Motivated for Movement - What is the Cost of Sow Exercise?

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Preliminary sow performance measures suggest exercising stall-housed gestating sows for 10 minutes, once per week has minimal effects on the productivity of younger sows, but may have a positive effect on older parity sows - increasing the number of live born and reducing stillborns. With productivity effects limited to a portion of the sow herd, exercising sows will result in increased costs of production by approximately $2.00/hog, mainly due to the additional labour required.

Results also indicate sows and gilts have a moderate level of motivation to obtain time out of their stall; sows and gilts trained to associate pressing a button with receiving a reward, will work moderately hard to obtain time out of their stall, as measured by their highest price paid (HPP – total number of button presses to obtain a reward). However, sows show a greater level of motivation to access a feed reward, and providing high fibre feed to sows reduces their motivation to exit the stall. Despite the provision of ad-libitum high fiber feed, a level of motivation to exit the stall remains, with sows continuing to interact with the operant panel. This suggests there can remain an intrinsic level of motivation for time out of their stall, or control over their environment. Results of sow behaviour when outside of the stall, and physiological measures collected over gestation need to be included, to draw full understanding on the motivation of sows to exit their stall, and the influence on sow welfare.

The Canadian Code of Practice for the Care and Handling of Pigs requires that from July 1, 2024, all mated gilts and sows must be housed in groups, or individual pens. The 2014 Code proposes that mated gilts and sows can be housed in existing stall barns if they are provided with the opportunity to turn around or exercise periodically; or other means that allow a greater freedom of movement.

Figure 1. A) The operant panel containing two identical buttons, a central divider, and a light (central dot above divider) to indicate to the sow when the panel is active. B) Sow pressing the active button (results in a reward) of the operant panel, hung over her stall gate.

Currently, there is a lack of scientific evidence on which to base a recommendation on what constitutes an acceptable greater freedom of movement for stall-housed sows. Additionally, whether periodically providing stall-housed sows with opportunities for a greater freedom of movement will benefit sow welfare and productivity is unknown. This research project aimed to address specific knowledge gaps to support informed decision making. Research questions focussed on understanding:

1. How motivated are sows to receive time out of their stalls?
2. How is the motivation of restricted fed sows, to exit the stall, influenced by diets that will influence hunger?
3. Does providing a low level of exercise (10 minutes once per week) benefit the welfare and productivity of stall-housed gestating sows?

Results

i) The motivation of sows and gilts to exit their stall:
Stall-housed sows were trained to associate pushing one of two buttons on an operant panel (Figure. 1) to request access to rewards; a) time out of their stall (movement) or b) a small feed reward (food). Results found that both sows and gilts show a level of motivation to exit the stall, as indicated by how hard the animals 'worked' – the Highest Price Paid (HPP): the total number of button presses to receive the reward (Figure 2). However, sows displayed a greater motivation to access a feed reward than to exit the stall. This greater motivation for feed may result from sows recovering from lactation at the time of testing.

The motivation of gilts to access feed was significantly lower than sows, with the level of motivation to exit the stall between sows and gilts being no different (Figure 2). That gilts showed an equal level of motivation to receive feed as to exit the stall, may indicate that gilts, who were stall-naïve at the start of the trial, value opportunities for each reward equally.

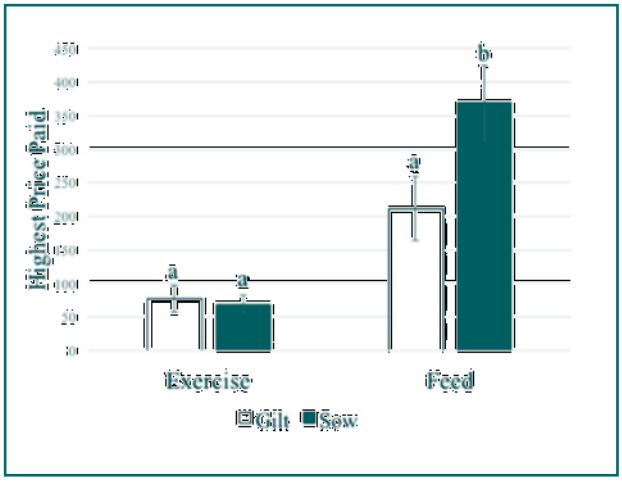

Figure 2. The highest price paid (mean ± SEM) for sows (n =12) or gilts (n = 12) to access time out of the stall, or a feed reward. Where superscripts differ, P<0.05.

(A Message to All Our Stakeholders... cont'd from page 1)

- The management team at the Centre has developed a COVID-19 response plan ensuring continuity of operations and research programs, including planning and implementing new preventative measures.
- We have created a work from home plan for all staff possible.
- We have incorporated split shifts and physical distancing protocols in the research/production facility in order to reduce the number of staff present at one time and the frequency of face to face interactions. Improved cleaning and disinfection protocols have been implemented.
- We have suspended all company travel.
- We require all staff who are returning from international travel to self-isolate for 14 days.
- We have restricted all individuals and companies from entering the Prairie Swine Centre office and production facility.
- We have eliminated in-person meetings, utilizing electronic and video communication when required.
- We continue to monitor and follow the recommendations of the appropriate public health agencies.

Prairie Swine Centre will continue to be a resource for the swine industry.

Finally, we encourage everyone to monitor and stay on top of the ever-changing environment.

Stay safe out there.

Murray Pettitt,
CEO
Prairie Swine Centre

ii) The influence of high fibre feed on the motivation of sows to exit their stall

Sows were trained to use the operant panel to work for time out of their stall, when fed one of three diets, designed to influence hunger levels.

Results suggest that providing ad-libitum high fibre feed in addition to the standard gestation ration reduces the motivation of sows to exit their stalls (Figure 3). This implies a desire to seek additional feed may be an influence on the motivation of sows to exit their stalls. However, whether fed a high fibre feed at 50% of their ad-libitum, or full ad-libitum intake level, sows still showed a level of interaction with the operant panel, which may suggest that the provision of the panel also provides an enrichment for exploration when presented in the stall. That

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sows fed additional high fibre feed worked to a moderate HPP to exit the stall may also suggest there remains an intrinsic level of motivation for sows to access time out of the stall. Analysis of sow behaviour when outside of the stall still needs to be completed. This will provide useful information that will support a better understanding on what may be motivating sows to exit the stall.

iii) Low level exercise on the productivity of stall-housed gestating sows

Results from the third experiment indicate that providing stall-housed gestating sows with 10 minutes of exercise once per week benefitted only the performance of older parity sows, indicating they may benefit from increased movement. However, we did not see measurable benefits from exercise in younger sows, as they tend to be in better physiological condition. Old parity sows that were group-housed, or stall-housed with weekly exercise had a greater number of live born piglets compared to sows housed in stalls throughout gestation (Figure. 4). Additionally, stall-housed old parity sows had a greater number of stillborns than sows that were stall-housed and received weekly exercise, or group-housed over the course of gestation (Figure. 5).

Still to be analysed include measures of sow behaviour, physiology and gestational stress of the sow and her piglets. Considered together, the results will provide a comprehensive information on how periodic exercise influences sow welfare and productivity.

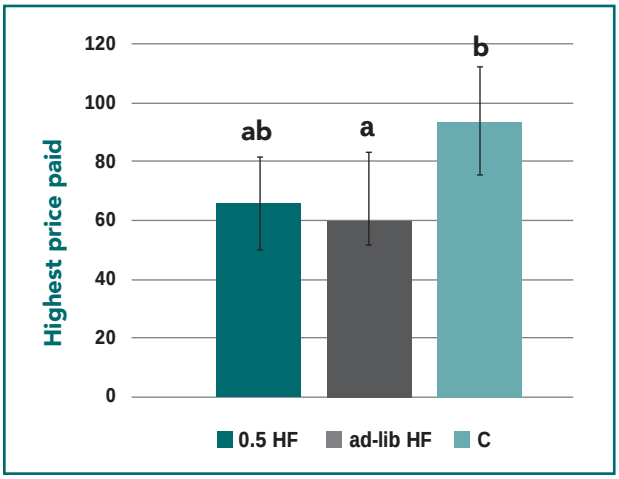

Figure 3. Highest price paid (HPP) for sows tested for their motivation to exit the stall for exercise when provided their standard gestation ration (Control, C, n = 14), provided with half of their ad-libitum daily high fibre feed intake in addition to their gestation ration (0.5 HF, n = 14) and provided ad-libitum access to a high fibre feed in addition to their gestation ration (ad-lib, n =14), (mean ± SEM). Where superscripts differ, P<0.05.

Economic Assessment

If producers decide to exercise their sows and keep the stall-based system, at what point in time does it pay to make the conversion to group sow housing? This decision is farm dependant, and determined by a number of factors including the availability and cost of labour and expected renovation cost to make the transition to group sow housing. Results indicate if sows were given 10 minutes of exercise, once per week, we will also see an increase in performance (2 pigs per litter) in older

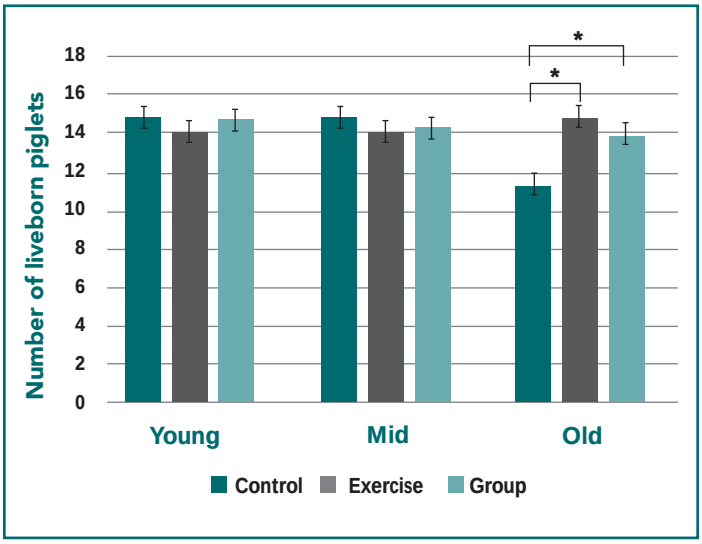

Figure 4. Number of liveborn piglets (mean ± SEM) for sows belonging to young (parity 0-1, n = 49), mid (parity 2-4, n = 95), and old (parity 5-7, n = 24) parity groups from control, exercise, and group treatments. Brackets connect treatments with significant differences,* P <0.05.

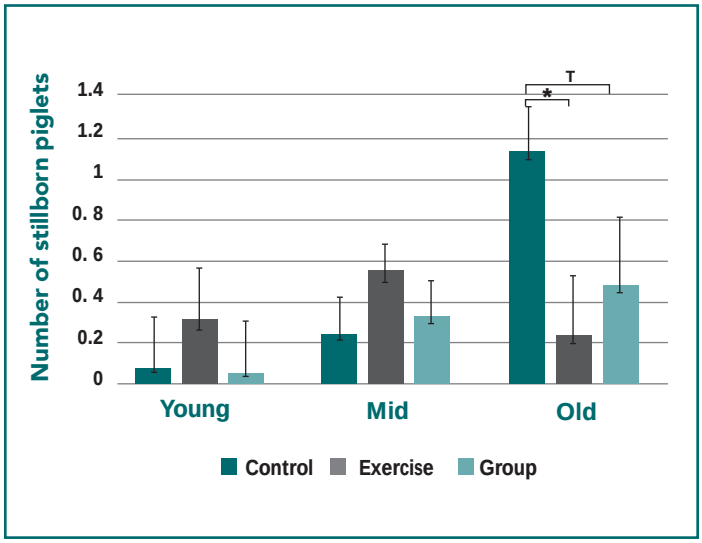

Figure 5. Number of stillborn piglets (mean ± SEM) for sows belonging to young (parity 0-1, n= 49), mid (parity 2-4, n = 95), and old (parity 5-7, n =24) parity groups from control, exercise, and group treatments. Brackets connect treatments with significant differences.* P <0.05; T: Tendency, P = 0.08.

parity sows. Taking these factors into account, we can estimate a payback in making the conversion to group sow housing.

Table 1 estimates the increase in total productivity, additional labour requirement and the cost associated with exercising sows in a 1,200 - sow operation. Assuming parity 5+ sows have greater productivity with exercise (2 pigs per litter), and represent 26.5% of the herd, this operation would produce an additional 1,282 pigs annually. However, this needs to be off set by the additional labour required for sow exercise. Based on a labour requirement of 10 minutes per sow/week this facility would require an additional four people in order to ensure all gestating sows would receive the appropriate amount of exercise on a weekly basis. Assuming an hourly labour rate of $15 per hour, we would need to spend an additional $2,450 per week or $127,400 annually on sow exercise. The overall impact to the operation would be an increase in the cost of production of $2.00 per - hog marketed; where the addition labour (for sow exercise) adds $2.94 per hog in cost, but the increase in production reduces fixed costs by $.94/hog.

"Exercising sows will result in increased costs of production by approximately $2.00/ hog, but what are the benefits? "

Figure 6 examines the impact of costs associated with sow exercise and the impact on spending that money to make the conversion to group housing. By looking at different costs of conversion and labour rates, we can identify specific trends. Overall, there is direct relationship between the cost of conversion to group sow housing and payback regardless of labour rate. In another words, producers would be encouraged to make the transition to groups sooner than later, the cheaper the conversion process becomes, as the payback to investment is better. The lower (better) the payback the more incentive producers have to spend money on their facilities rather than additional labour.

An inverse relationship exists between payback (in years) to group sow housing and the cost of labour ($/hour). As the labour rate increases producers will need to spend more money on labour in order to accomplish the same task (sow exercise), in a stall-based system. Based on information in Table 1, if we increased the labour rate from $15 to $30 per hour our total labour expense for the year would double, increasing by an additional $127,400. Looking at a specific example (Figure 5.), if we assume the cost of conversion (to group sow housing) is $500 per sow place, payback improves from 7.5 years to 2.5 years when labour rates increase from $15/hour to $30/hour respectively. This is a three-fold increase to payback when labour rates double.

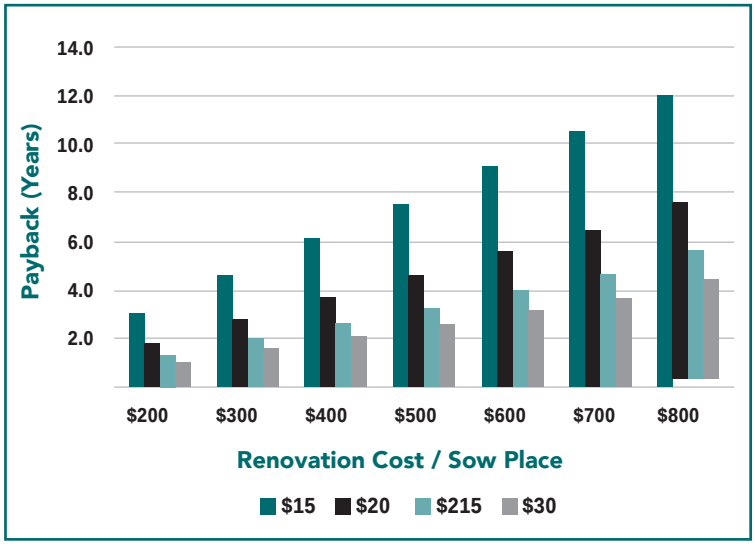

Figure 6. Impact of Labour Rate ($/hour) and Renovation Cost ($/sow place) on payback (time) required in making the conversion to group sow housing.

Table 1. Sow Exercise – Productivity Impact

Parity 5+ (%)	26.5%	of sow herd
Parity Impacted (5+)	318	sows
Pigs Sold/Sow	4.03	per year
Total Pigs Sold	1,282	per year
Farrowing Crates Required	55	per week
Sows requiring exercise	980	per week
Total time required	163.3	hours/week
Additional Staff Required	4.1	
Labour Cost	$ 15	per hour
Total Labour Cost for Exercising	$ 2,450	per week
Total Labour Cost for Exercising	$ 127,400	per year

Overall, as labour rates increase and renovation costs decrease producers should seriously consider re-investing in their operations. At some point, money spent on additional labour may be better re-invested in your facility. While each situation is unique, producers must calculate their own individual payback and consider where to spend their next dollar.

Acknowledgements

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