

Considerations for Large Group Housing of Finishing Pigs

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■ Introduction

Many questions have been asked about facility design and management of grower finisher hogs in large groups. This document is designed to evaluate our current knowledge of large group housing (LGH), and is based on the experience of researchers, equipment manufacturers and our members. The document is constantly evolving as new information is obtained. For the most recent version please check the website www.vido.org.

■ Objectives of Large Group Housing (LGH)

- Reduce labour associated with weighing/handling pigs
- Increase the number of pigs marketed in the ideal weight range
- Reduce overall production/operating costs
- Enhance animal welfare

This document is intended to increase the awareness with regard to the questions that must be answered when considering construction and operation of large group housing (LGH). It will focus on the following parameters:

- Group size of 250 or more pigs
- Weighing and sorting utilizing an auto sorter system
- Floors that are fully slatted*

Fully Slatted Floors versus Partially Slatted Floors

We fully recognize that producers will consider converting existing partially slatted floor barns to large group housing. Many of the points in this paper can be applied to partially slatted floors. We decided that we should maintain the focus on a fully slatted floor system, the most typical system used in Canada for LGH. It was also felt, that except for challenges with dunging patterns, most aspects of fully and partially slatted floors would apply to large group housing.

■ Facility Design and Operation

Positives

- Pigs will have a greater opportunity to choose an appropriate comfort zone within the larger pen layout.
- Pigs are able to avoid aggressive pigs.
- There is better observation because of less penning and longer distances moved.
- It is easier for the operator to move around pens checking pigs and equipment.
- The design forces more intimate observation of pigs, feeders and waterers since the operator must physically get in the pen.
- Size of groups is flexible
- A specialized handling and weighing areas/rooms within the barn are not required for sorting at market time.
- Construction of barn is easier due to less penning being installed
- Initial building cost is lower.
- Less maintenance because of less equipment and less places for catching dung.
- Ease of managing equipment (ex. Feeders can all be located in one area known as the food court, versus climbing over pen dividers to check feeders in multiple pens)

Negatives

- Air speed may need to be reduced in order to minimize the movement of air under the slats. The solid pen dividers used for small groups will buffer air speeds at slat level.
- Partially slatted floors are not recommended at this time because of the uncertainty of control of dunging patterns.

- Renovation of any room is difficult, dunging patterns are often hard to control and variable.
- Dunging patterns will determine manure levels and/or build up of solids in different parts of the barn pits. This could result in higher ammonia levels.

Discussion - Facility Design

Differentiation of eating, dunging and lying areas has caused uneven distribution of urine and spilled drinking water. You may need to add water to specific areas to improve flow in flush gutter. Fully slatted floors can lead to an increase in ammonia over partially slatted floors since there is greater area for evaporation. Alternative slot arrangements could be used to supply some increased solid floor for improved pig comfort. Some research is needed to define ventilation opportunities that can be captured with large group housing. There may be opportunities to create some very specific climate zones within the large group pens. These specific zones can better meet the variation of temperature needs within the population.

The equation $0.034 \times BW^{.66} = m^2$ (for full slats) for calculating predicted floor space works well regardless of group size for pigs on fully slatted floors where BW (kg) is the market body weight of the pig. The conversion factor is 10.73 to adjust from square meters to square feet.(source Dr. Harold Gonyou).

The art is to design a load out area that is flexible for a variable number of pigs.

If using a feeding area or food court design, the experience of the group is to provide 2.5 sq. ft/pig in this area. This area is designed to be intentionally small so as not to encourage pigs to lie and sleep in the area.

■ Equipment

Positives

- Less penning means less maintenance and replacement costs in the future
- Reduced feed system cost and maintenance (i.e. reduced auger length since all feeders can be grouped in one area or at least on one side versus both sides of the barn)
- Reduced water system delivery cost and maintenance (less pipe)
- Reduced cost of ventilation equipment (i.e. may not need re-circulation system with less penning and because the pig chooses the most comfortable area to lie)

Negatives

- Adds equipment requiring more maintenance - sorter, compressor, scale, and electronics. In addition the system requires the installation of one-way gates from the feeding area to the common area.

Discussion

It may be easier to achieve good operation of the ventilation system because pigs will find their comfort area. Auto sorters equipped with automatic spray markers could be used to identify pigs that are underweight for the current shipping event but that would probably be acceptable for the next shipping event, making it easier to predict shipping numbers for the next week's shipping.

The design of the facility will determine the equipment required. There are two basic forms of LGH management; Event Sort and Continuous Sort.

Event Sort

An event sort is a sort that is facilitated by the use of an auto sorter and is initiated by having the barn operator move the pigs towards and through the auto sorter such that all pigs in the large pen group are weighed and sorted. An individual pig will only travel through the sorter once per event. An event sort design requires less capital investment in the actual weighing and sorting equipment because it will sort perhaps as many as 1,000 pigs per sorter rather than 500 in a continuous sort system.

Continuous Sort

This is a process that occurs on an ongoing basis and is driven by the natural behaviour of the pig to move from the lying area of the room to the feeding area or watering area. Sorting using the continuous sort system allows separation for market weight, sorting for lights for special treatment, or phase feeding.

The portals that allow the pigs to return to the non-kitchen or resting area must be managed to ensure that it is working properly. If there is some restriction due to a blockage or mechanical failure there will be a problem with overcrowding in the food court.

Equipment used in sorting

Gate

Return gate design continues to evolve.

Checklist

- consider robustness
- trapping or injuring pigs
- ease of operation for all weights of pigs
- ensure that pigs can't use it in reverse
- potential for bruising near market weight
- overcrowding in the sorting area could be a major problem.

Feeder

Although we have changed the fundamental layout of the pen there is no indication to believe that feeder space allotment has to change. It is not clear if costs associated with feeder space that must be made available in LGH will decrease, remain neutral or increase.

Sorter

Checklist

- strength
- dependability
- mechanical reliability
- reliability of software and electronic components
- ease of software operation for staff
- easy to clean
- provide protection for animals in the sorter
- location of weighing mechanisms (above the pig)
- location of sorter so that exit area is unrestricted (i.e. 8-10 foot separation between the exit gate and the nearest closest obstruction).
- operation and design of gates - there are several proven entry gate designs
- flexibility of sorting options with hardware/software (spray paint for color, moving gates, capping the number of pigs in a particular group)
- maintenance/cleaning requirements
- good dealer support

Waterer

It is not evident from information available whether additional waterers are required when space is restricted.

■ Building Cost

Positives

- Reduced cost of pen partitions.
- Reduced cost of unusable floor space associated with pen dividers.
- Reduced cost of floor space used as alleyways. (approximately 5% of floor space)
- Reduced cost of augers and water lines when feeders and watering devices are concentrated in specific areas of the pen.
- Eliminates need for a dedicated shipping room which is present in some conventional barns
- Possibility of reduction of cost in ventilation.
- It has been suggested that a simpler ventilation system may serve a large group housing design (i.e. no re-circulation vent) because we are less concerned with less uniform air distribution within the barn.

Negatives

- Construction costs of \$25-\$30 more per pig space for fully slatted over partially slatted design.
- This cost may be partially offset by higher stocking densities on slatted floors.
- Cost of automatic sorter.

Discussion

Not all pen partitions will be eliminated. It is recommended that some pens would continue to be available as hospital pens, sort pens, market hog sorting and feed area segregation. Some stub walls or parking curbs could be made available as pigs prefer to sleep with their back against a wall or another pig.

Space that is normally set aside for handling, sorting or holding pigs will be made available to the pigs as they grow. The automatic sorter expense would be in the range of \$ 6500 to \$10,000. It appears that the limits are approaching 500 pigs per automatic sorter.

■ Labour/Skills

Positives

- There is reduced time spent in weighing of pigs with use of automated sorting equipment. The job of weighing pigs has been identified as one of the least desirable jobs in the finishing barns thus the unpleasant job is eliminated.
- There is reduced time required to check feeders and watering device if concentrated into a specific feeding/watering area. This is especially advantageous at the beginning of the batch when numerous adjustments must be made to accommodate the new incoming pigs and another unpleasant job is eliminated.
- Reduced time spent climbing over partitions or opening gates to access pigs encourages more thorough and frequent observation of the pigs. This may translate into more quality time available for herd health.
- Time spent in washing the room is reduced because of fewer pen partitions.
- Predicting the number of pigs to ship each week is easier because more data is available on pig weights.
- Reduced risk of injury to stockpeople from handling market weight hogs at weighing.

Negatives

- Maintenance could be more difficult with pigs still in the pens. There is no opportunity to empty an individual pen in which maintenance is required.
- Pigs "swarm" around the operator as they are working in the pen. Some people find large groups of pigs to be intimidating.
- Training methods will be required as barn operators become accustomed to observing and handling pigs in larger groups.
- Removing a single pig from these large groups may be more time consuming.
- Removing dead pigs may be more difficult.
- The use of the fully slatted floor may contribute to increased ammonia on average and this may be a labour issue in the future.
- Training requirements are needed to acquire a different skill set and workers have to embrace technology.

■ Operating Costs

Positives

- Reduced labour costs are associated with weighing, sorting, washing and maintenance of pens.
- Reduced wash water volume associated with less penning.
- It is easier to restrict feed resulting in reduced cost of feed in the pig's gut at the time of shipping.
- Sprinkler systems used for establishing dunging patterns could be eliminated.
- Reduced maintenance on equipment, especially penning..

Negatives

- Maintenance costs may possibly increase, depending on type of sorter and return gates.

■ Performance and Productivity of Animals

Positives

- It has been reported that some farms have achieved as much as \$7.00 / pig in improved revenues by tightening the number of pigs shipped within the targeted carcass window. The expectation is that the core marketing will be improved because the sorting is constantly selecting those pigs of the ideal market weight (over 90% in core of market grid).
- The uniformity of market weights would not necessarily be better than weighing and sorting all the pigs manually, but will in all probability be better than weighing a few pigs and 'eyeballing' the rest. There are at least some operators that are exceptionally proficient at estimating market weights by visually assessing the pig and for these operators there may be fewer advantages.

Negatives

- Vices may affect a greater proportion of pigs in the LGH building as more pigs are at risk than in small groups. The pig that is biting or nuzzling potentially has more pigs available to express the undesirable behavior.
- There has been no apparent increase or decrease in variation of body weight within pen when comparing LGH vs. small pen groups.

■ **Health**

Positives

- Disease causing agents such as Salmonella can be harboured in hard-to-clean cracks such as those under pen partitions that are difficult to clean. LGH has fewer pen partitions.
- Animals can escape within the pen and avoid injury.
- Hospital pen plays a prominent role within the room facilities and it is easier to reintroduce pigs into the main group once treatment is complete.

Negatives

- There may be an increased risk of health problems spreading throughout the barn. Diseases that rely on nose-to-nose contact or oral/fecal contamination may present more risk because of the increased number of pigs that can be contacted by the initially infected pig.
- Vaccination is more difficult and there is a need to develop a system for ease of handling for efficient vaccination.
- The daily health check must be more intensive in order to observe sick pigs in the larger group.
- Sick pigs may be harder to handle when they are being moved to a hospital pen.
- Early detection of health problems is enhanced when the pigs are up and moving about.

■ **Animal Welfare**

Positives

- The pen space associated with LGH is more spacious and environmentally enriched. There is more room for the pig to explore and to escape another pig's aggressive behavior.
- It has been proposed that the public perception of LGH may be more positive due to the perception of more space per pig.
- It appears there is a reduction in the amount of fighting when stocking an LGH configuration.
- Ease of animal handling is enhanced and there is less stress associated with moving animals into and out of the large groups.

- Regrouping of pigs for ease of loading at marketing results in little or no fighting.
- Co-mingling at closeout is easier when pigs come from large groups and are moved into small pens.
- Livestock transporters have reported that group-housed pigs are easier to handle at loading and unloading.
- There does not appear to be any increase in the incidence of social vices such as tail biting in LGH.

Negatives

- Injured animals may be more difficult to find.

■ Pork Quality/Food Safety

Positives

Better carcass quality due to

- Less stress and fighting when pigs are co-mingled prior to shipping.
- Barn managers report handling and movement of pigs from large groups is easier than pigs housed in small pens.
- More pigs shipped in the desired weight range through a more uniform carcass at processing targets the size of cuts that the consumer desires thus increasing true demand for pork.
- The removal of feed prior to marketing is facilitated with the LGH configuration.

Negatives

- It is more likely that a treated pig will need to be removed from the large group when medicated so the quality assurance requirements are satisfied and marketing can continue.

■ Conclusions

Large group housing offers significant benefits in the areas of better space utilization, reduced labour, improved stockperson working conditions, and improved ability to select more pigs within the marketing grid core.