centred on SWINE

PRAIRIE SWINE CENTRE

Summer 2019 Volume 26, Number 1

What is the Long Term Impact of Feeding DON to Finishing Pigs?

Dan Columbus, PhD,
Research Scientist,
Prairie Swine Centre, Inc.,

Mycotoxins continuous concern for agriculture

Mycotoxin-contaminated grains are commonly downgraded for use in livestock feed. While the best strategy for livestock producers is to avoid feeding mycotoxin-contaminated grain altogether, with the increased incidence and level of contamination this is no longer a viable option. The mycotoxin, deoxynivalenol (DON), is of significant importance to agriculture since it commonly contaminates corn, wheat, oats, and barley and is one of the most prevalent mycotoxins worldwide. Therefore, strategies which allow the use of mycotoxin-contaminated grains in livestock feed are necessary.

The majority of studies examining the effects of mycotoxins in swine are performed in young (e.g., weaned) animals with the assumption that the effects of consuming mycotoxin-contaminated feed is highest in the young animal.

(What is the long-term ... continued on page 2)

Inside This Edition

Program funding provided by

Sask Pork · Manitoba Pork · Alberta Pork · Ontario Pork · Saskatchewan Ministry of Agriculture

(What is the long-term... continued from pg.1)

Moreover, previous studies have examined the impact of mycotoxins over a relatively short period of time. It is possible that due to the higher feed intake in grower-finisher pigs and longer possible exposure time that the effects of mycotoxins may be greater in this stage of production. However, it has also been suggested that the effect of mycotoxin intake is reduced in grower-finisher pigs and that older pigs may have the capacity to adapt to DON-contaminated feed, with feed intake and growth performance recovering after a period of exposure. We wanted to examine the impact of long-term feeding of graded levels of DON in finisher pigs to determine whether pigs have the ability to adapt to DON-contaminated feed and the economics of reduced growth performance.

What we did

A total of 200 pigs (initial BW of 76.6±3.9 kg) were housed in groups of 5 pigs/pen and randomly assigned to 1 of 4 dietary treatments over 2 blocks (n=10/trt). Dietary treatments consisted of a control diet with no DON contamination (CON), or 1 of 3 DON-contaminated diets containing 1, 3, or 5 ppm DON (DON1, DON3, DON5). DON contaminated diets were achieved by the addition of an appropriate amount of naturally-contaminated wheat and wheat screenings at the expense of clean wheat. All diets were formulated to be isonitrogenous and isoenergetic and to meet or exceed nutrient requirements (NRC, 2012) and both feed and water were provided ad libitum. Body weight and feed intake were measured on a weekly basis for 6 weeks for determination of average daily gain, average daily feed intake, and feed efficiency (gain:feed).

Table 1. Growth performance of finisher pigs fed diets containing graded levels of DON for 6 weeks

	CON	DON1	DON3	DON5	SEM	P-value
Body weight (kg)						
Day 0	76.9	77.0	76.3	76.0	1.18	0.917
Day 7	85.4^{a}	84.8^{a}	83.0^{b}	80.8^{c}	0.34	<.0001
Day 14	95.3^{a}	95.3^{a}	92.4^{b}	88.7^{c}	0.42	<.0001
Day 21	103.4^{a}	103.8^{a}	99.8^{b}	95.7^{c}	0.50	<.0001
Day 28	112.1^{a}	111.9^{a}	107.8^{b}	103.0^{c}	0.53	<.0001
Day 35	119.7^{a}	119.8^{a}	114.9^{b}	110.4^{c}	0.63	<.0001
Day 42	126.7^{a}	126.9^{a}	123.6^{b}	118.5^{c}	0.80	<.0001
Average daily gain (kg/d)						
Week 1	1.27^{a}	1.18^{a}	0.93^{b}	0.60^{c}	0.05	<.0001
Week 2	1.40^{ab}	1.49^{a}	1.33^{b}	1.13^{c}	0.04	<.0001
Week 3	1.17^{ab}	1.21^{a}	1.06^{b}	1.01^{c}	0.04	0.004
Week 4	1.24^{a}	1.17^{ab}	1.15^{ab}	1.04^{b}	0.04	0.033
Week 5	1.08	1.12	1.01	1.06	0.04	0.392
Week 6	1.06	1.00	1.20	1.14	0.06	0.116
Overall	1.19a	1.20^{a}	1.12^{b}	1.00^{c}	0.02	<.0001
Average daily feed intake (kg/d)						
Week 1	2.59^{a}	2.59^{a}	2.22^{b}	1.70^{c}	0.06	<.0001
Week 2	2.98^{a}	3.07^{a}	2.89^{a}	2.55^{b}	0.07	<.0001
Week 3	3.03^{a}	3.03^{a}	2.88^{a}	2.56^{b}	0.05	<.0001
Week 4	3.25^{a}	3.19^{a}	3.13^{a}	2.85^{b}	0.05	<.0001
Week 5	3.22	3.20	3.19	3.04	0.06	0.222
Week 6	3.19	3.11	3.36	3.05	0.08	0.079
Overall	2.99^{a}	3.06^{a}	2.94^{a}	2.60^{b}	0.05	<.0001
Gain:Feed (kg/kg)						
Week 1	0.49^{a}	0.46^{a}	0.41^{a}	0.34^{b}	0.02	<.0001
Week 2	0.47	0.49	0.47	0.44	0.01	0.136
Week 3	0.38	0.40	0.37	0.40	0.01	0.518
Week 4	0.38	0.36	0.37	0.36	0.02	0.738
Week 5	0.33	0.35	0.32	0.35	0.01	0.211
Week 6	0.33	0.32	0.36	0.37	0.01	0.083
Overall	0.40	0.39	0.38	0.38	0.01	0.073

^{a,b,c,d} Means within a row without a common superscript differ significantly ($P < 0.05$)

What we found

Compared to CON fed pigs, body weight was reduced in pigs fed the DON3 and DON5 diet from week 1 to the end of the study. Average daily gain was reduced on the DON3 and DON5 diets for the first 3 weeks of the study but recovered by week 4 for DON3 and week 5 for DON5. Average daily feed intake was reduced only in week 1 for pigs fed DON3 and DON5 diets and only in DON5 fed pigs up to week 4, whereas afterwards ADFI was the same across diets. Feed efficiency was only reduced for DON5 fed pigs in week 1. There was no difference between CON and DON1 fed pigs for any measures.

> “Based on project results, it would appear that pigs have the ability to adapt to DON-contaminated diets.”

What does this mean?

While it has been suggested that deoxynivalenol can have a significant impact on animal physiology, with negative effects on gut health, protein synthesis (lean gain), and organ function, the results observed in the present study suggest that the reduction in performance is mostly related to the reduction in feed intake observed immediately after introduction of the experimental diets. Indeed, while feed intake was reduced for up to 5 weeks in DON-fed pigs compared to control fed pigs, feed efficiency was only reduced in week one, suggesting that the capacity for growth is not affected in these pigs but feed intake is insufficient to support maximum growth. While there was an immediate reduction in feed intake, growth performance, and feed efficiency, these parameters had recovered by week 4, for DON3-fed pigs, and week 5, for DON5-fed pigs. Based on these results, it would appear that pigs have the ability to adapt to DON-contaminated diets. While feed intake and growth performance had recovered to the level of CON-fed pigs, body weight never recovered.

Economics

Initial results indicate margin over feed costs may not differ between 1, 3, and 5ppm DON contaminated diets. While feeding diets containing 3 and 5 ppm DON resulted in a lighter hog at market resulting in lost revenue up to $20/hog – feed consumption was also reduced by approximately $20/hog resulting in little change when comparing margin over feed cost. It is important to note individual grading grids may have a significant impact on the change relative to margin over feed cost.

Take Home Message

Overall, it may be possible to feed diets containing higher levels of DON than currently recommended, however, adjustments may be needed to account for reduced performance.

Acknowledgements

Funding for this research was provided by Saskatchewan Ministry of Agriculture and the Canada-Saskatchewan Growing Forward 2 bi-lateral agreement, Biomin Holding GmbH, Saskatchewan Barley Development Commission, and Mitacs. General program funding provided to Prairie Swine Centre by Saskatchewan Pork Development Board, Alberta Pork, Manitoba Pork, Ontario Pork, and the Government of Saskatchewan.

Can Trailer Design Effectively Reduce Disease Transmission?

Bernardo Predicala, PhD, Research Scientist – Prairie Swine Centre

Addressing an Industry Need

In response to an industry need for a livestock vehicle that addresses both increased animal welfare and biosecurity during transport, a prototype air-filtered trailer was designed and assembled. The project set out to select the best possible option for a swine transport trailer which reduces or prevents the risk of airborne disease transmission and at the same time address issues commonly encountered on existing trailer designs such as animal welfare, ease of maintenance as well as trucker/worker well-being. An industry questionnaire gathered input on observed strengths and deficiencies of the conventional commercial swine transport trailers and was distributed to a number of stakeholders involved in pig transportation and researchers. Additionally, desired features and preferences for an improved swine transport trailer were gathered and formed the basis for the initial new trailer design. Multiple design configurations were narrowed down using computer simulation with the most promising trailer design being developed as a prototype.

Trailer Design

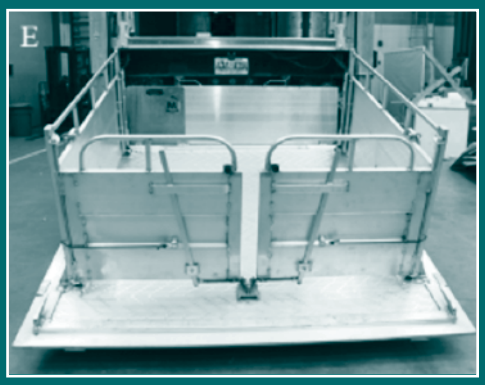
The final design featured a transport trailer with two separate compartments: front compartment that houses generator set, a bank of 6 air filters, ventilation controller, supplemental heater, and two axial fans. The livestock compartment (Figure 1) has solid walls, in contrast to conventional livestock trailers where side vents are present throughout the entire length of the trailer. It has two straight decks each divided by a gate into two compartments (front and rear). Both bottom and upper decks are 3′5″ in height. The middle portion of the floor of the upper deck is hinged and can be lifted up to allow easier loading, unloading

(A) lower and upper decks

(B) hinged roof

C) gate that partitions each deck into two compartments

(D) air exhaust damper



(E) hydraulic loading platform

Figure 1. Photos of the animal compartment

or other activities (i.e., trailer cleaning, washing, inspection, etc.) in the bottom deck. Similarly, the middle portion of the trailer roof is hinged for the same purpose in the upper deck. Additionally, pneumatic cylinders are installed on these hinged panels of floor and roof for easier lifting and closing of these movable parts. To address animal handling and welfare issues arising from use of ramps in the conventional livestock trailer, a 1000-kg capacity hydraulic loading platform was added in the prototype trailer.

Trailer Efficiency

Based on this design, the prototype trailer was assembled and evaluation of the effectiveness of the installed air filtration system (MERV-8 pre-filter and MERV-16 main filter) showed overall reduction of 96.9% in concentration of aerosolized model virus (bacteriophage Phi X174) inside the animal compartment relative to upstream of the filter (Figure 2). In addition, over two monitoring trips with pigs loaded, the trailer showed the mechanical ventilation system was able to maintain the desired thermal conditions within the animal compartment. Supplemental heating unit helped to ensure that the temperature in the animal compartment did not go lower than 10°C during the trips under winter conditions. However, events during the trip (slowing down or full stops due to traffic stops) affected environmental conditions inside the trailer. However desired conditions were quickly restored once the trip resumed - when the mechanical ventilation control system enabled compensation for relative humidity and carbon dioxide levels in the animal compartment in addition to the conventional temperature-based control.

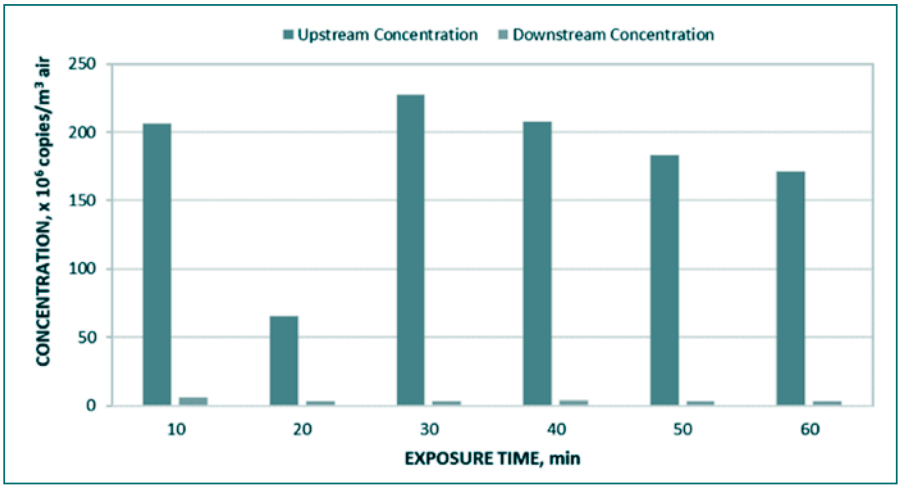


Figure 2. Total bacteriophage Phi X174 (in genome copies/m3 of air) detected by qPCR. Each bar represents average concentration of the surrogate virus in the air sampled using 37-mm cassettes loaded with polycarbonate filters from four replicate trials.

(F) hydraulic system showing motor, pump, controller and power supply,

(G) exterior of the assembled compartment.

Cost Analysis

Cost analysis of the air-filtered trailer (prototype) including equipment, installation, operational and filter maintenance costs, yielded a payback of 2.10 years assuming a $5 premium per pig for transporting pigs using an air-filtered trailer. From this first effort on design and development of this new transport trailer, various points for optimization of the prototype have been identified to facilitate continuing work to further improve the efficiency of the trailer and to bring the overall trailer design closer to commercialization.

Next Steps

The next step is to fully gain the confidence of livestock producers to adopt and utilize this design, it is strongly recommended that the air-filtered trailer is ultimately tested against a disease challenge, wherein the performance of the trailer in protecting the animals being transported is assessed when the trailer is actually exposed to conditions known to certainly cause airborne transmission of disease. For more information on this project please visit prairieswine.com.

Acknowledgements

We would like to acknowledge the financial support for this research project from the Saskatchewan Ministry of Agriculture and the Canada-Saskatchewan Growing Forward 2 Bi-lateral Agreement and the Canadian Agrisafety Applied Research Program funded by Agriculture and Agri-Food Canada. 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.

Group Sow Housing Feeding Systems

PRO

Determining which grou
from, and no hard rules
Combined with the Gro

Category	Floor Feeding	Shoulder Stalls
Space Allowance	**Pro:** Moderate space requirement	**Pro:** Moderate space requirement
Cost	**Pro:** Low cost	**Pro:** Low cost
Daily Management	**Pro:** Low tech **Con:** High management input to sort groups, find and manage dropouts	**Pro:** Low tech **Con:** High management input to sort groups, find and manage dropouts
Training	**Pro:** No sow training	**Pro:** No sow training
Social/Welfare	**Con:** High aggression and competition	**Con:** Aggression and competition
Other	**Con:** Over feeding used to reduce aggression	**Con:** Over feeding used to reduce aggression

s & Cons

PRAIRIE SWINE CENTRE | 25 YEARS

up housing system to use can be a daunting task. There are multiple systems to choose to follow. This chart outlines some of the pros and cons of each of the different systems. up Housing Decision Tree, this should help you decide which system fits your needs.

ESF	Free-Access ESF	Free-Access Stalls
Pro: Low space requirement	**Pro:** Low-moderate space requirement	**Con:** High space requirement
Con: Moderate to high cost	**Con:** Moderate cost	**Con:** High cost
Pro: Automated management **Con:** Technical expertise, ear tags	**Pro:** Automated management **Con:** Technical expertise, ear tags	**Pro:** Low management input **Con:** Low tech
Con: Training required	**Con:** Some training required	**Pro:** No sow training
Pro: Individual feeding **Con:** Sows compete at feeder	**Pro:** Individual feeding **Con:** Sows compete at feeder	**Pro:** Individual feeding **Con:** Many sows remain in stalls
Pro: Automated sorting, heat checking, 'precision farming'	**Pro:** Automated data collection, 'precision farming'	**Con:** All sows in a group get same feed amount

Practical Environmental Enrichment Strategies for Piglets

Hayley Bowling,
Western College of
Veterinary Medicine

Jennifer Brown, PhD,
Research Scientist -
Prairie Swine Centre

During the summer of 2018, undergraduate student Hayley Bowling carried out a research project at the Prairie Swine Centre that examined effective and practical ways of enriching piglets in farrowing and nursery. Recent interest in environmental enrichment stems from the National Farm Animal Care Council's 2014 update to the Canadian Code of Practice for the Care and Handling of Pigs which states that all pigs must have "multiple forms of enrichment that aim to improve the welfare of the animals through the enhancement of their physical and social environments." Pens in commercial barns severely restrict pigs' innate foraging behaviours. The lack of enrichment can lead to problematic behaviours such as tail-biting and belly-nosing and there is a need for practical and cost-effective solutions that producers can implement.

Pigs are intelligent and curious from birth, and the lactation and nursery periods are critical for their mental and physical development. Despite this, research on suitable enrichments for piglets is lacking. Research that has been done found that piglets given enrichment had increased play and exploratory behaviours and decreased aggression, tail-biting, and belly-nosing. There is also some evidence of improved growth and meat quality when pigs are given enrichment, so there is potential for enrichment to benefit production as well as welfare.

Unfortunately, most previous research on enrichment for pigs has been done using substrates such as straw. While straw is effective and attractive to pigs, it isn't feasible for most Canadian barns because of biosecurity risks and slatted flooring systems. The project therefore looked at enrichment alternatives such as commercially available pig toys hung from chains, segments of PVC pipe, hanging knotted cotton rope, rubber mats, and hay cubes. To help maintain pigs' interest, three or four objects were provided at once, and the set of enrichments was rotated twice per week.

Thirty litters were used for the experiment: ten litters received enrichment only in the nursery (from 4-8 weeks of age), ten received enrichment both pre-weaning and in the nursery, and ten received no enrichment. All piglets were weighed shortly after birth, at weaning (approximately 28 days of age), and at 8 weeks. Video cameras were used to record piglet behaviour in their nursery pens at weaning, two weeks post-weaning, and four weeks post-weaning. Skin lesions were recorded before weaning, 24 hours post-weaning, and four weeks post-weaning. Finally, the pigs' fear of humans was assessed by measuring their latency to approach and contact a human.
Results showed that piglets given enrichment before weaning showed less pen-mate manipulation (tail-biting, ear-biting, belly-nosing, etc.) and tended to fight less at weaning than the other pigs. This is important because weaning is stressful for piglets, so anything that can help to reduce weaning stress has the potential to benefit their health, welfare, and productivity throughout the nursery and beyond. Similarly, piglets that were given enrichment only in the nursery had fewer head and shoulder lesions at four weeks post-weaning than the other groups, indicating that they fought less towards the end of the nursery phase.

> "Pigs with enrichment spent more time exploring their pens at three weeks post-weaning, indicating that they were more engaged with their surroundings"

(Practical Environmental... continued on pg.11)

What can the Web Calculator do for me?

Abisola Omoniyi, MBH, Research Assistant, Canadian Centre for Health & Safety in Agriculture

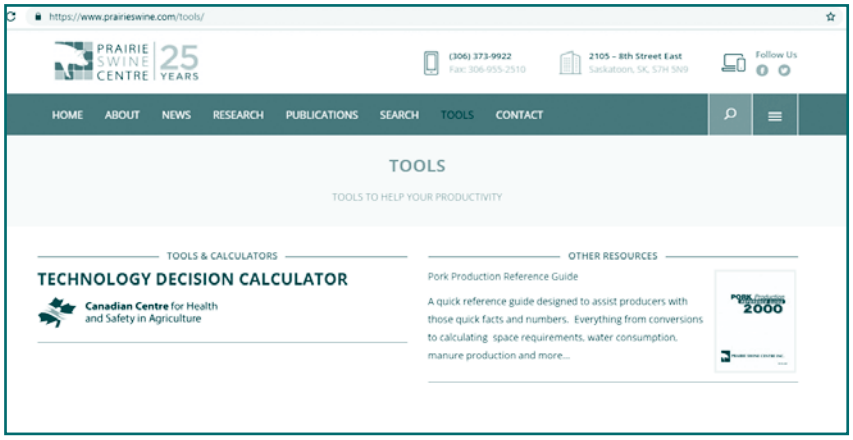
Applying the Technology Decision Calculator for Swine Operation

New technologies are constantly being introduced into barns due to promised benefits and enhanced profitability. However, these innovations can also introduce new challenges and costs, such as the impact of new technologies on worker health and safety. So how do you know if it will work in your specific situation? Prairie Swine Centre and the Canadian Centre for Health and Safety in Agriculture have collaborated to develop a simple, personalizable web calculator that can help predict the value of technology adoption. This multidimensional tool incorporates implementation costs, productivity, and health and safety impacts, and was developed to help forecast the overall benefit of investing in new technology.

Visit the technology decision calculator online to see if that new tool, equipment, or process has what it takes to be profitable in your barn. In a few simple steps, you can fill in the inputs and click on the 'calculate' button to get a personalized result presented as incremental cost-benefit ratio. The incremental cost benefit ratio shows the difference between the current situation and what is obtainable with the new technology; values greater than one indicate profitability, while values less than one indicate the proposed technology isn't a good bet. In addition to the incremental cost-benefit ratio for over the life span of the new technology, the printable report delivers a range of estimates based on different pork prices and cost and benefit variance.

The technology decision calculator was developed based on the test case of needle-less injectors, the topic of a research study at the Canadian Centre for Health and Safety in Agriculture. In many cases, it is not possible to know in advance what all the costs will be. Since it is not always possible to get precise costs when estimating the amount of labour, maintenance, and productivity increases, this tool also provides information to allow for educated estimates. We provide background information, things to consider, and the dollar-value results from the needle-less injector study. Of course, each new technology is different, but it is hoped that this background information will allow you to make an educated guess about the numbers for your enterprise.

Of course, all model reports are estimates and not a guarantee. The model cannot account for all possible variables and is only as accurate as the numbers given as inputs. This tool allows you to select the range of certainty for your cost estimates, resulting in a range of potential cost-benefit estimates. The lowest estimates from cost benefit analysis are considered the most conservative, i.e. the worst-case scenario. If the conservative 'worst case scenario' is still profitable, then the model projects that your organization would still benefit from the new technology even with the worst combination of costs and benefits. You can also re-run reports for different values, and see how small differences can add up.
We invite you to try using this web calculator for your next project and see how it works.
We would love to hear your feedback!



Access the technology decision tool via the Prairie Swine Centre 'Tools' website.

To learn more about the needle-less injector study, visit our study website.

With questions or feedback about the tool, feel free to contact us directly:
Abisola Omoniyi, Study Coordinator (+1306 966 5971, email: abisola.omoniyi@usask.ca)

Practical alternatives for managing castration pain in piglets

J.A. Brown[1,2]
Y.M. Seddon[1,3]
J. Stookey[3,]
Terry O'Sullivanand[4]
and E.L. Davis[1,3]

1 Prairie Swine Centre,
2 Department of Animal and Poultry Science, University of Saskatchewan,
3 Western College of Veterinary Medicine, University of Saskatchewan,
4 Ontario Veterinary College

Castration is a common procedure performed at an early age to prevent the development of boar taint, an unpleasant smell and odor in pork from intact males. Additional reasons for castration include reduction of aggression and mounting behaviour and improved animal handling. Research has determined that piglets experience significant pain and stress during the procedure, and that pain may last for up to five days thereafter (Taylor and Weary, 2000, Marchant-Forde et al., 2014). To address this problem, the Canadian Code of Practice for the Care and Handling of Pigs requires that castration be done with analgesics to help control post-procedural pain (NFACC 2014). Furthermore, if piglets are castrated over 10 days of age, the Code requires that both an analgesic (to control pain following castration, eg meloxicam) and an anesthetic (to reduce local sensation during the procedure, eg lidocaine) must be provided. While considerable research has been done on management of pain in pigs following castration (Hay et al., 2003; Sutherland et al., 2012; O'Connell et al., 2014), few clear recommendations are available.

The Canadian Code of Practice for the Care and Handling of Pigs (NFACC 2014) has requirements for pain control at castration, but does not provide specifics regarding the appropriate analgesics or protocols for their administration. The Canadian Veterinary Medical Association (CVMA) and Canadian Pork Council (CPC) have provided some guidance on appropriate drugs and dosage, however, several questions remain. The NSAID drug Metacam has received regulatory approval for treating pain at castration, but other options such as ketoprofen and acetaminophen may also be effective. Castration is normally performed in piglets at 3 to 5 days of age. Some studies have suggested that castration may be less stressful in older pigs, but clear evidence is lacking. Also, the timing of drug administration has been questioned: providing pain control 30 min prior to castration may be more effective. However, producers would then need to handle pigs twice and coordinate injection and castration times at processing, and so producers would prefer to provide analgesia at the time of castration. The overall objective of this project was to determine optimal procedures for controlling post-procedural pain in piglets at castration. Three specific objectives were: 1. to compare the effectiveness of different analgesics; 2. to study the effect of piglet age at castration on pain responses, and; 3. to study the timing of drug administration.

What did we do?

Castration of male piglets is known to cause pain during the procedure and for hours or days during recovery. As of July 1, 2016, the Canadian Code of Practice has required that swine producers provide analgesics to piglets at castration to alleviate post-procedural pain. However, complete information on the analgesic drugs available, their effectiveness and appropriate methods of delivery is not available. The objective of this research was to evaluate drugs and administration procedures

> "The overall objective of this project was to determine optimal procedures for controlling post-procedural pain in piglets at castration. "

to help identify effective and practical pain control strategies for piglets at castration. Three studies were performed: the first study compared the effectiveness of three non-steroidal anti-inflammatory drugs (NSAIDS) on treatment of post-castration pain. The second study examined the effect of age at castration (3 vs 10 days) on piglet's responses to castration when provided pain control or not. Study 3 compared the effectiveness of providing pain control 1 hour before the procedure to providing pain control immediately before castration, which would facilitate implementation of the procedure on-farm.

Behavioural and physiological responses were measured in each study. Of the behaviour measures studied, only tail wagging behaviour in Study 3 showed a tendency for interaction between treatment and time point. At 20 min after castration, piglets that were castrated did more tail wagging that those that were sham handled only. Behaviour measures using a specially designed-handling chute were not reliable. Cortisol results in blood were more informative. Study 1 showed higher cortisol concentrations at 45 minutes after treatment in castrated piglets compared with

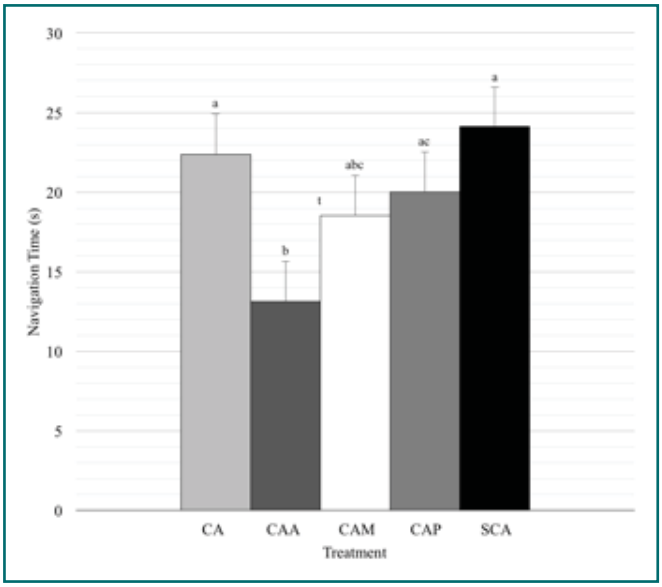


Figure 1: Study 1. Overall navigation time after treatment. Average of chute runs at 15, 40, 60 and 120 minutes post-treatment (LS means ± SEM in sec) for pigs given one of five treatments. Treatments: CA: castration control; CAA: castration with ketoprofen; CAM: castration with meloxicam; CAP: castration with paracetamol; and SCA: and sham castration. Bars with different superscripts are significantly different, P ≤0.05.

those that were sham castrated, with piglets given pain control being intermediate. Studies 2 and 3 also showed an increase in cortisol concentrations following castration with higher levels in castrates compared to sham castrates. Comparing cortisol responses in pigs castrated at 3 and 10 days of age, older piglets showed lower cortisol levels overall and a greater effect of analgesia on reducing cortisol levels. In Study 3, providing analgesia 1 h before castration resulted in significantly lower cortisol levels compared to pigs that did not receive analgesia. Providing analgesia immediately before castration was also significantly better than providing no analgesia, but was not as effective as provision at 1 hour prior. We conclude that the analgesic, ketoprofen, has a positive effect on reducing pain following castration when given 30 minutes to 1 hour before castration. Drug provision immediately before castration appears to be better than providing no pain control. Older piglets showed a clearer response when given pain control than young piglets, and could be used as a model for evaluating pain control options.

Conclusions

A number of conclusions and recommendations can be drawn from this project. First of all, we can conclude that, based on this work and previous studies, both meloxicam and ketoprofen can reduce cortisol levels following castration. In addition:

1. Providing ketoprofen 1 h before castration is more effective than administering the drug immediately before castration.
2. Pigs castrated at 10 days of age show lower cortisol levels in response to castration than pigs castrated at 3 days.
3. Providing ketoprofen to pigs castrated at 10 days of age had a greater effect on reducing pain than providing ketoprofen to pigs castrated at 3 days of age.
4. The handling chute used as a behavioural measure in these studies is of limited value.

Acknowledgements

We would like to acknowledge the financial support for this project from the Saskatchewan Agriculture Development Fund and Sask Pork. 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.

(Practical Environmental... continued from pg.8)

Additionally, pigs with enrichment spent more time exploring their pens at three weeks post-weaning, indicating that they were more engaged with their surroundings. Pigs enriched post-weaning also showed reduced fear of humans, which has implications for both welfare and ease of handling.

No difference in growth between the groups was found, however previous research indicates that the effects of early enrichment on growth are be greater later in the pigs' lives. Pigs in this trial were not followed after 8 weeks of age. Therefore, more research should be carried out regarding the long-term growth and welfare effects of enrichment.

Of the objects used, the hanging knotted cotton rope was the most popular. Pigs are known to prefer malleable objects that they can chew and destroy because these qualities allow them to express their instinctive rooting and foraging behaviours. The attractiveness of the rope and its low cost make it a viable alternative to substrates such as straw. However, the drawback of destructible enrichments such as rope is the fact that they need to be replaced regularly, which may make them more labour intensive than something that can be used for a longer period of time. If a more durable option is desired, commercial pig toys hanging from chains were also attractive to the piglets and required significantly less labour, however they involve a higher initial cost. Both the rope and the pig toys had the advantage of being suspended off the ground and were not soiled by feces, unlike the rubber mat and PVC pipe which were placed on the floor of the pen.

This study indicated that for producers looking to implement physical enrichment in their barns, a rotation of several inexpensive objects can be effective to increase exploration and reduce manipulation of pen-mates among piglets. Environmental enrichment for piglets is an exciting area of research because it also has potential to improve pig health, productivity, and public perception of the swine industry as a whole.

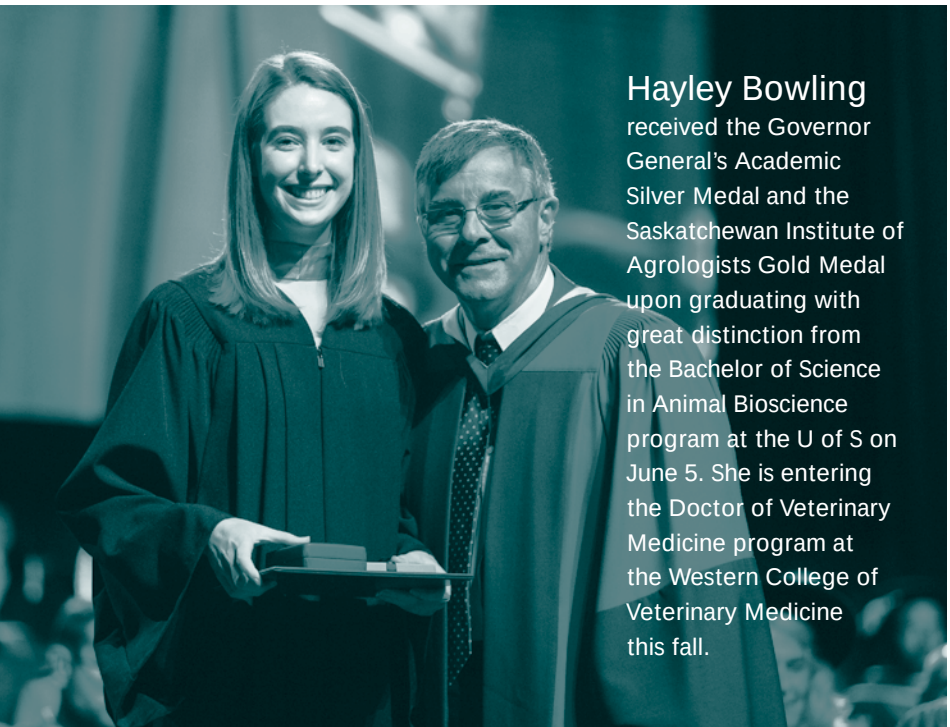
This research project was funded by an NSERC Undergraduate Student Research Award and by Prairie Swine Centre.

Personal Profiles

Young Scientist Award

Dr. Dan Columbus
Prairie Swine Centre

Dr. Dan Columbus was recently presented the Canadian Society of Animal Science Young Scientist Award. He is a Research Scientist in Nutrition at Prairie Swine Centre and Adjunct Professor in the Department of Animal and Poultry Science at the University of Saskatchewan. Dr. Columbus completed his BSc, MSc, and PhD from the University of Guelph in 2004, 2008, and 2012, respectively. He then completed a Postdoctoral Fellowship at the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine. He joined the Prairie Swine Centre in 2015 and became Research Scientist in 2016. Dr. Columbus' research focuses on the interaction of nutrition and health and nutrient utilization in swine and he has secured more than $4 million in research funding as PI and Co-I. His research is supported by NSERC, the Government of Saskatchewan, Alberta Agriculture and Forestry, and Swine Innovation Porc – Canadian Agricultural Partnership, among other agencies and industry sponsors. He currently serves as Western Director for the Canadian Society of Animal Science and as reviewer for several journals, including Journal of Animal Science and The Journal of Nutrition, and as Associate Editor for the Canadian Journal of Animal Science. He is involved in both undergraduate and graduate teaching and mentorship and has provided training to 20 HQP including undergraduate, graduate, postdoctoral, and research assistants. He has published 23 peer-reviewed scientific publications, 55 conference abstracts, and 13 industry publications. He has received 8 scholarships and awards including the NSERC Alexander Graham Bell CGS.



Hayley Bowling received the Governor General's Academic Silver Medal and the Saskatchewan Institute of Agrologists Gold Medal upon graduating with great distinction from the Bachelor of Science in Animal Bioscience program at the U of S on June 5. She is entering the Doctor of Veterinary Medicine program at the Western College of Veterinary Medicine this fall.

Coming Events

Alberta Livestock Expo
October 9, 2019
Lethbridge, Alberta

Red Deer Swine Technology Workshop
October 23, 2019
Red Deer, Alberta

Sask Pork Symposium
November 12 – 13, 2019
Saskatoon, Saskatchewan

Brandon Hog & Livestock Expo
December 11, 2019
Brandon, Manitoba

Banff Pork Seminar
January 7 - 9, 2020
Banff, Alberta

PRAIRIE SWINE CENTRE

Centred on Swine is a semi-annual newsletter produced by Prairie Swine Centre Inc. (PSCI).

Prairie Swine Centre Inc.
P.O. Box 21057, 2105 - 8th St. E.
Saskatoon, SK S7H 5N9 Canada

Tel:(306) 373-9922
Fax:(306) 955-2510
www.prairieswine.com

Prairie Swine Centre is an affiliate of UNIVERSITY OF SASKATCHEWAN