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PRAIRIE SWINE CENTRE

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Forward facing Animal Welfare Research drives innovation

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The NSERC Industrial Research Chair in Swine Welfare is a five year research program focusing on emerging questions in swine welfare. Led by Dr. Yolande Seddon and developed in collaboration with 14 industry partners representing Canadian producers, processors and swine genetics, the Chair program will deliver knowledge and increased resources in swine welfare to position the industry to respond to a evolving farming practices: increasing production efficiency while meeting social responsibility.

Based at the University of Saskatchewan, the research partnership, one of the largest of its kind, is a collaboration between the 14 industry partners, the Natural Sciences and Engineering Research Council (NSERC), the University of

(Forward facing Animal Welfare research ... cont'd on page 2)

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Playful pigs: A piglet launches into a playful run, photo: Christina Weese.

(Forward facing Animal Welfare research ... cont'd from page 1)
Saskatchewan, the Prairie Swine Centre and national and international research groups. The research is being conducted at the Prairie Swine Centre and in industry partner facilities – bringing together the science and commercial application. The Chair program has four overarching research goals, each focusing on an area critical to advancing our understanding of swine welfare. In this article, part one of a five part series on the NSERC IRC program, the overarching goals of the program are introduced.

Goal 1: Early life management of piglets on lifetime welfare and performance

Early life (birth to four weeks of age) is a critical phase for the piglet during which rapid physiological development occurs. What the piglet experiences during this phase has long-term implications for their future welfare and performance, influencing behavioural development, stress responsiveness, health and future reproductive success.

Goal 1 breaks down the separate and interactive effects of early life management strategies to influence the development of the pig, to understand the consequences for animal welfare and productivity. Sociability, resilience to stresses, gut health and tail biting will be explored in pigs reared birth – slaughter with different early life management. This research will identify practices conducive to promoting high pig welfare, support the development of greater stress resilience in pigs, and deliver knowledge on relationships that lead to the development of tail biting.

Goal 2: Play behaviour and its role to enhance pig welfare and production

Play behaviour, characterized by spontaneous and excitable movements, is a natural behaviour and integral to the development of species specific behaviour, emotional regulation and social skills. Goal 2 will identify the role of play to enhance pig welfare and promote beneficial production characteristics, in particular by determining whether opportunities to play can induce positive emotions and influence the pigs' immune response, sociability skills and ability to respond effectively to stress.

Goal 3: Biomarkers of pig welfare: Measuring and monitoring – to understand and improve

Animal welfare can be a divisive issue fueled by emotion and subjective opinion. Tools for the objective measurement of animal welfare are important for improving our understanding of pigs and how management practices influence their needs, providing information for constructive debate between stakeholder groups when developing animal care requirements. Goal 3 will identify and validate biological markers, objective and quantifiable characteristics of biological processes, for their ability to provide information on the welfare of the pig. Under investigation includes methods to evaluate welfare over a longer period of time (chronic measures) and real-time monitoring of welfare on farm. Deliverables will provide tools for industry and research use.

Goal 4: Pig welfare assessment at meat inspection: Can carcasses assessment inform about animal welfare at different stages of the value chain?

Animal-based indicators of welfare look at measurements on the animal and are a favoured method for welfare evaluation because they can inform on the wellbeing of groups and individuals, regardless of the production system (Whay et al. 2003). Goal 4 is examining whether measuring animal-based indicators of welfare measured on the carcasses of swine at meat inspection can provide accurate and reliable information about the swine welfare at different stages of the value chain:

on farm, handling and transport, lairage and stunning. Exploring the links between welfare indicators, meat quality and animal management, the value of a carcass assessment system to provide feedback to producers and different parts of the value chain will be understood. Success in this area could provide the basis for the development of a standardized, continuous animal welfare monitoring system: providing oversight for the large number of pigs sent to Canadian abattoirs. Application includes a tool for tracking production progress and complementing on-farm assurance scheme animal care measures.

Adapting for research to continue in the Covid-19 pandemic, the use of camera systems to perform welfare assessments on farm and at slaughter is being explored – paving the way for understanding the capabilities of new tools for remote and automated animal welfare assessment and animal care tools.
To conclude: the NSERC IRC in Swine Welfare will advance understanding on critical topics in swine welfare, and provide practical information on management strategies to improve pig welfare and to effectively monitor the welfare of swine from multiple farming operations. The research output will provide strategies for the swine industry to also meet broader goals including reducing antibiotic use, improving pig health and meat quality.

The creation of the NSERC IRC in Swine Welfare research program represents a commitment by the Canadian swine industry to advance the care of farmed swine. The application of the knowledge output will position the Canadian swine industry as a leader in progressive, welfare-based management practices that also improve product quality.
Stay tuned….Over the next four issues, each of the four research goals will be separately explored covering; the scientific questions, the deliverables for pig welfare, production and product value and, introducing the collaborating teams working on each goal.

Acknowledgements

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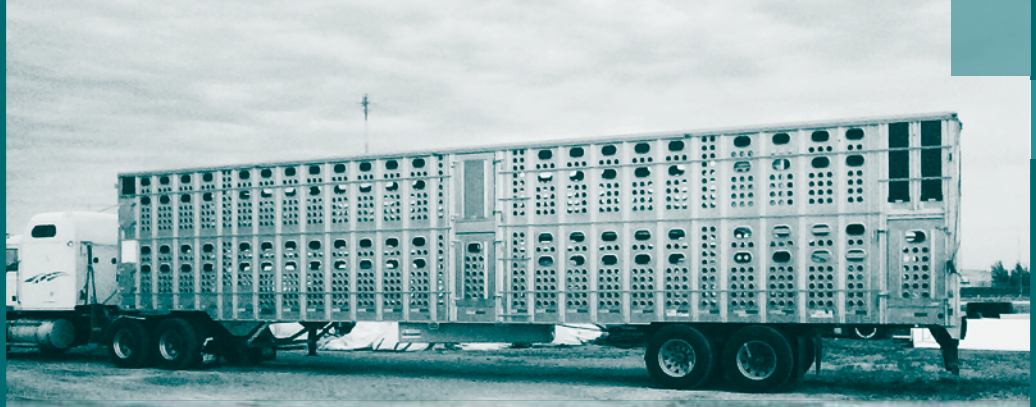
Reference

Whay, H.R., Main, D.C.J., Green, L.E. and Webster, A.J.F (2003) Animal-based measures for the assessment of welfare state of dairy cattle, pigs and laying hens: Consensus of expert opinion. Animal Welfare, 12: 205-217.

Dr. Seddon is an Assistant Professor at the University of Saskatchewan, Western College of Veterinary Medicine and the NSERC IRC in Swine Welfare. With specialized training in animal behaviour and scientific assessment of animal welfare, her research career has focused on addressing welfare challenges in farmed swine. Her previous research has involved management of sows in group housing, pain control, early disease detection, and high welfare farrowing systems.

Dr Giuliana Miguel-Pacheco is a veterinarian with an MSc in Applied Animal Behaviour and Welfare from the University of Edinburgh, UK, and a PhD in Dairy Cattle Behaviour and Welfare from the University of Nottingham, UK. She is currently working with Dr Yolande Seddon's team at the University of Saskatchewan in the development of methods for pig welfare assessment on-farm and at the abattoir. She has experience as a researcher in the areas of animal welfare assessments and applied animal behaviour for precision livestock farming. She has been an independent farm animal welfare consultant for international food companies and animal welfare NGOs.



Enhancing biosecurity and welfare of pigs during transport

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Introduction

Airborne transmissible diseases have the potential to create significant economic losses due to lost productivity, added costs of medication and eradication measures, and even potentially market access.

A previous project examined the development of a new prototype trailer design aimed to protect the animals (such as high-value breeding stock) from airborne transmissible diseases during transport.

The design of the prototype trailer assembled in the previous project tried to integrate as many features as possible identified by stakeholders. This initial prototype was a first attempt at developing an entirely new platform for animal transport, however it still requires additional work before it can be widely adapted and commercialized. This subsequent work involved trailer improvements focused on better environmental control and data logging systems as well the addition or modification of necessary features such as drinkers, misters, and lighting in the animal compartment of the trailer.

What did we do?

The first phase of the project looked at implementing modifications to the existing prototype trailer in order to optimize biosecurity and welfare properties for swine transport. Recommendations from previous work was re-examined and a list was developed that included suggested modifications to the prototype air-filtered trailer, and was supplemented by a search of information from various sources such as product brochures, feature articles, and promotional videos of various improved and modern livestock trailers. The search aimed to identify relevant, innovative and applicable features that can be part of the new trailer design. Further investigation also included the inspection of two existing state-of-the-art commercial pig trailers, manufactured in Europe, to gain first hand knowledge on available and promising new features.

Results and Discussion

Two aspects of trailer modification included: 1) modification of the instrumentation systems; and, 2) physical or structural modifications of the trailer. Table 1 presents a summary of modifications recommended for the prototype trailer.

Implications

A new and more versatile environmental control system was developed. The system has independent and separate controls for the top and bottom deck fans and will be governed by temperature, RH and CO2 levels inside the trailer. The new system includes a more reliable data logging features that are capable of displaying data in real-time, allowing the driver to access to the data, or bypass the system, while in transit. After completion of trailer modification work, the new re-designed prototype will be subjected to further testing to evaluate its performance.

Acknowledgements

We would like to acknowledge the financial support for this research project from the Saskatchewan Agriculture Development Fund and the Canadian Agrisafety Applied Research Program funded by Agriculture and Agri-Food Canada. As well, Polar Pork Farms is acknowledged for the invitation to visit their modern hog trailer purchased from Europe. The authors would also like to acknowledge the strategic program funding provided by Sask Pork, Alberta Pork, Ontario Pork, the Manitoba Pork Council and the Saskatchewan Agriculture Development Fund. In addition, we also wish to acknowledge the support of the production and research technicians at Prairie Swine Centre that make it possible to conduct this research.

Table 1. List of suggested modifications to the prototype trailer

Area of Modification	Description of Desired Modification / Reason for Modification
I. Instrumentation — Environmental Control and Datalogging System	
Ventilation system control	1. Independent and separate control for the top and bottom deck fans. The system is governed by: i. Temperature – primary ii. RH and CO2 levels – could bypass temperature if RH and CO2 levels exceed a set threshold level while at minimum ventilation. 2. Ability to log temperature, RH and CO2 levels, as well as air flow inside the trailer at selected time intervals. Also, logging of ventilation flow rate (i.e., % fan capacity of each fan) for the duration of transport journey. 3. Real-time display and access to above data while in transit, and capability to be bypassed by the truck driver if the need arises. 4. In-cabin controls and alarms.
Misting system	Ability to activate manually or automatically if certain temperature level is reached inside the trailer.
Area of Modification	**Description of Desired Modification / Reason for Modification**
I. Instrumentation – Environmental Control and Datalogging System	
Monitoring and data logging of the above parameters	1. Upgrade/replacement of sensors and stand-alone data loggers shall be wired for permanent installation in the trailer, such that sensors (and its housing) can withstand washing and disinfection (including baking), or sensors can be easily removed/detached prior to washing and can be re-installed without technical complications. 2. Parameters to be monitored and logged: i. temperature ii. RH iii. CO2 level iv. air speed/air flow v. trailer surface temperature – this parameter should be monitored real-time during baking to confirm when desired temperature of key surfaces is attained to achieve proper disinfection vi. GPS location monitoring
II. Physical / Structural Modifications	
Hydration control system	1. Water tank/s, water heater and water distribution system, with appropriate controller to activate the water tank heater at pre-set ambient temperature (i.e., European trailers have -10°C threshold, below which the water system is not used). 2. Design safety for water distribution (e.g., avoid protrusions or pinch points) shall be considered.
Lighting	1. Interior lights will be permanently installed following welfare criteria on lighting, with manual or automatic control switches. 2. Installation of lights on rear exterior of animal compartment that can be activated together with hydraulic ramp control, for use during loading/unloading before dawn or after dusk.
Portable heater at front compartment	Heater/s shall be installed at the front compartment. This requires appropriate positioning and ducting to uniformly distribute the supplemental heat within the compartment, and then into both decks.
Area of Modification	**Description of Desired Modification / Reason for Modification**
II. Physical / Structural Modifications	
Access for inspection	This is required by regulation, especially at border crossing. This can be achieved by installing air-tigh-hatches along the side walls, which can be opened to carry out the inspection without compromising the biosecurity of the animals (i.e., prevent entry of unfiltered air into the compartment).
Wireless remote control of the hydraulic lift	The current wired controller for the operation of the hydraulic lift is quite inconvenient to use; a wireless option should be investigated.
Man-door or side access ladder	In conjunction with the inspection hatch, this is needed in emergency situations when the hydraulic lift failed to operate.
Emergency unloading door for animals	In conjunction with the inspection hatch, this is needed in emergency situations when the hydraulic lift failed to operate.
Emergency plan in case of ventilation system failure/malfunction	Also in conjunction with inspection hatch/unloading door, alternate openings for natural ventilation of the animal compartment should be installed in case of prolonged shutdown of the main ventilation system.
Water-proofing of sensor/ data loggers housing	Appropriate protective housing for electronic components should be installed. Alternatively, the sensors should be easily detachable prior to trailer washing and disinfection.
Generator exhaust pipe	Current exhaust pipe on the side of the trailer may allow the exhaust fumes to enter the air inlet of the front compartment. The exhaust pipe needs to be extended to vent the fumes at the top of the trailer.
Hydraulic lift side panels	For animal and handler safety, options should be explored to increase the height of the side panels by adding detachable extension panels, without hindering the opening and closing of the hydraulic lift gate.

Does creep feed have any benefit?

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Shannon White, BSc.
Prairie Swine Centre, Inc.

Creep Feeding Inconsistencies

Creep feeding is a common practice throughout the pork industry. There are a number of perceived benefits, including provision of nutrients, higher weaning weight, and improved transition at weaning, however, these benefits only occur if the creep feed is consumed. It is estimated somewhere between 4-40% of piglets will consume creep feed during lactation. Intake of creep feed is usually low and highly variable among pigs, with smaller piglets having higher intake and larger having little to no consumption. The achieved benefit of creep feed on growth performance in lactation and/or the nursery period remains inconsistent.

The benefits of providing creep feed may have less to do with provision of nutrients and more to do with exposing piglets to a dry feed and enhancing exploratory behaviour. Dietary diversity, such as particle size variation, has been shown to have a greater influence on pre-weaning feed intake than dietary flavour. Therefore, it is possible that provision of expensive creep diets is not necessary to achieve creep feeding benefits related to weaning weight and overall performance. Feeding simple diets, such as a typical lactation diet, may be sufficient. Identifying less expensive alternatives will help to reduce cost of production in the pork industry.

What We Did

A total of 50 sows and litters with 12-14 per treatment were randomly assigned to 1 of 4 creep feeding treatment protocols. Creep feeding protocols were 1) no creep feed provided (CON), 2) complex creep feed provided (CC), 3) simple creep feed provided (SC), and 4) both complex and simple creep feed provided (SCC). The CC consisted of a standard nursery starter diet and the SC consisted of a standard lactation diet. For the SCC treatment, one feeder contained the simple creep and one contained the complex creep.

Sows were moved into the farrowing room approximately 5 days prior to the expected farrowing date and placed on a commercial lactation feed. Upon farrowing, total pigs born alive and litter weight was recorded. Within 24-h of farrowing, piglets were cross-fostered, if needed, equalizing the number of piglets per sow (12-14 piglets/sow).

Litter weight was recorded weekly on day 7, 14, 21, and at weaning (d28), all mortalities were recorded and litter size adjusted. At day 14 post-farrowing, litters were placed on their respective creep protocol treatment. Type of creep provided and intake were recorded daily and adjusted for wastage. Fresh creep feed was provided each day until weaning.

Upon weaning, piglets were housed in pens of 10-13 pigs/pen with each treatment having 14-16 pens within pre-weaning treatment groups. Individual pig body weight and per pen feed intake were recorded weekly for 4 weeks.

> Overall, there appears to be little benefit of providing creep feed in general or of providing complex, expensive creep feed.

What We Found

Pre-weaning Performance (Table 2)

There was no difference in litter performance prior to provision of creep feed or in average daily gain (ADG) throughout the first week after creep was provided. However, the second week saw an increase in ADG in piglets, with an overall trend for improved ADG in litters receiving the SC and SCC creep treatments. There was no difference in creep feed intake across treatments. There was no preference for simple or complex feed (Figure 1) in those piglets that had access to both dietary treatments.

(Does Creep Feed Have Any Benefit.....cont'd on page 11)

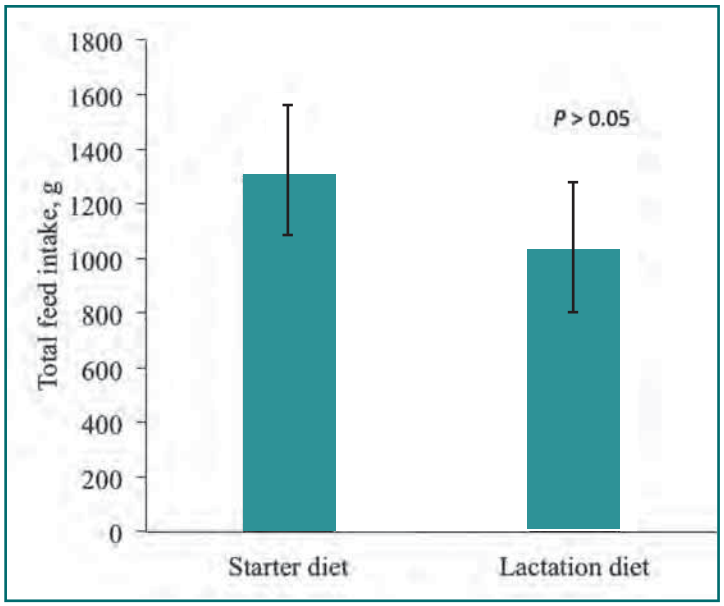

Figure 1. Total intake of starter and lactation diet in litters offered both diets during the pre-weaning period. Values are least square means ± SEM.

Table 2. Pre-weaning performance[1,2]

	Treatment					
Item	Control	SC	CC	SCC	SEM	P-value
n	14	12	12	12		
Birth weight, kg	1.52a	1.53a	1.45ab	1.43b	0.030	0.041
d 14 weight, kg	4.69	4.74	4.57	4.60	0.138	NS
Wean weight, kg	8.17	8.59	8.19	8.25	0.209	0.081
Average daily gain, kg/d						
d 0-7	0.180	0.187	0.181	0.187	0.010	NS
d 7-14	0.273	0.273	0.262	0.265	0.007	NS
d 0-14	0.219	0.223	0.216	0.220	0.008	NS
d 14-21	0.278	0.291	0.294	0.283	0.112	NS
d 21-28	0.221b	0.259a	0.223b	0.239ab	0.015	0.002
d 14-28	0.274	0.290	0.276	0.284	0.008	0.062
Creep consumed, g/pig/d						
d 14-21	-	6.02	4.14	6.68	1.41	NS
d 21-28	-	13.85	13.83	20.62	4.37	NS
d 14-28	-	9.88	9.04	13.62	2.55	NS

BW, body weight; CC, complex creep provided; Control, no creep feed provided; NS, not significant; SC, simple creep provided; SCC, both simple and complex creep provided; SEM, standard error of the mean

[1]Values are least square means.

[2]Creep feed was offered to piglets from d 14 after birth until weaning.

Table 3. Nursery performance[1]

	Treatment					
Item	Control	SC	CC	SCC	SEM	P-value
n	14	16	15	14		
Initial BW, kg	8.14	8.19	8.13	8.08	0.283	NS
Final BW, kg	21.60	21.91	21.99	22.15	0.445	NS
Average daily gain, kg/d						
d 0-7	0.163b	0.181ab	0.209a	0.192a	0.015	< 0.05
d 7-14	0.446	0.454	0.452	0.453	0.047	NS
d 14-21	0.584	0.588	0.604	0.621	0.040	NS
d 21-28	0.723	0.731	0.721	0.742	0.020	NS
d 0-28	0.480	0.496	0.489	0.502	0.124	NS
Average daily feed intake, kg/d						
d 0-7	0.163	0.172	0.185	0.176	0.010	NS
d 7-14	0.468	0.466	0.488	0.490	0.022	NS
d 14-21	0.732	0.725	0.744	0.772	0.034	NS
d 21-28	0.970	0.971	0.978	1.002	0.034	NS
d 0-28	0.584	0.583	0.599	0.610	0.017	NS
Gain:Feed, kg/kg						
d 0-7	0.985	1.048	1.099	1.087	0.046	NS
d 7-14	0.935	0.971	0.919	0.931	0.078	NS
d 14-21	0.803	0.802	0.817	0.797	0.035	NS
d 21-28	0.754	0.751	0.742	0.731	0.018	NS
d 0-28	0.867	0.823	0.852	0.825	0.031	NS

BW, body weight; CC, complex creep provided; Control, no creep feed provided; NS, not significant; SC, simple creep provided; SCC, both simple and complex creep provided; SEM, standard error of the mean

[1]Values are least square means.

Feed Processing to Reduce Ergot Toxicity

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University of Saskatchewan,

Ergot has long been known to have detrimental effects when fed to pigs, and a producer's best option is to avoid feeding ergot contaminated grains. Ergot alkaloids are produced by fungi and infect grasses and cereal crops like rye, wheat, triticale and barley. Although it can vary significantly from year to year, most regions in Western Canada have seen a recent increase in ergot occurrence. There are more than 50 different ergot alkaloids that differ in toxicity, with only about eight measured in traditional assays. Alkaloids exist as R and S epimers and the toxicity of these vary as well. Unlike other mycotoxins, ergot alkaloids are toxic to all livestock species, including ruminants. The maximum level of ergot alkaloids that is tolerable in young pigs is 1 to 2 ppm, while symptoms can range from reduced feed intake to gangrene in extremities depending on the amount of ergot consumed in the diet. The hormone, prolactin, seems to be especially sensitive to ergot toxicity leading to a decrease or complete cessation of milk production following ergot consumption.

Currently, visual inspection is the most practical method for reducing the risk of ergot toxicity, however sorting based on appearance or size is unreliable. There is some limited evidence that ergot toxicity can be reduced by processing methods such as pelleting. The use of heat and moisture may destroy some of the alkaloids or change the ratios of the epimers, reducing toxicity.

What We Did

Rye and wheat screenings heavily contaminated with ergot were subjected to different processing methods and fed to a group of 324 newly weaned piglets in the nursery. Pigs were grouped by weight and gender and assigned to one of nine different treatments. Diets were formulated in two phases allowing for changing nutrient requirements of the piglets through the 28 day trial, where ADG, feed intake and plasma prolactin were analyzed. A sample of piglets were scanned using a thermography camera measuring changes in temperature of the extremities, possibly due to vasoconstriction caused by the ergot. Feeding trials with piglets determined if the toxicity of the ergot was changed due to the steam explosion.

1. Control
2. No processing 0.5 ppm ergot
3. No processing 1.0 ppm ergot
4. No processing 2.0 ppm ergot
5. No processing 4.0 ppm ergot
6. Steam exploded 0.5 ppm ergot
7. Steam exploded 1.0 ppm ergot
8. Steam exploded 2.0 ppm ergot
9. Steam exploded 4.0 ppm ergot

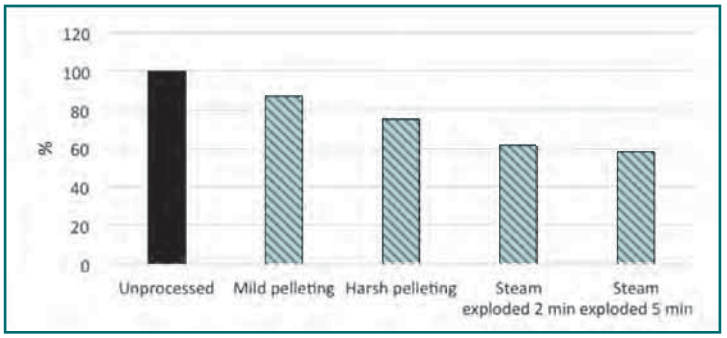

Figure 1: The percentage change in ergot concentration when heavily contaminated rye screenings (~ 518 ppm) were subject to various processing methods

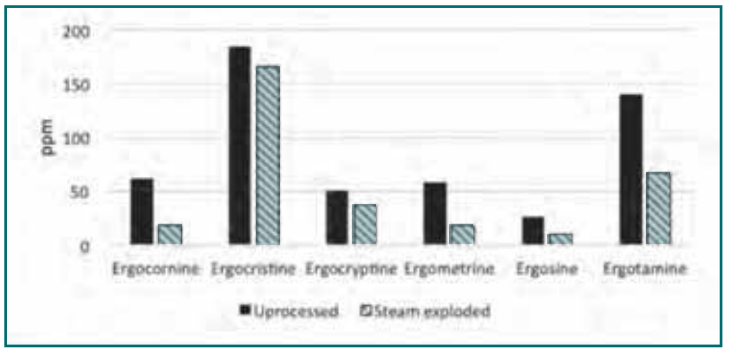

Figure 2: The effect of steam explosion on ergot alkaloid content (ppm) of heavily contaminated rye screenings

What We Found

Pelleting and steam explosion reduced the ergot concentration of heavily contaminated rye to approximately 75 - 85% and 60% of the original concentrations respectively. (Figures 1 and 2). Similar results were found with wheat screenings (Figure 3) as steam explosion (at 200 psi) resulted in a 55% reduction in total ergot alkaloid content, and steam explosion, preceded by soaking for 40 minutes reduced this by an additional 5%.

Performance

Overall (d0 to 28) growth, feed intake and feed efficiency of piglets fed diets with 0 to 4 ppm ergot alkaloids was similar among the ergot treatments. However, in the first week of the trial, growth rate and feed efficiency was reduced linearly by ergot, but only when the piglets received the unprocessed screenings. Piglets receiving the processed screenings, regardless of ergot levels had increased growth rates, feed intakes and feed conversion throughout the entire experiment.

Body temperatures

Body and rectal temperature was similar throughout the experiment in all treatments (Table 1). Pigs fed 1 ppm and 4 ppm of unprocessed ergot had a reduction of 3.78 °C and an increase

Table 1: The change in rectal, body, ears, and feet temperatures of nursery piglets fed processed and unprocessed ergot over 28 days

	Unprocessed		Processed		P-value				
Control	1 ppm	4 ppm	1 ppm	4 ppm	SEM	Process	Ergot	P*E[1]	
Rectal initial	38.18	37.68	38.15	38.29	38.57	-	-	-	-
Rectal change$_2$	1.43	1.70	1.43	-2.35	1.02	0.15	0.684	0.998	0.212
Body initial	35.03	34.97	35.08	35.54	35.35	-	-	-	-
Body change	-0.63	-0.33	0.25	-0.64	-0.63	0.36	0.235	0.434	0.360
Foot initial	29.71	32.51	30.61	32.17	30.56	-	-	-	-
Foot change	1.53	-1.88	1.82	-0.57	1.17	0.86	0.836	0.052	0.322
Ear initial	29.48	31.92	30.09	31.22	29.94	-	-	-	-
Ear change	1.78	-3.78	2.73	0.18	0.15	1.05	0.712	0.108	0.012

[1] Processing by ergot level interaction
[2] Temperature change from d1 to d28

of 2.7°C for their ear temperatures respectively; compared to the control diet having an increase of 1.8°C over the 28-day period. An interaction was between processing and ergot for ear temperature. (Table 1).

The foot temperature of pigs fed the control diet had an increase of 1.5°C from day 0 to 28. The pigs fed unprocessed ergot at 1 ppm inclusion had reductions in foot temperature of 1.88°C, while the 4 ppm had an increase of 1.82°C. For the processed ergot, pigs fed a 4 ppm inclusion had an increase of 1.17°C. Results indicate temperatures of the feet and ears were reduced when fed 1 ppm inclusions but increased when fed 4 ppm inclusions in their diet.

Implications

Severe processing can help reduce ergot alkaloid content and toxicity. The alkaloids responded differently depending on the cereal grain used, indicating that processing may affect grains differently when it comes to toxicity. Ergot only affected performance during the first week and had no effect in the following weeks, indicating piglets may have adapted to the ergot in their diets. The feeding trial confirmed that steam explosion reduced toxicity of ergot in pigs. It is not surprising that the body temperature was not affected by ergot inclusion since ergot typically affects the extremities rather than the core body temperature. However, it is unclear why pigs fed a greater inclusion of ergot had an increase in temperature in the ears and feet.

Extreme processing is a potential solution for reducing ergot contamination in cereal grains. While processing may be an extra cost for the producer, it is a possible strategy to reduce total ergot content enough to be within the maximum allowable inclusion rate, or to improve performance of pigs. Ergot contamination has previously required cereal grains to be downgraded or cleaned; steam explosion could have an economic benefit for producers by allowing them to feed these

grains to livestock without having major negative impacts on their animals. We are currently investigating less extreme processing conditions.

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Agriculture Development Fund

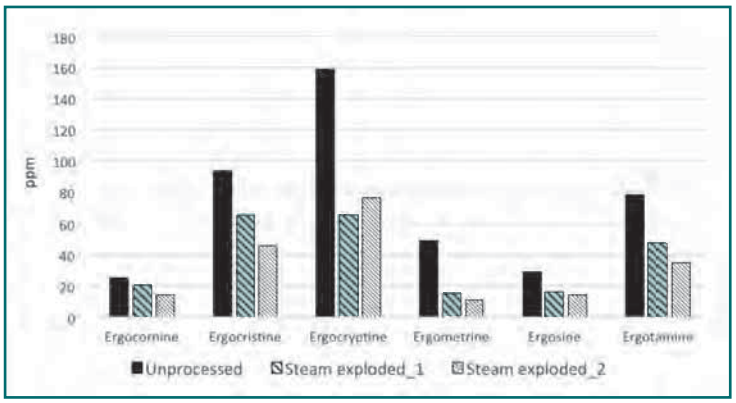

Figure 3: The effect of steam explosion (1) or steam explosion preceded by soaking for 40 minutes (2) on ergot alkaloid content (ppm) of heavily contaminated wheat screenings (approximately 434 ppm total ergot content)

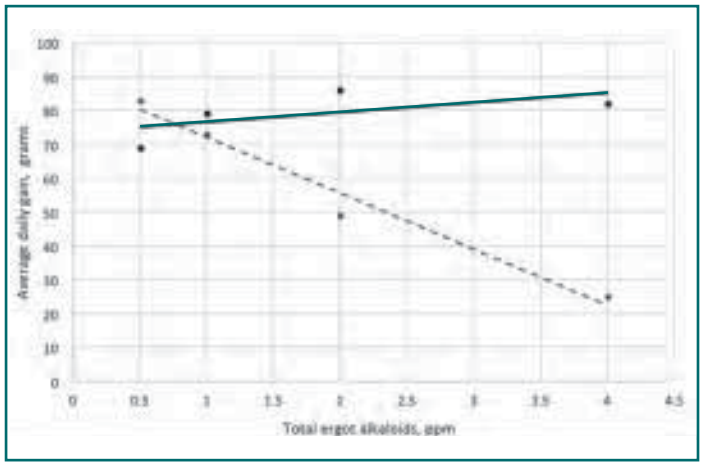

Figure 4: The effect of processing (steam explosion) heavily contaminated wheat screenings on the response of growing pigs, day 0 to 7 post weaning, to 0.5 to 4 ppm ergot alkaloids in their diet

Reducing Pre-Weaning Mortality

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A major welfare and economic issue in the swine industry is pre-weaning mortality (PWM). The incidence of PWM in Canada is often between 12 – 15%, though this can be lowered with the use of proper management tactics. PWM is increasing along with the continual increases in litter size due to more non-viable piglets being born. The sows' uterus has a specific capacity so if there are more piglets, there is less room for them to grow. Smaller piglets have a more difficult time staying healthy and extra care is often needed. There is no single cause for PWM; the sow, the environment and the piglets all need to be monitored. Staff presence is essential at the time of farrowing to reduce PWM. Other important factors to consider are heat, source of energy, piglet management and colostrum. The following article is based on management practices in place at the Prairie Swine Centre that help maintain the pre-weaning mortality at 12.3% with the goal of decreasing it to 9.6%.

Practical Tips from the Production Manager

Staff Presence/Labor

Having staff present is a crucial factor to help lower PWM. The production team should plan how more time can be spent in the farrowing room when it is needed. Before loading the farrowing rooms with sows, staff need to make sure that all the fans, heaters, nipple drinkers and feeders are working properly. Room temperature should be set up to 22.6°C for the sows comfort. Before farrowing starts, a drying agent (potato starch) needs to be applied in the creep area of the crate, and towels for drying piglets can be placed at the back of the farrowing crate. Two heat lamps in the farrowing crate should be turned on at 110 days of gestation, creating a 32-35°C microenvironment for the piglets.

Sows must be closely observed and checked in 30 minutes intervals during farrowing and staff may need to assist in farrowing and drying piglets off with a towel. Sows with a prolonged farrowing time may need special attention as well. Oxytocin can be used to start uterine contractions and speed up the farrowing process if needed. Try to avoid having piglets born later as they have a higher chance of suffering from hypoxia and poor colostrum quality. In instances when the sow is progressing quickly with labor, a drying agent can be poured directly on the piglets to help with the drying process.

Staff should closely observe the piglets' attitude and viability, and piglets are encouraged to latch on the teat within 30 minutes of being born. Low viability piglets, pale looking piglets or piglets born last in the littler should have extra attention. Depending on the number of animals farrowing and staff availability, colostrum can be collected and non-viable piglets should be syringe fed, preferably by their own dam's colostrum.
Piglets need to be given an energy source, so if colostrum from their own sow is not available, a different sows' colostrum can be used instead. When fresh or frozen colostrum is not available, an oral energy supplement, Pig Kare, can be used to give small piglets an energy boost. Colostrum should be fed 2-3 times per day at 10-20 ml per feeding per piglet (depending on the size of the piglet).

The decision to euthanize smaller piglets, 1 kg or less, is largely based on the piglet's demeanor. Some other factors to consider are splay piglets, pale piglets, and "dumbo" looking piglets that have neonatal abnormalities. The likelihood of their survival is very low, so the time and teats are saved for piglets that have a higher chance of recovery and survival. The most humane approach is to euthanize the piglets right away and give attention to the ones that could still have a chance to survive.

> "Having staff present is a crucial factor to lowering pre-weaning mortality."

Split Suckling

Split sucking is a very effective management tool that helps to reduce PWM. Our herd at the Prairie Swine Centre has highly productive sows that average 14.7 born alive, therefore we use split suckling on all the litters with 14+ piglets.
Split nurse during the day for the litters farrowed on the previous night or in the afternoon for the litters born that morning. Do not split nurse while the piglets are still wet. Heated boxes can be used to separate the heavier pigs so the teats are available for the lighter pigs, but ensure not to keep them separated longer then 1.5 - 2 hours at the time.

Non- Viable Piglet Management

For the piglets with reduced chance of becoming full value market hogs, try to establish a realistic goal whether or not to invest the time and effort as they often have a difficult time competing with their littermates, which may put them at disadvantage post weaning.

Based on the number of sows farrowing in the room, create a litter of light piglets 24 hours post farrowing, using a parity 2 or parity 3 sow as a nurse sow. Processing of the lightweight piglets should be postponed for 4-5 days. These litters need to be provided with extra starch under the creep cover as well as Pig Kare once a day.

Cross Fostering

Nurse sows can be used when the number of piglets born is greater than cross fostering can accommodate. Litters with 14-15 piglets can generally be left intact; given that the sow has a well-developed underline to support that many piglets. Litters should be as uniform as possible in relation to piglet size as well.

We do not induce sows, so the farrowing process often extends over a 5 to 7 day period. This can create challenges when cross fostering, as litters born at the end of the week may not be able to be cross-fostered within 24 hours. There should not be frequent disruptions of the litters as it may negatively affect the sow and milk let down. Depending on the litter sizes in the farrowing rooms, it can be very useful to put all the fall-behind piglets and extra piglets together 3-7 days after farrowing on a fresh sow.

Sometimes scours develop as a result of mixing. Starching the piglets and the mat while adding electrolytes greatly improves the piglets' condition, and scours often resolve within few days.

Our goal is to nurse 14-15 piglets farrow to wean and challenging the gilts to nurse 14-15 piglets to properly develop and stimulate all mammary glands.

Handling Defects

For splay-legged piglets, tape within 6 hours post farrowing. Make sure the microenvironment is up to proper standards and remove the tape 24-48 hours later. Success rate is higher on the bigger piglets as smaller piglets tend to get laid on overnight.

Preventing Savaging

Savaging is seen more in gilts and less in older sows. If this occurs, piglets can be placed in heated bucket until the sow settles in and calms down. Stresnil can be used to manage aggression as well. Sows should be monitored closely during farrowing as uterine contractions might slow down in these cases. It is ideal to minimize activities in the room, as this can be a trigger too. Once the sow is calm piglets can be put back on her.

The Bottom Line

Pre-weaning mortality needs to be reduced in order to increase the welfare of the animals and the profits associated with them. There are many management techniques that can be put in place to help decrease PWM. Having staff present during farrowing may be the most beneficial technique, as problems can be detected and solved much sooner.

Staff Presence/Labor	• Farrowing room temperature should be set to 22.6°C • Ensure staff are present during farrowing, check on sows in 30 minute intervals
	• Use a drying agent and towels to keep piglets dry • Heat lamps should be used at 32-35°C • Use oxytocin if the farrowing process needs to be faster • Syringe-feed colostrum to low viability piglets • Euthanize piglets who will not survive
Split Suckling in a litter	• Split suckling can be done if there are more than 14 piglets • Split nurse in the day if born the previous night • Split nurse in the afternoon if born in the morning • Place heavier pigs in a heated box for a maximum of 2 hours
Non-Viable Piglet Management	• Create a litter of lighter piglets on a parity 2 or 3 nurse sow • Postpone piglet processing for 4-5 days • Provide extra starch and Pig Kare once a day
Cross Fostering	• Nurse sows can be used if there are over 15 piglets • Separate so that each litter has a fairly uniform piglet size • Cross-foster within 24 hours if possible
Handling Defects	• Tape splay-legged piglets
Preventing Savaging	• Remove piglets and place in heated area away from sow • Stresnil can help manage sows' aggression • Minimize activities in the room

(Does Creep Feed Have any Benefit.....cont'd from page 6)

Post-weaning Performance (Table 3)

Pigs that received creep feed pre-weaning had slightly increased ADG in the first week post-weaning, with no differences based on creep feed type provided. There was no difference in performance after the first week and no effect on ADG throughout the entire nursery period or on final body weight.

Overall, there appears to be little benefit to providing creep feed under the conditions of the current study. It should be noted, however, that the data presented are averages for litter (or pen) and does not account for potential positive effects of creep feed on individual piglets. Previous work has indicated there may be a benefit of providing creep feed, but only in those piglets that actually consume it. Another factor to consider - while creep feed had no benefit on overall pig growth, there may be other benefits that were not determined in this study. For example, quicker adaptation to feeding and adjustment to plant-based diets vs. milk may help to improve gut development and health, improving long-term robustness of the pig. Future work should focus on the non-growth impact of provision of creep feed.

Results indicate piglets had no preference between the simple or complex creep diets. Intake of both creep types was similar in the SCC group that had access to both diet types.

The Bottom Line

Piglets showed no preference for simple or complex creep feed. Providing creep feed had little impact on pre-weaning performance, with increased ADG only in the final week pre-weaning. While there was a slight benefit to providing creep feed on growth performance in the first week post-weaning, this was not maintained through the nursery period.

Further research is required to determine the impact of creep feed on individual pigs and to determine if increasing the number of pigs consuming creep feed will improve the potential benefits of provision of creep feed.

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Personal Profile

Micah Sapaden,

Engineering M.Sc. student

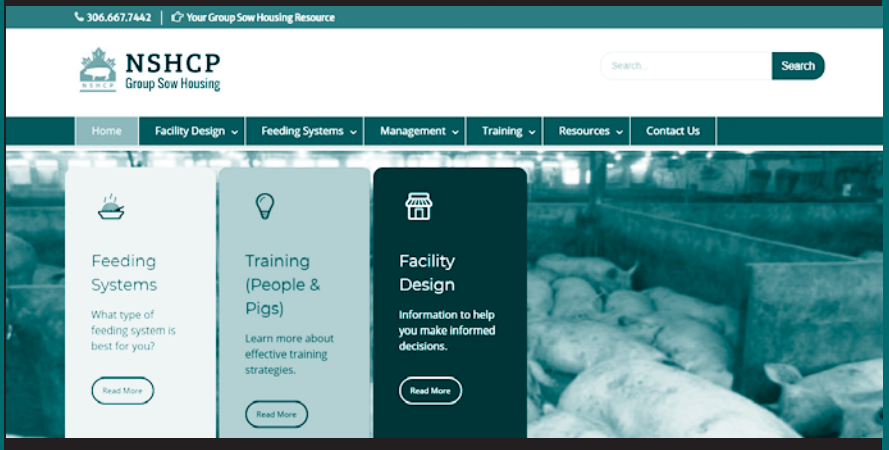
Micah has a degree in Electrical Engineering from Mariano Marcos State University in the Philippines and has worked in the fields of solar renewable energy and building construction from 2017 to 2019. She developed an interest in livestock animals while growing up on the outskirts of her home town in the Philippines. She started on her M.Sc program in Biological Engineering at the Department of Chemical and Biological Engineering at the University of Saskatchewan in January 2020. Under the supervision of Dr. Bernardo Predicala, she will be working on the "Optimization and evaluation of a prototype trailer to enhance the biosecurity and welfare of livestock animals during transport." The enclosed prototype trailer was built with filtered air ventilation system, which she will evaluate for efficacy in protecting transported animals against the threat of airborne diseases. Micah plans to pursue a career in swine biosecurity and welfare after she completes her Master's degree.

Coming Events

Events for this summer and fall are currently being scheduled. Check prairieswine.com at a later date for more information. Dates will be posted when they become available.

Group sow housing resources at your fingertips.

GroupSowHousing.com
has the information you are looking for.



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