



## Swine welfare a hot topic in cold Banff

Miranda Smit, Ph.D.<sup>1</sup>  
Yolande Seddon, Ph.D.<sup>2</sup>

1 Prairie Swine Centre  
2 University of Saskatchewan,  
College of Veterinary  
Medicine

Just prior to the start of the Banff Pork Seminar, on January 9, while it was quickly becoming frigidly cold outside, discussions were taking place around animal welfare in modern pork production systems.

More than 40 pork producers, industry representatives and researchers came together for a research forum to hear the results generated from the Natural Sciences Engineering Research Council (NSERC) Industrial Research Chair (IRC) in Swine Welfare research program. The program is located at the University of Saskatchewan, led by Yolande Seddon. The forum

was hosted by Prairie Swine Centre, which played a key role in the establishment of the research Chair.

Seddon kicked off the meeting with an overview of the factors at play driving the conversation forward on animal welfare, including emerging regulatory changes. This includes the switch to group sow housing by 2029, as mandated by the National Farm Animal Care Council's (NFAACC) Code of Practice for the Care and Handling of Pigs, along with changes to the Health of Animals Regulations under the Health of Animals Act.

Transport regulation changes have come under fire from the industry, as changes are considered to be not fully informed by science, due to a lack of research in the area of swine transport.

*(Swine welfare a hot topic in cold Banff... cont'd on page 2)*

### Inside This Edition

Impact of dietary Calcium and Phosphorus on sow reproduction and bone development in piglets..... 4

Evaluation of a Pilot-Scale Electro-nanospray System for Decontaminating Pig Barns.....6

A Survey of Best Management Practices of Swine Farms Across Canada Part ..... 8

Personal Profile ..... 12

Program funding provided by



Saskatchewan  
Ministry of  
Agriculture



*The NSERC IRC in Swine Welfare program was on full display during a forum in advance of the Banff Pork Seminar.*

### Program created to address industry challenges

With the onset of regulatory changes for animal welfare, in 2015, the industry recognized the need to proactively respond, which prompted 14 partners in the Canadian pork value chain to come together with a vision to enhance collective understanding of welfare considerations.

The solution was the creation of a research Chair in swine welfare, providing resources to address current and future challenges. The University of Saskatchewan agreed to create a position at the Western College of Veterinary Medicine (WCVM) in Saskatoon, and following a competitive application process, including an international scientific review, NSERC matched industry funding to create the five-year program, which started in 2018 and is now wrapping up.

From the beginning, the objective was to conduct research to support sustainable pork production systems, with a focus on improving welfare in fully slatted reared pigs, including tools to measure and monitor welfare. Along with improving welfare of pigs on-farm, the program provides an opportunity to communicate progress on animal welfare within and outside of the industry.

This objective was split into four goals: 1) the impact of early life influences on sociability and resilience to stress of growing pigs; 2) the ability for play to induce positive emotions and immune response; 3) the identification of biological markers to indicate welfare; 4) and the examination of carcasses at processing to measure welfare.

During the forum in Banff, three PhD students and one postdoctoral fellow presented their research

results tied to the respective program goals.

### GOAL 1 - Early life management leads to long-term success

Siba Khalife looked at how early life management of pigs influences their long-term welfare in fully slatted systems. Pigs were provided enhanced management consisting of chewable materials to support normal foraging behaviour, intermittent positive human contact to reduce their fear of humans and additional space to support social skill development either in the farrowing room, nursery or both stages until 12-weeks-old, before returning to 'standard' production conditions and followed to slaughter.

Pigs provided with enhanced management in both the farrowing and nursery stage had higher lifetime weight gain thanks to

improved growth in the nursery period, and better handleability scores at the end of the nursery period, suggesting that modifications in early life management can have long-term positive effects.

### GOAL 2 - Play provides benefits beyond enjoyment

Understanding the role of play as it relates to disease resiliency and quality of life provides production benefits for producers and increases public trust for the entire industry.

Karolína Steinerová explored whether play behaviour can be used as a tool to enhance positive welfare and quality of life for pigs, while also supporting benefits for production.



*When pigs play, they're happier and healthier, which support their wellbeing and those who work with them in the barn.*

Research showed it's possible to stimulate play in pigs in a commercial environment beyond the age it naturally occurs – between two- to six-weeks-old – demonstrating the potential for the industry to promote this behaviour, characterized by spontaneous excitement with arousal. The research also collected data supporting the assumption that play is a positive experience for pigs, therefore increasing the evidence that play can be used as an approach to support positive welfare in commercial settings.

Since positive emotional wellbeing is associated with improved health and resilience in humans, an important aim of the research was to evaluate whether the same benefits can be realized by pigs, through play. Exciting findings reveal that when challenged with a Porcine Reproductive and Respiratory Syndrome (PRRS) infection, pigs reared with play opportunities had a more moderated immune response than control pigs – those reared without play – suggesting a lower inflammatory response.

Pigs reared with play and control pigs both fended off the PRRS virus at the same rate, but pigs reared with play gained more weight. Pigs reared with play also experienced lower respiratory distress and for less time, suggesting enhanced disease resilience. For producers, this demonstrates the potential to incorporate play strategies into production to better manage disease threats. Improved approaches to animal care routines can promote positive welfare, enhancing pigs' quality of life and resilience to production stressors. Positive welfare can also be incorporated in on-farm assessment programs as a measure of animal care. The next steps are to test play promotion on commercial farms to develop practical adoption strategies.

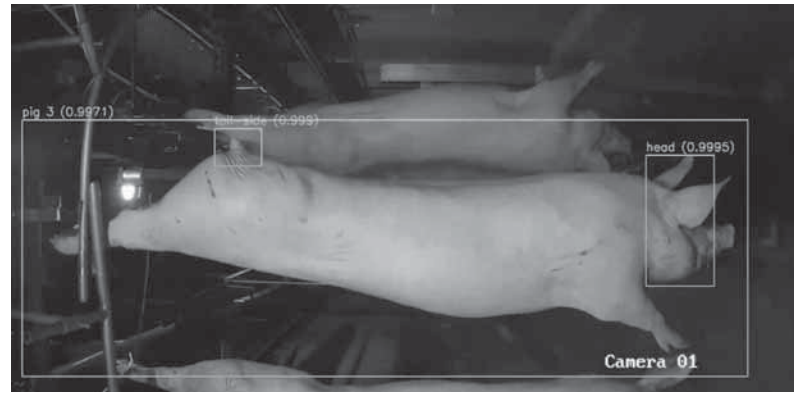
### GOAL 3 - Physical indicators speak volumes

Whether looking at live pigs or carcasses, biological markers and other physical indicators can paint a picture of welfare that is now better understood. By tying this understanding to farm- and processing-level assessments, decisions around pig care can be evidence-based.

Darian Pollock presented her work on using hormone levels in swine hair to measure welfare and discussed the applicability of this technique for genetic selection for stress resilience. Hair collection is a non-invasive, low-cost method of sample collection, and a section of hair can provide information on the hormone activity over time, corresponding to the hair growth, helping to reduce the frequency of sample collection and providing a chronic measure.

One of the significant advantages of the NSERC IRC in Swine Welfare program is the opportunity for additional collaborations with industry researchers across North America. Darian Pollock presented work on a collaboration between the WCVM Swine Welfare team, Iowa State University and PigGen Canada to analyze hair from pigs with a variety of genetic backgrounds, taking a closer look at using hormone levels for genetic selection of stress resilience.

This work showed a correlation between cortisol levels in hair and the number of struggles and vocalization intensity of



*Physical indicators provide a wealth of information on pig welfare, but monitoring at the processing plant level demands automation to support integration.*

piglets during a standardized handling test – the backtest – that evaluates behavioural stress response. Hair cortisol levels are also considered 'moderately heritable,' meaning they are somewhat able to be passed from sows or boars to piglets, suggesting the potential application of hair hormones for genetic selection for stress resilience.

When evaluating whether hair hormones were influenced by rearing system modifications that could support improved welfare, Pollock found that hair hormone levels were not influenced by providing straw to pigs, nor by the enhanced early life management practices described by Khalife. However, there was a lot of individual variation in hormone levels, and piglets with lameness pre-weaning did have a higher ratio of cortisol-to-DHEA – a steroid hormone precursor – suggesting hair hormone ratios can potentially be used as a biomarker of individual pig welfare.

### GOAL 4 - Assessing on farm welfare at the packing plant

Martyna Lagoda looked at whether physical indicators on pig carcasses could be used to automatically monitor welfare in plants. The research team assessed on-farm welfare indicators all the way from breeding to slaughter. Indicators on carcasses were evaluated using a camera installed opposite the production line after scalding and dehairing had taken place.

Analysis is evaluating if the appearance of skin lesions, tail length and hernias can shed light on the conditions under which pigs were raised. Initial results show a relationship between the proportion and severity of tail-biting on-farm and observable lesions on carcasses, demonstrating how monitoring carcass lesions could be used as a herd diagnostic tool for welfare on-farm and during pre-slaughter handling.

For processors, using these indicators to determine welfare requires seamless integration with existing plant procedures. The research team collaborated with Seok-Bum Ko from the College of Electrical & Computer Engineering at the University of Saskatchewan to develop a software model using artificial intelligence to recognize and track individual pig carcasses and identify different body parts for assessment. The next steps are to train the model to measure skin lesions, tail length and hernias while organizing the data collected for analysis.

*(Swine welfare a hot topic in cold Banff... cont'd on page 11)*

*(Swine welfare a hot topic in cold Banff... cont'd from page 3)*

### Research supports pigs and people

Given the success of the projects under the NSERC IRC Swine Welfare research program, the group is looking to continue its efforts on behalf of the Canadian pork industry. The commitment of NSERC and producer organizations to date has made it possible to build a strong research team that is also able to look at other welfare priorities outside of the research Chair focus, providing opportunities to up-and-coming professionals aiming to make their careers here in Canada. Carmen Cole, who first joined the swine welfare research group to do her undergraduate research thesis, then continued as a research technician, is now a Master's student with the group. She had the opportunity during the forum to present on her work developing and validating a one-step electrocution technique for on-farm euthanasia. As her research continues, the program holds value not only for the students engaged in the work and the pigs whose quality of life is improved, but also for those who reap its benefits in pork production and processing. Seddon ended the research forum with a call to action: as the program will end in June 2024, she encouraged stakeholders to consider renewing their commitments to the program, both financially and in principle. Sustaining a research Chair in swine



*The NSERC IRC in Swine Welfare program wraps up this year, but researchers are looking for continued support.*

welfare maintains key research infrastructure for the industry and demonstrates a strong working partnership. She also encouraged producers to think about how they can incorporate results of this work into their own operations.

This certainly gives everyone enough to think about while we're waiting for warmer temperatures outside!

