

Managing Large Group Grow Finisher Pigs

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■ Introduction

The purpose of this presentation is to provide a practical case study for those considering building either a new swine unit with group housing and sorter or renovating an existing operation. The case study is based on Peace Pork Inc.'s actual experience in installing over 50 automatic sorters in finisher barns. Of the 50 installed, 16 were installed in a barn that was converted from partially slatted floors to the fully slatted system necessary to accommodate the sorters.

As feeding units become much larger and the jobs much more specific or single tasked, employees that run finishing barns have a daunting task. Peace Pork Inc. operations include two 8,000 head finishing barns that are operated by a single crew of four. The two barns have a separation of growth of about two months. Therefore, the crew is weighing and shipping pigs constantly. When the last stragglers are exiting one barn they are starting to weigh the heaviest pigs in the next barn. Throw in some washing and receiving and this is the life of a large finishing barn pig farmer. To hire individuals to work in this environment is challenging to say the least.

When the concept of using group housing and an electronic sorter to weigh and group hogs became known, we realized that this could help us in a number of areas. Although saving the backs of employees is a good goal to have, there still needs to be other advantages to warrant such an investment. Based on our research and experience to date we have been able to determine that there are three main economic advantages:

- Reduction of labour costs
- Higher percentage of hogs in the target weight zone
- Increased utilization of barn space

My presentation today will be divided into four main topics: a brief discussion of the concept, ideas on barn design, our experiences in operations and a summary of the economic impact the change has had on our bottom line. In general my presentation will focus on the fully slatted barns.

■ **Concept**

The general concept of large group housing is the elimination or reduction of traditional pens in favour of a large common area separated by a feeding area or "food court". Hogs are allowed to move freely around the common area and are enticed into the food court to eat and drink. Pigs enter the food court through an automatic sorter and exit through a series of one-way gates strategically placed around the food court area. By entering and exiting the food court the opportunity presents itself to weigh, sort and monitor the hogs through utilization of the air-operated gate on an automatic sorter.

Conventional barn designs have different ways of weighing pigs. Some barns have a centre weigh area located in the load out hallway where full pens of pigs would be moved to the scale. From there they are weighed and market weight pigs are sorted together for shipping or the whole pen is returned to ship at a future date. Either way, a significant amount of stress is put on both pigs and employees. One alternative utilized by Peace Pork has the scale being brought to a pen where sample pigs are weighed and used as the basis for an estimate of weight for the remainder of the pen. Those estimated to be ready for shipping are marked. The pigs would then be left in the pen until shipping day at which time those marked and ready to ship were sorted and moved. Staff became rather proficient and could keep about 92 % of the pigs in the target weight range. Every individual pig could be weighed in the pen, but this proved to be extremely labour intensive and costly. In all cases the work involved excessive stress on both stock and stock handlers.

The group penning and automatic sorting concept is a response to this stress and poor labour utilization and is an effort to streamline operations, improve livestock health and increase shipping efficiencies.

Barn Design

After reviewing the concepts and discussing the ideas with colleagues at VIDO, Peace Pork decided to convert some of its conventional design feeder barns to group housing and automatic sorting. The barn is a typical modern 8,000 head barn having eight rooms of 1,000 head each with totally slatted floors and a conventional centre alley. The pens were a typical rectangle design holding approximately twenty-two pigs with eight square feet per pig. The ventilation is a negative air pressure design with centre inlets drawing air across the pens to

the sides of the room. The exhaust fans are either chimney type and/or wall fans.

The first step was to remove existing penning and start fresh. New barn projects were also being undertaken at the time to use the surplus penning, so there was little waste of this previously invested capital. The result is eight rooms of 1,000 head each with reduced penning and two auto sorters per room (**Figure 1**).

Experience showed that there are many important design factors. If some of these main design issues are not implemented then performance may be compromised. The following considerations are key in any proposed barn conversion process. However, as with any new concept in the industry, this is a work in progress and alternative design factors may evolve to improve the utilization of this concept and ultimately improve pig performance.

Pen layout

The new large rooms within the barn are approximately 200 feet by 40 feet requiring two sorters per room. This necessitates two food courts one on each side of the room. The common group area becomes the end of the barn and space between the food courts. The holding area for pigs sorted for shipping is the end of the barn that exits to the shipping hallway.

Food Court

In a traditional small pen, a pig goes to a feeder and eats up to seven times per day. The new design requires the pig to pass through the sorter in order to enter a specified eating area. It is our experience each pig accesses this area 2-3 times per day. Design of the food court is the single most critical design factor in the success of the overall concept. Factors such as square footage, feeder spacing and feeder density are very important. (**Figure 2**)

Once the pig is inside the food court, it tends to stay awhile and go to the feeder a number of times. Therefore, it is critical to have enough square footage per pig so that pigs can enter and feel comfortable to stay and eat what they wish. Sorter manufacturers recommend that a density of 2.5 square feet per pig be allowed within the food court. Based on our experience, there should be no major compromise on this recommendation. Whether density is 2.5 or 2.4 square feet may not make a difference, but moving down to 1 or 1.5 square feet will hurt pig performance. This is based on experience from other barns using this higher density that experienced a significant drop in ADG as a result. Even a reduction to a density of 2.2 square feet may hurt performance. Make sure there is close to 2.5 square feet per pig.

Using conventional wet dry feed, some manufacturers say that up to 60 or more pigs can be fed using a double-sided feeder. However, considering the feeding dynamics of group housing, this should change to approximately 40 to 50 head per feeder. The objective is to not limit feed access by overcrowding the feeders.

It is also important that feeder spacing provide for clear access and pig movement around each feeder. Once inside the food court, pigs tend to lie against the walls away from the feeders during the time between feedings. Spacing the feeders approximately 6 to 8 feet apart accommodates this activity. As well, if a feeder is too close to where pigs enter through the sorter there becomes a congregation of pigs that will restrict pig flow. Therefore, allow at least 10 feet from the sorter to first feeder. However, too much room could encourage a sleeping area next to the entrance, creating further restriction of pig flow.

Providing easy exit from the food court will also reduce crowding. In addition to regular spacing of one-way exit gates throughout the food court, placing one gate close to the sorter can help reduce the back up of pigs since some pigs may choose to exit from where they entered.

Ship-out or Heavy Area

When pigs approach shipping weight a ship-out area is implemented. This area is referred to as the heavy side and, prior to sorting, is part of the whole room used by all pigs. When weights reach the point where heavy pigs need to be sorted, a series of gates are closed that create pens used to separate the heavy pigs from the rest of the group. The sorter directs the heavies to one side using the air-operated gate. The art is in designing a system that allows flexibility in using only as much room as is needed for the heavy pigs. For example, when shipping from a group of 1,000, there may be as few as 20 pigs ready at the start. In a perfect world, these pigs should only need 160 square feet (20 pigs at 8 square feet per pig), however in the real world the design needs to be flexible enough to accommodate these few pigs at the start without stealing square footage from the rest of the group. This can be accomplished by having a series of gates that expand your heavy area by as much as 25 to 30% of the original room depending on the maximum number of pigs to be shipped. Each barn or system will have to review this to accommodate individual shipping patterns.

The heavy area also requires separate feeders from the rest of the group. This creates an interesting challenge, especially in the first few loads. Consider the following dilemma. The plan is to ship 20 pigs out of the overall group of 1,000 (2%). Pen design may require providing those few initial pigs with 6 of the 24 feeders (25%). This creates a situation where, instead of 24 feeders for 1,000 pigs (42 pigs per feeder) there now exist only 18 feeders for 980 pigs (54 pigs

per feeder). This is still within recommended densities, but creates challenges until at least approximately the first 100 pigs are marketed. There needs to be about 25% of the feeders available for the heavies since there will be times when this amount or more will be moved out on one shipping date. (see section *Weighing and Sorting* following)

Pig Density

With respect to large group housing and pig density, there are two important factors: space required for alleyways and pen partitions. A room 200 feet long with an alley three feet wide means 600 square feet of space. This same room could have forty partitions three inches wide and eighteen feet long, another 185 square feet. Group housing eliminates the need for alleys and partitions. Assuming a conventional density of eight square feet per pig on fully slatted floors, this extra space could accommodate another 100 pigs, an increase in barn capacity of 10 %.

The dynamics of pen and space utilization in the large room also change. Interaction between the pigs within the one large common area may allow a further increase in density. Other speakers in this session will provide more information on this topic. This change in dynamics may allow a reduction from the conventional eight square feet per pig to seven and one half square feet. Producers will need to determine their own densities taking into account such things as health status, genotype, feed density, pig flow and a number of other factors.

Equipment

The equipment list for large group housing includes three main items:

- Sorter and scale
- One-way gates
- Air compressor

The sorter is an electronic scale that comes with a variety of options depending on the manufacturer. These options include electronic eyes, double gates, spray marking systems and different weight and grouping options. Attached to the scale is an air operated gate system and computer controlled operating system. Equipment suppliers recommend about five hundred pigs per sorter. This may be increased to an upper limit of six hundred but care should be taken to understand the impact on growth. Each producer should look at the options available from various manufacturers to balance options with price.

Ventilation

The small pen system uses shoebox ventilation, attempting to regulate air in every pen to be the same. If this doesn't work the pigs may suffer. While early in the conversion process and not many ventilation changes have been made, the observation is that the ventilation is not so critical in a large pen and in fact variance in temperature and airflow may be desirable. Pigs can then choose where they want to be. More work needs to be done on this, but definitely the ventilation and the controls can be less sophisticated in a large group.

Other Design Issues

Two other design issues to consider are hospital pens and play areas. Hospital pens are more important in large pen systems as some pigs may need different care from the large group. These pens will be similar to a standard pen and require access to a feed line. Play areas are a centralized place within the common area with a variety of toys allowing pigs to visit and occupy time. Hanging waterers can also be left out in the common area and can act as a type of toy, but also ensures water use is not limited by access to the food court. However, this needs more investigation because the alternative, having water available only through the wet dry feeder in food court, may provide added incentive to enter the sorters.

■ Operations

Health and Movement

When pigs first enter the room they weigh approximately 25 kg. With a large territory to explore, the pigs group very easily and quickly become content with very little fighting. This freedom of movement becomes a great asset as they grow and reach market weight.

One major change from conventional housing is management of the health check. While no more difficult, it is different. The large group means walking through the pigs and having more interaction. The herds person needs to have a good eye, but again, you need to have a good eye in a conventional pen system. The large area will not hinder good herdspeople. Walking amongst one thousand pigs is not a concern since they become very docile and easy to work with. Sorting a sick pig two hundred feet to the hospital pen is not difficult since the pigs are now accustomed to moving and the other pigs are not as 'hyper' as before.

Canadian Quality Assurance requires that when pigs go to market they must have gone through a defined antibiotic drug withdrawal time. Therefore, in

group housing, pigs that are approaching market weight, but require treatment, should be taken to a hospital pen to monitor their withdrawal time. In a small pen you could identify that one pen, but with the large group the whole group would have to be put on hold. Button tags can be used as an alternative to moving the treated pig to the hospital pen, but they are difficult to read and monitor in a large group setting. A huge advantage of group pen dynamics is that after a pig has regained its strength or becomes healthy there is no problem to reintroduce that pig back in the group. This is unlike the small pen system where the hospital pen often becomes the pen with the highest density because returning the pig back to its original pen is difficult due to fighting.

There also appears to be fewer vices amongst the group, such as tail biting, since they have more room to escape. The whole pecking order or boss hog dynamics that happen in a smaller pen will not happen in a large group. It is hard to be the boss of 1,000 pigs. If you think you are the boss, chances are the rest of the group doesn't really care. The whole movement of pigs in or out of the large group is exceptionally easy. If you have light pigs from other rooms at the end of a batch, they can be mixed with very little fighting. When it is time to ship, the pigs are much easier to load. Since they are used to moving they are not as timid or scared when being loaded. Without a doubt, the pigs are much more content and pig movement is much easier in this system.

Training

A major concern when considering an automatic sorter system was the ability of pigs to figure out the system. Therefore, some time was spent designing a training system to condition the pigs to learn how to enter through the sorter. When pigs are first introduced to the room they are not restricted entry to the food court for the first three weeks. Gates at the end of the food court along with the two gates next to the sorter are left open. The sorter is also left open but not activated to open or close the gate. As well, initially, the young pigs are also small enough to go under the one-way gates. After three weeks, entry is gradually restricted. At first the gates at the end of the food court are closed. After another three or four weeks the gates next to the sorter are closed and then the only access into the food court is through the sorter. By week nine the pigs are only going through the sorter and by week ten the sorter air gate is activated. The only other tool used is a light over the sorters which remains on at all times to help identify the entrance to the food court. It is important to not just use the sorter prior to weighing or expect to move one sorter from room to room. If pigs have access to the scale at all times they will know what to do with it when the time comes.

To date, this simple plan has had a one hundred percent success rate, with all pigs learning to enter the food court through the sorter with little difficulty.

Weighing and Sorting

The beauty of the system is the ability to weigh and sort pigs prior to shipping. Once the pigs have been trained and it is time to begin weighing for market, the sorter is activated to move the pigs left or right depending on weight. This offers a number of advantages:

- Computer operations offer several marketing tools for identifying and grouping market hogs. Pigs can be weighed individually, counted and marked for identification.
- Automatically prepares groups that are ready to tattoo and load. If during the process one pig appears to be light, send it back to the group area. If it is truly heavy enough then it will be back within a day.
- Ability to adjust group sizes to meet load requirements. If ten more pigs are required to fill a truckload, change the weight parameters on the scale and within an hour or two those extra pigs will be added to the group.
- Increase target shipping weight range. Peace Pork has been able to obtain approximately 96 % within the target weight range. This could be higher, but trucking issues related to first and last pigs in a batch sometimes mean shipping pigs out of the target range to fill a truck.
- Easier mixing of pigs. If there are only a few pigs in one room ready and you don't want to tie up the heavy area for just a few, then move them across to another room and group them with some other heavies.
- Select and group pigs to restrict feed intake. In a small pen system if one or two in a pen of twenty are ready to market, and the feeder is shared with the pen beside it, it is impossible to restrict feed before shipping. This LGH system allows pigs to be held with restricted food. This keeps the packer happier and saves on feed.

Performance

There are a number of performance standards that need to be examined in the evaluation of group housing.

Mortality

Mortality in our old small pen system, when measured including pigs condemned at the plant, was approximately 2 % (± 0.5 %). Experience with the large group to date has been in the same range, with the last batch of 8,000 head having a mortality rate of 2.1 %.

Average Daily Gain and Feed Conversion

These parameters are somewhat more difficult to quantify. Every batch of pigs has its own issues and there will always be some variation between batches,

whether in small pens or large pens. However, during the conversion process, half of the barn was using small pens while the other half was using the group pen sorter system. This provided the ability to compare gains between the two batches. Results showed that the large pen system shipped a higher percentage of pigs over a given time period. Based on this experience the initial conclusion is that the group system has as good or better gains than the conventional small pen system. Data on this performance factor will continue to be collected.

Manure

As with any fully slatted floor you may have pigs dunging in a certain place, but it only relates to that one pen. In a large group they may pick a place that could be at the end of a gutter or confined to one area. This may lead to problems in draining gutters or washing. This needs to be monitored and can be helped by putting hanging waterers or sprinklers to help with the manure flow. Installing false walls or pen dividers can also influence dunging or sleeping patterns.

Washing

The amount of wash time and wash water used in large pens is reduced significantly. Our managers report it takes half to one-third of the time to wash and prepare a room since there is only 20% of the wall or partitions in a large pen system compared to a small pen system. It is a huge saving of labour on a not so pleasant task.

■ Economics

While each manufacturer and dealer will offer a variety of options and packages, the cost to convert fully slatted barns to the system described above will cost approximately \$20,000 per 1,000 pigs. Peace Pork invested approximately \$320,000 to convert its two 8,000 head barns. Main items include the sorters, one-way gates, air compressor and installation labour.

With respect to farm labour, for the two 8,000 head barns referred to above, the number of employees required was reduced from four to three. This results in a savings of \$30,000 or more per year.

The increase in number of pigs processed through the barn can be accomplished by:

- Utilization of alleyway space;
- Lower square footage per pig required by large pens;

- An increase in performance by running the same number of pigs with more square footage.

Any combination of these improvements creates benefits. For example, the conversion can increase pig population by 10 %. The cost of converting the barn is approximately 66 % of the capital cost to build the equivalent new barn space.

Target weights should increase by at least 4 %. A barn capacity of 16,000 pigs at 2.8 turns per year means 1,800 pigs more in the target weight range. This could translate to an additional \$20,000 per year towards payback of the investment.

■ Conclusion

By adopting the innovation of group housing and sorters, Peace Pork has learned the following:

- The technology is a wonderful tool to tackle one of the biggest problem facing intensive livestock producers: attracting and maintaining quality staff. It is possible to build a working environment for employees that is easier, safer and involves less stress.
- Sorting, shipping and improving target weights are much easier to obtain.
- Pigs are happier and in a better social environment.
- Excellent payback period for investment due to improved volume of pigs, savings in labour and higher packer returns.

What could be better?