Free space utilization of sows in free access stalls

F. Lang, Ph.D.
S. Hayne, Ph.D.
V. Heron, BSA
H. Gonyou, Ph.D.

Harold Gonyou

With announcements by the largest producer/packers in both the USA and Canada that they will transition all of their production facilities to group housing for sows over the next ten years, all North American producers are anticipating a change to group housing. This can be a challenging step for producers, and it is made more difficult by the lack of scientific information currently available on the implementation and design of alternative systems. Group housing systems can be complex to initiate and require greater input from stockmen, however when done correctly, can produce sows that are able to socially interact with one another and have the freedom to move. Sows currently housed in gestation stalls have almost no opportunity to exercise and perform natural behaviours, leading to a possible decline in well-being. It has previously been suggested that exercise is required to maintain bone composition and strength, and when exercise is insufficient, calcium will be mobilized from the bone itself (Lanyon, 1984 and 1987). Exercise is important to allow the development of bone and muscle to their maximum potential. Decreased muscular strength (which is commonly observed in confined sows) can contribute towards difficulty in lying and standing, and higher susceptibility to lameness due to increased slipping. Lack of exercise in confined housing has also been shown to cause bone weakness in other species. For example, confined laying hens have significantly weaker humeri and tibiae than birds housed in non restrictive environments (Knowles and Broom, 1990). One possible alternative to gestation crates are free access or walk-in/lock-in stalls.

This system provides sows with opportunities to interact as a group in a communal area, or remain alone in a free access stall. There is some concern regarding the degree to which sows use free space group areas, and how to avoid aggression, particularly when new sows are mixed into a group. This study investigates the implementation of walk-in/lock-in stalls for group housed sows. More specifically, the objectives of this study were to compare two different pen configurations by determining the proportion and type (size/parity) of sows that are using the free space areas of the walk-in/lock-in stalls, and also how sows utilize the free space areas.

Eight groups of ~25 sows were used in the study, and were housed in walk-in/lock-in stall gestation pens at the Prairie Swine Centre, Saskatoon. Groups were selected according to how many individuals were confirmed pregnant in a batch of animals within a 2 week breeding date window, therefore group size was not always the same. Each of the groups were exposed to one of two configurations of free space areas. The first is referred to as the 'I' pen as it consisted of an alley (10ft x 35ft) with slatted flooring running between two lanes of 16 stalls on each side. Any additional stalls, surplus to the group number, were locked off for the purpose of the trial. The second pen configuration is referred to as the 'T' pen as it consisted of an identical alley with an additional solid floor loafing area at one end (12ft x 23ft). Sows were weighed when moved from their breeding stall to the gestation pen, and individually marked with livestock paint.

Photographs were taken from mounted cameras at 2 minute intervals over a 24hr period, once a week, for 11 weeks throughout gestation.

Looking down onto the 'I' pen

Pigs using the 'T' pen free space area

Two cameras were set up in the 'I' pen, one at each end of the pen. Four cameras were used in the 'T' pen in order to also observe the free space area. The pens were divided into 3 areas (I pen) and 9 areas (T pen) (see Fig. 1). The individual sow and location was recorded numerically by a trained observer. Measurements recorded from the photographs include the percentage of time spent out of the stall over 24hrs, and also the

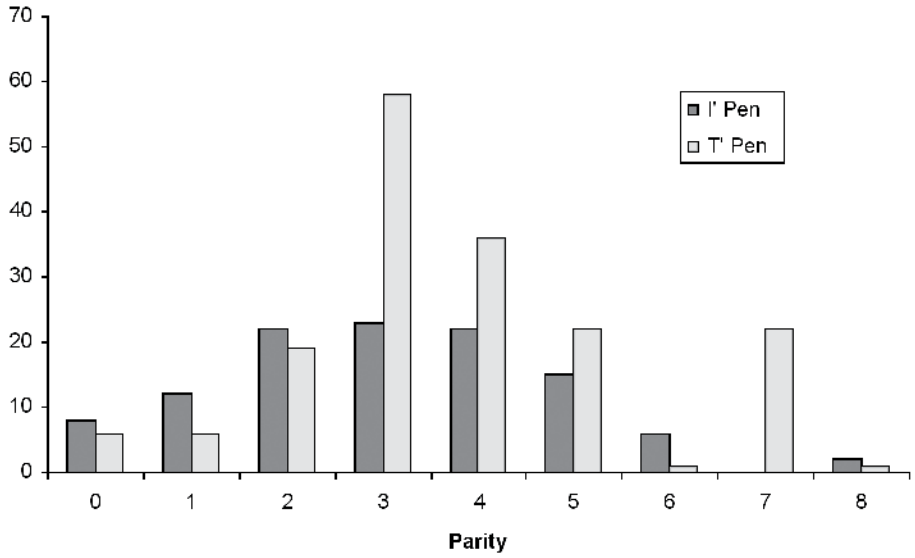

Figure 2. Average total time that sows of varying parities spend in the free access areas.

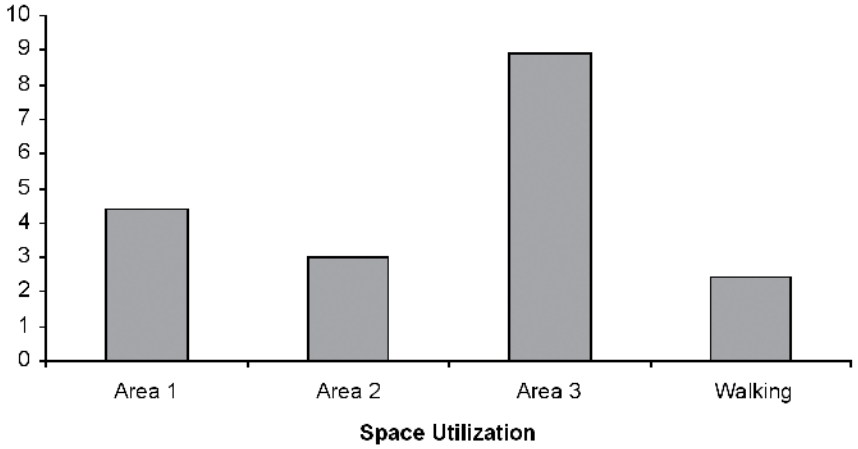

Figure 3. Percentage of time that sows spend in each location during utilization of the free space areas, I-pen data.

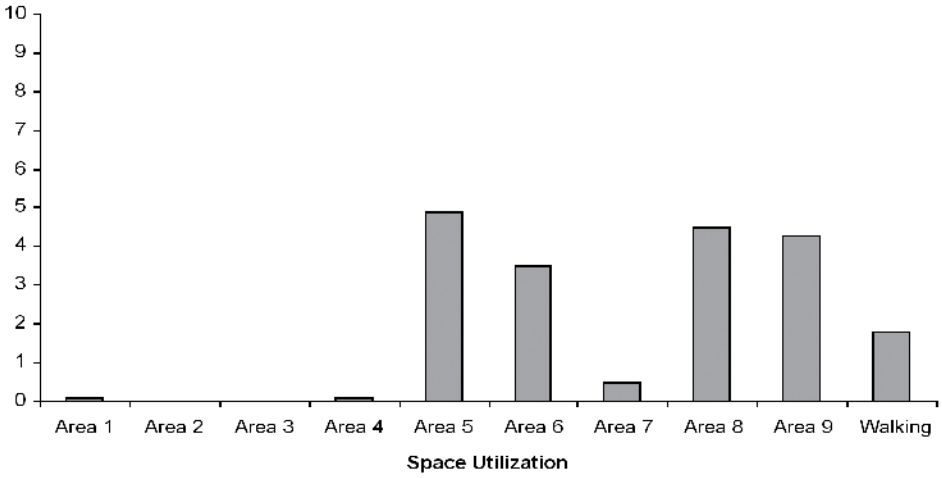

Figure 4. Percentage of time that sows spend in each location during utilization of the free space areas, T-pen data.

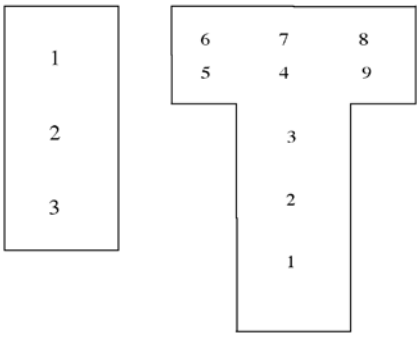

Figure 1. Location of free space areas used for space utilization analysis.

location and position of sows in the free space areas.

The majority of sows did use the free space areas (> 95% of sows) although not on a regular basis or for extended periods of time. The average usage for the 'I' and 'T' pens were both relatively low, however, the sows housed in the 'T' pens used the free space area significantly more than the sows housed in the 'I' pens ($P<0.001$). More than half the animals in the study spent < 5% of their time in the free space area, however the average usage was ~18% (with considerable individual variation). Heavier sows appeared to use the free space area significantly more than lighter sows ($P<0.0001$), and older (higher parity) sows also used the free space significantly more ($P<0.001$) (Fig. 2). Figures 3 and 4 illustrate the preferred lying areas of the sows. In the 'I' pens, the far end of the pens was the most preferred place to lie, with the highest recorded usage in Area 3 with 8.9% of the average total usage. Similarly, with the 'T' pens, the most preferred place to lie was also in the corners (Areas 5, 6, 8 and 9).

Although many sows did use the free space, it was at a much lower level than expected. This could be due to several possibilities, such as lower ranking animals feeling threatened by higher ranking sows, or larger sows utilizing the free space due to crowding in the stalls. It has been suggested that due to the rigorous selection for improved meat production, the body shape of modern domestic pigs has been changed (Whittemore, 1994). Selection has resulted in larger pigs which can have difficulty lying and standing, and may not fit comfortably into conventional stalls (24 inches wide).

The areas where sows have shown a preference to lie down all have more walls than the other available areas, which can act as support. This finding is in agreement with previous studies (mostly in the farrowing environment) where sows also show preference to use support

(Free space utilization ... continued on page 11)

(Benchmarking ... continued from page 1)

Table 1.

	Top 10%	Avg	Bottom10%	Top vs Bottom
Sow mortality rate	4.4%	6.7%	10.5%	57% decrease
Marketed hogs/mated female/yr	24.0	22.3	20.6	16.5% better
Whole herd feed conversion	2.98	3.25	3.44	13.4 % better

Take for example a survey of western Canadian mid-sized farrow to finish producers that was recently shared with me. The top 10% of producers demonstrated significant productivity measure improvements over the average and bottom 10% for key measures such as shown in Table 1.

Looking at these measures we are immediately aware of two things: 1) The variation within each measured factor is large, and 2) with such large variation there is significant motivation to do better regardless of where your particular herd stands. There is a third factor we should be aware of – that is this variation in productivity pales in comparison to the variation in financial performance seen between these same farms (Table 2 — all financial measures taken for same time period as productivity data above).

Table 2.

	Top 10%	Avg	Bottom 10%	Top vs Bottom
Revenue per hog marketed	154.75	145.28	134.47	15% better
Utilities per hog marketed	$2.58	$3.65	$5.21	50.5% better
Margin over recorded cost*	34.74	25.62	12.75	2.72 times better

* note that labour, depreciation, interest removed to allow for comparison of variable costs only

The reason benchmarking works is it provides a tool to see beyond our current practices. Termed "paradigm blindness", individuals become so focused and or entrenched in their operation they fail to see other possibilities to address the activity.

The Bottom Line

Accepting the inaccuracies that come with such comparisons there is significant opportunity to improve productivity and profitability through comparison (benchmarking) to other similar farms. Below are a few articles that can be found in the Pork Insight database located on the Prairie Swine Centre website that will assist in our pursuit of improved profitability, and one article that encourages the use of statistical control charts to detect changes in herd productivity.

Profit Sensitivities to Feed Price and Pig Price with Varying Production Levels (Banff Pork Seminar, 2009)
http://www.prairieswine.com/database/details.php?id=39200

Top 10 Cost Cutters and Revenue Generators (Centred on Swine, 2004)
http://www.prairieswine.com/database/details.php?id=1847

Control charts applied to simulated sow herd datasets (Germany, 2009)
http://www.prairieswine.com/database/details.php?id=39056

Common Misconceptions In Benchmarking

(summarized from J. Deen, S. Anil University of Minnesota. published in Farms.Com, Benchmark 2009 Edition)

#1 Confusing benchmarking with participating in a survey

#2 Thinking there are pre-existing benchmarks to be found.

#3 Not all production and economic parameters can be benchmarked – example service delivery and customer satisfaction.

#4 The process is too large and complex to be manageable.

#5 Benchmarking is not research

#6 Misaligned benchmark targets – what is the overall farm strategy that you are trying to benchmark?

#7 Picking a topic that is too intangible and difficult to measure

#8 Not establishing a baseline

#9 Not researching benchmarking partners thoroughly

#10 Not having a code of ethics and contract agreed upon with partners.

For complete article see **www.benchmark.farms.com,** click on Disciplined Benchmarking