving competitiveness.
2. **Market Penetration:** We foster research that assists the Canadian Pork Value Chain differentiate its products in its key markets.
3. **Value Chain Integrity:** We promote and encourage research that assists the Canadian Pork Value Chain to demonstrably strengthen the integrity of the value chain.
4. **Innovation:** We put in place the organizational and scientific resources to permit innovation to flourish.

(More information on the Canadian Pork Value Chain Framework can be found on the Canada Pork Council website www.cpc-ccp.com.)

The research program conducted within Swine Innovation Porc consists of 14 research projects (see page 9) with 10 focused directly on increasing revenue or decreasing the cost of production, four focus on product differentiation, and three technology transfer initiatives. It is truly a collaborative project involving the coordination of 22 private partners, 100 researchers, 14 universities, and 13 research centres (16 organizations throughout Canada). Prairie Swine Centre and CDPQ have been given the task of developing a coordinated technology transfer program that effectively delivers the research results to pork producers and the industry.

> Results from the Banff Pork Seminar indicate that feed costs may be cut by as much as $8/pig marketed.

Benefits to the Producer

The ultimate goal of Swine Innovation Porc is to ensure adoption of research results in the Canadian pork industry, and ensure measurable results by the completion of the funding agreement (March 2013). This will happen in a number of ways including the translation of research results in both official languages, and the development of a lead users program (demonstration farms) that would implement new technologies or management strategies developed through Swine Innovation Porc. Research projects have identified short, intermediate and long term benefits to the Canadian pork industry in the areas of swine nutrition, genetic improvement, animal welfare and environmental and engineering management.

The kick off of Swine Innovation Porc was held in conjunction with the 2012 Banff Pork Seminar through hosting a special breakout session Breakthroughs in Canadian Swine Nutrition. This session focused on delivering some of the expected research results in conjunction with three research projects:

Sustainable Precision Livestock Farming: A Vision for The Future of the Canadian Swine Industry
Candido Pomar, AAFC Lenoxville, QC

Towards Integrated Nutritional Management of Growing-Finishing Pigs
Kees de Lange, University of Guelph, ON

Novel Swine Feeding Programs To Enhance Competitiveness And Pork Differentiation
Ruurd Zijlstra, University of Alberta, AB

Looking at the material presented at the Banff pork seminar, preliminary results indicate that feed costs may be cut by as much as $8/pig marketed. In today's world of above average feed costs this would have a significant impact on a producers bottom line.

Table 1 provides a listing of the 14 projects funded through Swine Innovation Porc. For More detailed information regarding the research projects can be found at www.swineinnovation.com.

Table 1. Swine Innovation Porc Projects

Project Title	Objectives
Food safety and microbial quality	
Use of tools related to molecular characterization, systemic analysis of stakeholders and geomatics for identification of principal vectors and contamination sources by bacteria and virus indicators at the farm and slaughterhouse level.	To identify vectors and microbial contamination sources among herds and slaughterhouse using geomatic, systemic and genomic tools.
Animal welfare	
Sow Housing: risk factors and assessment techniques for lameness, productivity and longevity in group and individually housed gestating sows.	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.
Study of 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.	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.
A comparison of three animal welfare assessment programs on Canadian swine farms.	Compare the three on-farm animal welfare programs as they pertain to Canadian farms.
Use of non-penetrating captive bolt for euthanasia of neonate, suckling and weaned piglets up to 9 kg.	Investigate the effectiveness of the modified design of the non-penetrating captive bolt for euthanasia of neonatal piglets as well as older piglets.
Environmental changes	
Development of an innovative air cleaning system for swine buildings.	To improve the acceptability of swine facilities in rural areas by reducing their potential environmental impacts.
Equipment standardization	
Development of an innovative precision farming system for swine.	Develop a commercial, fully automated precision feeder and acquire the required scientific knowledge to feed pigs individually with daily diets tailored for optimal management of both feeds and animals.
Development of standards for swine production systems.	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.
Feed inputs and feeding	
New and innovative swine feeding programs to enhance competitiveness and pork differentiation: The Canadian feed & pork value chain	To develop a unique Canadian feed management strategy and feed ingredient data base 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.
Novel nutritional strategies for optimum sow and piglet productivity.	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.
Mycotoxins	
Efficacy of feed additives in mitigating the negative impacts of mycotoxin contaminated feed on performance and health of piglets.	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 performances.
Mycotoxins contents evaluations of corn hybrids adapted to Quebec growing conditions.	To determine, under natural disease pressure, whether there are any differences between hybrids (Genotype effect, G) in their grain content levels for four different mycotoxin (Deoxynivalenol, fumonisin, zearalenone and T-2 toxin) in 3 different environments (Environment effect, E). G x E interactions will also be evaluated.
Genomics	
Capturing genetic merit in differentiated pork production systems through genomics.	Demonstrate that alignment of the excellent genetic potential of Canadian dam-line sows and AI stud boars, with management strategies that recognize the origins of major variation in phenotypic traits of terminal line litters, provides major competitive advantages to Canadian pork producers.
Development of new genomic tools to improve meat quality traits and production efficiency in pigs.	Develop new genomic tools to improve meat quality traits as well as enhance product differentiation and efficiency of pork production.

Focus on Feed Efficiency in Pork Production

Ken Engele, BSA.
Manager Information Services

Feed represents the largest proportion of cost of production, contributing up to 70% of the variable cost of production. This is nothing new. However in the past couple of years we have seen feed costs rise to historically high levels, while costs may retreat somewhat, it is highly unlikely in the short term that we will see feed costs dip to levels experienced in 2004 and 2005.

There has always been emphasis on feed efficiency in production systems, however the discussion comes to the forefront when feed costs rise and show no real signs of a significant retreat. Since feed costs represent the largest portion of cost of production, it also represents the greatest opportunity for reducing costs in particular the grower-finisher barn. Feed efficiency can have the single biggest impact on feed cost per pig. With the higher feed costs there has been a greater push towards managing feed efficiency within operations. At current feed costs an improvement in feed efficiency of 0.1 kg of feed per kg of gain will result in a greater than $2.00 net income per pig marketed.

There are a number of considerations that need to be taken into account when examining feed efficiency in pork production: These are environmental (temperature, humidity, air circulation), social (space allocation, group size, re-grouping), immunological (disease, pathogen concentration), and management (particle size, feeder adjustment).

Factors Impacting Feed Efficiency:

- Genetics: Are you feeding according to the maximum lean yield potential of your herd?
- Feed processing: Understanding the impact of pelleting and size of grind. Industry standard for particle size is 600-800 microns. Kansas State University demonstrated a 1.2% improvement in feed efficiency for every 100 micron reduction in particle size relative to the optimal range. Pigs fed pelleted diets vs. mash have 3-6% better feed efficiency.
- Management: Ensure feeders are checked daily and feeders are adjusted for 40% pan coverage to maximize feed efficiency, by maximizing performance and minimizing feed wastage. In addition, a 3% reduction in pen space translates to a 1% reduction in feed intake and growth rate.
- Dietary energy level: Use of alternative feed ingredients typically provides a lower energy density within the diet, thereby increasing the amount of feed required per pig. Pigs will typically compensate for the lower energy diets by increasing their consumption, subsequently having a significant impact on feed efficiency. Poorer feed efficiency may be offset by cheaper diet cost. It is very important to monitor this relationship.
- Environmental temperature: Ensure pigs are kept within their thermal comfort zone. Cold temperatures increase feed intake while hot temperatures reduce feed intake
- Disease challenge: Healthy pigs grow faster. Pigs are able to utilize nutrients for growth rather than fight disease. Disease challenges can also increase mortality, when occurring in the finishing herd can have significant impact on whole herd efficiency.
- Breeding herd productivity: On average a sow will consume approximately one tonne of feed per year. The greater number of pigs produced per sow will improve whole herd feed efficiency.
- Market weight: Feed efficiency worsens as pigs get heavier. Ensure pigs are marketed at their optimal weight to minimize feed cost per kg gain, maximizing profit potential.

"Focus on Feed Efficiency" webinar series starts March 5, 2012

While this is not an inclusive list of factors that influence feed efficiency, it gives us the perspective of the multi-disciplinary approach that is required to achieve its full potential. One of the ways in which Prairie Swine Centre is delivering this message is through a series of webinars specifically dedicated to a "**Focus on Feed Efficiency**".

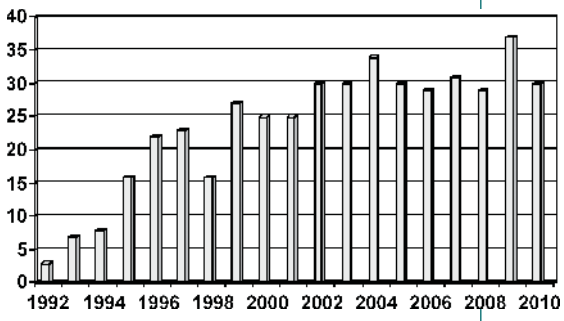
This series of eight Feed Efficiency webinars are being delivered in partnership with the Farm Leadership Council starting March 5 and concluding June 19. Webinars will run on two week intervals by well-known experts in the area of feed efficiency discussing a wide range of topics including: feeding and barn management, whole herd factors, feed processing, new technologies and health impact on feed efficiency.

"Focus on Feed Efficiency" Webinar Series

March 5, 2012 (1:30 p.m.)	The Future of Precision Livestock Farming	Dr. Candido Pomar, Agriculture and Agri-Food Canada
March 27, 2012 (1:30 p.m.)	Feeding and Barn Management Practices that Maximize Feed Efficiency	Dr. Bob Goodband, Kansas State University
April 10, 2012 (1:30 p.m.)	Herd Management Factors that Influence Whole Herd Feed Efficiency	Dr. Aaron Gaines, The Machoffs
April 24, 2012 (1:30 p.m.)	New Processing Technologies that may Influence Feed Efficiency	Dr. Tom Scott, University of Saskatchewan
May 8, 2012 (10:30 a.m.)	Health Effect on Feed Efficiency	Dr. Steve Dritz, Kansas State University
May 22, 2012 (10:30 a.m.)	Fueling the Immune response: What is the Cost?	Dr. Rod Johnson, University of Illinois
June 5, 2012 (10:30 a.m.)	Emerging Technologies with Potential to Influence Feed Efficiency	Dr. Denise Beaulieu, Prairie Swine Centre
June 19, 2012 (10:30 a.m.)	Dietary Energy Concentration and Feed Efficiency Targets: What are the right questions, and do we have the answers	Dr. John Patience, Iowa State University

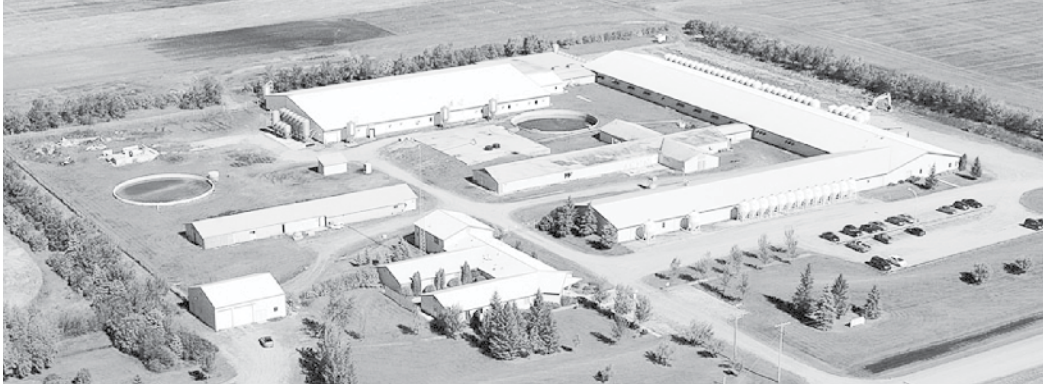
(PSC turns 20... continued from page 1)
world-wide has developed a reputation for practical solutions addressing global competitiveness through developing technologies, personnel and knowledge products. Since inception the research objectives for the Centre spoke a language that both the industry and researchers could embrace and pursue. For example, the first objective dealt with feed – To define the optimum feeding and management procedures to reduce the cost of feeding out grower-finisher pigs by at least $2.00. Dr. John Patience, the Centre's original Director and first President had a shared vision with the industry that research should be accountable and live up to the rigors of business performance measures like attaching dollars and cents to research outcomes. This was an area that attracted a great deal of interest and support from industry and government. Two studies summarizing the economic impact of this approach to research have been conducted. By 2004 the added benefit to a producer applying PSC technologies was estimated to be nearing $30/pig marketed, a second study focused on the research from 2005-2010 concluded an additional

NUMBER OF FUNDERS: 1992-2010



$20 in net income per pig marketed had been identified.

Part of the success in developing economically relevant research results can be attributed to the Centre generating new attention and enthusiasm which attracted young research scientists from around the world who wanted their contribution to make a difference in industry. These scientists have gone on to form the pillars of pork research in many institutions, their work having an impact not just on the Canadian industry but around the world. Additionally students have been attracted from around the world to round out their education in an academic environment that worked to make that link to the industry part of their graduate studies experience. After nearly 20 years the Centre has trained 48 graduate students, plus summer students, post-doctoral fellows and employees that every day work in academia, commercial production, government and supplier industries.



New office wing in 1997. New all-in all-out nurseries, 2002. Sow research unit added in 2008.

The evolution continues as the Centre seeks to fill industry needs and match this with young talent looking for a place to start. The Gowans Feed Consulting Graduate Student Award is the most recent innovation, partnering industry need and funding directly with the selection and training of a graduate student. The customized graduate studies program will include specified amounts of time working in industry, with pork producers and mill operators doing on-farm trials, trouble shooting and real-world problem solving. The result will be the development of the next generation of pork production experts who enter the field armed with a degree, experience and industry contacts ready to make a difference in assisting producers in their pursuit of lowering cost of production and finding ways to differentiate their product in a world of commodity pork.

Where is it all going? Prairie Swine Centre started at a very opportune time. Key production performance measures have exploded during this period with advancements in genetics, health, nutrition, and housing. It is important to stop and take stock - we have seen average daily gains increase by 33%, the sow herd increased by 30% while sow productivity jumped 30%, and market weights increased by 20%. What a fantastic period of growth and change to be involved in trying to fit the pieces together to optimize productivity, but more importantly maximize net income when the whole pork production system is evolving so rapidly. When we recall the technological changes during this period it is a mixture of simple things, for example, how much of the feeder pan needs to be covered by feed to optimize performance and minimize waste? Whether that feeder should be wet/dry or dry? Research told us unequivocally the answers to these questions and a sea change took place in feeder equipment and management which we take for granted now, but in the mid-1990's designs still resembled the traditional feeders of the 50's and 60's more than they resemble today's wet/dry single space feeder. Daily management of that feeder was a personal choice as no information existed which described best management practice. Today's feeder designs and management procedures waste less feed, provide greater protection to the animal and support our goals to reduce production costs.

> Drivers of near-market research can be described as those that affect supply, demand, environment, risk and support research infrastructure.

The way forward will involve research continuing to stay linked to the commercial pork industry but changing with evolving needs. For example, some questions are best answered using formal research trials conducted under strictly controlled conditions, while on-farm studies involving larger numbers of animals and specific farm conditions speed the adoption of new ideas faster and more convincingly than a research report from Prairie Swine Centre. That makes sense and the two approaches need to work more closely together to speed adoption and give Canadian producers the advantage they seek in the world marketplace.

Our compliments and thanks to those pork producers, university and government leaders who foresaw the need, attracted the necessary people, funding and leadership to make Prairie Swine Centre happen. Will the next two decades see the level of change we have experienced in industry growth and efficiency we have seen during the past twenty years? Possibly not but if history tells us anything it is to stay flexible, look for opportunities and move quickly to fill a need. I suspect twenty years from now we will look back on 2012 as being a beginning of phenomenal changes in productivity, wide fluctuations in economic conditions and shifting consumer demand. In other words we should be prepared for more of the same but thrown at us just a bit faster.

Personal Profile

Ken Engele

Ken Engele has recently re-joined Prairie Swine Centre in the role of Manager, Information Services. Ken is no stranger to the pork industry previously spending nine years in the role of Assistant Manager, Information Services, and four years previous with Outlook-based Quadra Group where he focused on pig performance monitoring, and risk management strategies. While serving in the role of Assistant Manager, Information Services he was responsible for delivering the communications program including Centred on Swine, Annual Report, and the Focus on the Future Conference, in addition to assisting in the development of the Prairie Swine Centre/George Morris Centre economic model.

Ken's new role at Prairie Swine Centre will in part focus on the management of knowledge and technology transfer activities associated with Swine Innovation Porc (Canadian Swine Research and development Cluster). Swine Innovation Porc is a national program funded through Agriculture and Agri-Food Canada with the objective to facilitate research, technology transfer and commercialization initiatives designed to enhance the competitive and differentiation of Canada's pork industry.

In his time away from Prairie Swine Centre, he spent two and a half years in the field of community economic development. Ken is a graduate from the University of Saskatchewan, College of Agriculture majoring in Agricultural Economics, and continues to operate and beef and grain farm near Carmel, Saskatchewan.

Leila Dominguez

Leila Dominguez grew up in an agricultural town in the central part of the Philippines. Born in a farming family, her interest in agriculture lead her to complete her Bachelor's (with honors) and Master's degrees in Agricultural Engineering from the University of the Philippines Los Baños where she also served as an assistant professor before she came to Canada in 2009 to continue her education. She is currently a PhD student at the University of Saskatchewan and the Prairie Swine Centre. Her research work aims at optimizing energy efficiency and reducing energy use in swine barns to reduce the cost of production in swine operations.

Coming Events

Alberta Pork Congress
March 28-29, 2012
Red Deer, AB

London Swine Conference
March 28-29, 2012
London, ON

Western Canada Livestock Expo
April 13-14, 2012
Saskatoon, SK

World Pork Expo
June 6-8, 2012
Des Moines, Iowa

Ontario Pork Congress
June 19-20, 2012
Stratford, ON

International Pig Veterinary Society (IPVS)
June 10-13, 2012
Jeju, South Korea

PRAIRIE SWINE CENTRE

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