Reducing Temperature Requirements for Group Housed Sows to Save Cost

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Work at Prairie Swine Centre indicates that sows in group housing systems will maintain room temperatures between 9 to 12 °C, leading to approximately 78% reduction in energy consumption when compared to gestation rooms maintained at pre-set temperature of 16.5 °C.

Conversion of gestation sow housing from stalls to group systems has been mandated in the recently revised Canadian Code of Practice for the Care and Handling of Pigs, with all sow farms expected to adopt this practice by July 2024 (NFACC, 2014). In order to take advantage of these legislative changes, the hog industry is looking for management options that will take advantage of potential merits of group sow housing, in order to ensure successful implementation group housing systems in all farms.

> Average temperature was considerably lower with sows fed the high heat increment diet

One such advantage of group housing systems is that sows can better interact with and control their immediate environment, including thermal conditions. Research results at Prairie Swine Centre indicate sows housed in groups have the freedom to exhibit thermoregulatory behaviour such as huddling to maintain comfort even when the temperature in the barn is lowered. Temperatures currently maintained in barns when sows are housed in stalls are based on the current published lower critical temperature (LCT). Allowing the temperature to drop below this LCT will require additional feed to maintain the sow body condition and weight gain over the gestation period.

It has been widely thought that sows housed in groups may have LCT values significantly lower than 15°C when given the ability to utilize behavior such as huddling. If group-housed sows can maintain body condition and weight gain at temperatures lower than currently maintained in sow barns without the need for additional feed, the potential exists to significantly reduce energy costs for heating and ventilation, reducing the overall cost of production. Currently, energy/utility costs rank third in total cost of production, only behind feed and labour cost.

However, some issues anticipated with group-housed sows include the potential for higher activity levels and aggression among sows. These problems are heightened when sows are put on a restricted feeding regime, which is a common practice for gestating sows to maintain optimal body condition. The sensation of feeling “full” is improved when high-fiber diets are fed; these diets are also known to reduce the urge to feed continuously, reducing the sow overall activity, and repetitive behaviours.

Dietary fiber increases heat production in sows without increasing digestible energy. As such, adding fiber to the diet can be a means of reducing activity and limiting aggression in sows under reduced barn temperature. The addition of fiber to the diet could be a means of addressing

behavioral issues associated with grouped-sows as well as contributing to the energy balance of sows under reduced barn temperature.

What temperatures do group-housed sows prefer?

The project consisted of two phases of experiments; the first phase utilized environmental chambers followed by tests in actual group-housed gestation rooms. Results from the first phase of the study indicated that throughout the trial a pattern was observed where temperature changes occur mainly during the day when sows are mostly active, as barn operations were carried out (between 7 AM-3 PM) ; beyond this period, lights in both chambers are turned off. Room temperatures at the time sows activated the operant mechanism was also recorded. Average temperature when the operant mechanism was activated was considerably lower at 12.5°C for the sows fed with high heat-increment (high fibre) diet. This suggests the sows could tolerate lower temperatures before calling for supplemental heat compared to sows fed with standard gestation diet.

In terms of performance, sows fed with standard gestation diet had an ADG of 0.16 kg/day on average over the trial period. While sows fed with high heat-increment diet were able to tolerate lower temperatures and performed slightly better with average ADG of 0.20 kg/day.

Phase 2

The second phase of the project configured two barn rooms for group housing, with each room housing 28 gestating sows. One room was operated at a typical set-point temperature (16.5°C) while an operant mechanism was installed in the other room, allowing the sows to control the temperature. Similar to Phase 1, temperature fluctuations occurred mainly during the day (7AM-3PM) when sows are mostly active and when the actual switch presses occurred. Preliminary results for Phase 2 of the project have shown that sows could tolerate temperature lower than the typical 16.5°C set-point maintained in gestation barns with sows maintaining temperatures about 5 °C lower than in a pre-set room, leading to about 78% reduction in energy consumption. At current energy prices, this 78% reduction in energy consumption would improve the producers' profitability by more than $5.00/hog during the heating season.

(Learning from industry...Cont'd from pg. 1)

the industry can readily access, interpret and apply. Articles you see in Centred on Swine come from PSC research teams and are often in collaboration with Scientists who have developed unique skill sets from facilities located in Canada and throughout the world. These partnerships give the Canadian industry an edge by providing timely and reliable information that can be used by the barn manager, the transporter, the packer and the suppliers.

I want to focus on just a few recent initiatives that help to explain how our Centre turns science into knowledge then supports this knowledge through demonstration to hasten adoption by industry. The cycle continues when industry participates in and gives back its experience and the knowledge pool grows which further encourages adoption.

• The National Sow Housing Conversion Project. This started with a vision to take the knowledge developed by research and pair that with on-farm building and swine management expertise. The result would be, and is, a series of barn conversions that successfully use the growing knowledge pool to demonstrate that these conversions from stalls to groups can be accomplished successfully in a variety of farm situations. The result is improved design of space to meet the needs of the sow, maintaining or enhancing productivity for the farm and boosting the confidence of individual pork producers to invest in new systems and technologies.

• Transportation of animals of all sizes is integral to pork production in Canada. For more than 10 years the Centre has pursued collaborative projects on the effects of transport on the pig and meat quality. The outcome has been an improved understanding of the transport environment and how the pig responds. The work continues with advances in specialized trailer design that addresses biosecurity, animal welfare and ease of handling.

• The area of nutrition is a benchmark of being at the leading edge of picking up new technologies. Having demonstration and research projects that gather on-farm data includes; a 'blue dye technique' for determining eating behavior of nursing piglets; recently a grinding and particle size evaluation study that confirmed we are not optimizing performance with our on-farm milling systems; and demonstration of feed cost savings through allowing the lactating sow to determine her daily feed needs.

For 25 years Prairie Swine Centre's approach has focused on the delivery of knowledge to the pork industry

• A newly-funded collaborative initiative between Prairie Swine Centre, Centre de developpment du porc du Quebec, and Swine Innovation Porc will focus on the financial benefits of adopting new research on pork farms across Canada in 2016-2018.

Closing the loop by engaging innovative pork producers to work with researchers for the purpose of demonstrating the effectiveness of new technologies on-farm is an important way to speed adoption and improve the competitiveness of the whole sector.

I end this article by pointing you in the direction of our most recent publication, the 2016 Annual Research Report. In that publication my President's Report highlighted the following:

World-class research organizations don't just happen, they are the culmination of seeking out research scientists that have a passion for progress and share a vision of how science can make a contribution to the Centre's mandate. Although strong science is at the centre of a research institute it is just the beginning. The full team of staff must be pulling in the same direction, which can be a challenge because science by its nature is based in discovery and the outcome isn't known. So, research centres have that juxtaposition within their DNA. That is: 1) To perform as an innovative knowledge developer; while 2) managing production systems and a workplace expectation that seeks stability and regularity.

Dr. Jim Brandle, CEO of Vineland Research and Innovation Centre summed it up succinctly in their Centre's 2014 Innovation Report:

World-class research organizations don't just happen. They're the result of great science, innovative thinking, strong local and global partnerships and sheer tenacity. — J. Brandle, CEO, Vineland Research and Innovation Centre.