

How to Keep Pigs Flowing when Space is Limited

Michael C. Brumm

Brumm Swine Consultancy, Inc, PO Box 2242, North Mankato, MN 56002-2242 USA
Email: mbrumm@hickorytech.net

■ Introduction

As producers improve their reproductive herd performance with both genetics and management, the number of pigs weaned per litter and per week increases. At the same time, slaughter weights are increasing. Combined, these improvements mean too many pigs in the facility and other issues related to pig flow in facilities become a bigger concern.

To illustrate the concern, let's use as our base production system - a farrow-finish enterprise farrowing 30 females weekly that was constructed in the mid 1990's. At the time of construction, the producer(s) planned for weaning 250 pigs per week from 30 farrowing crates with an average sale weight of 105 kg (231 lb). In the 10 years since construction, they have improved reproductive performance to the point that they now wean 275-280 pigs per week and sale weight is now 120 kg (265 lb).

When constructed, the site had 6 nursery rooms for 250-head at 0.25 m²/pig resulting in 62.5 m² (673 ft²) of pen space per room. There were 16 grow finish rooms at 0.67 m²/pig with a total of 167.5 m² (1803 ft²) of pen space per room. Each nursery and grow-finish room had 4 pens on each side of a central aisle with 31-32 pigs/pen. With the changes in reproductive efficiency the nurseries now have 0.23 m²/pig and 34-35 pigs/pen. The finishers are reduced to 0.61 m²/pig before death loss is accounted for (**Table 1**).

Table 1. Reduced pen space due to increased reproductive performance

	Nursery Room		Grow-Finish Room	
	m ² /pig	ft ² /pig	m ² /pig	ft ² /pig
250 pigs per week	0.25	2.75	0.67	7.2
275 pigs per week	0.23	2.50	0.61	6.6

Based on the results of Gonyou et al (2006), each 3% change in space in the range of the space allocations in this production flow results in an estimated 1% reduction in daily gain. Thus, the best estimate is that daily gain is reduced 3% as a result of the 8-10 % reduction in space due to increased productivity of the breeding herd. This reduction in productivity doesn't take into account the increased space that may be necessary to grow pigs to heavier weights.

For those unfamiliar with the necessity of all-in/all-out by room and other pig flow issues, an obvious solution is to simply construct more facilities. The challenge with additional construction – how to maintain all-in/all-out pig flow within rooms. In the system described above, rooms are loaded with one week of pig flow (weaning) and managed all-in/all-out. How do you size additional construction to 22 250-head nursery and finisher rooms when the need is to find space for 25 more pigs per week?

■ **Constant Room Size and Altered Room Fill Schedules**

One option to deal with more weaned pigs is to fill a room at weaning to a fixed capacity, with the excess pigs beginning to fill the next nursery room. The challenge in this is that heating and ventilation systems are not designed for partial room fills. That is, if the ventilation requirement at weaning is 1.5-2 cfm/pig and fans are sized based on a capacity of 250 head, how do you modify the ventilation rate when only 25 or 50 pigs are placed in the room? In addition, what is the extra expense associated with heating the room to 27°C (80°F) when the room is only partially filled?

A second challenge to this option is that the number of days available for nursery pig growth decline. When a room is filled once a week under the scenario described above, the number of days available for pig growth averages 39 days, assuming 3 days (time to clean, disinfect and dry the room) between successive groups of weaned pigs. If excess pigs fill the next room, instead of 39 days of nursery growth, the average declines to 32 days, since 2 nursery rooms must always be available to accept weaned pigs (250 pigs in one room and excess into the next room). This creates tremendous stress on the grow-finish rooms since the pigs are now close to 3 kg (6.6 lb) lighter at placement into these rooms.

To make this option work, the producer needs to add at least 1 more nursery and/or finishing room. This comes at a huge price since the number of days pens/rooms are not stocked with pigs increases in the system, adding to the capital expense of production.

■ **Batch Farrowing**

An option that some producers are using is to modify pig flow by going from a weekly farrowing system to a batch farrowing system. That is, instead of farrowing 30 sows every week, they are farrowing 120 sows once every 4 weeks. They accomplish this by breeding for a 2 week period with a 2 week non-breeding period. This keeps weaning age of pigs within a batch fairly close (within 2 weeks) and allows for a large number of pigs to flow through the system at one time (approximately 1100 pigs every 4 weeks). Larger groups of pigs also solve the problems of small pig numbers in one or more rooms since there are larger numbers of pigs available for allocation across a number of rooms.

While producers generally are adverse to sale of weaned pigs that they could potentially grow to market weight and capture additional profit, under this scenario there are sufficient pigs weaned at one time to occasionally sell SEW pigs to ease facility flow concerns. This becomes a very real option if no new nursery space is added to better match facilities with pig flow.

One challenge in this scenario is the limit of 6 weeks of nursery capacity (6 rooms) when farrowing occurs every 4 weeks. The solution is to add 2 nursery rooms so that nursery capacity matches farrowing capacity. There then is 8 weeks of nursery capacity, with the pigs remaining in the nursery for 52 days before relocation to growing-finishing rooms. This often means the pigs are 7+ kg (15+ lb) heavier at placement into the growing-finishing phase of production, which results in more opportunities for the pigs to achieve the desired sale weights prior to the need for the space for the next group of nursery pigs.

A second challenge is the altered labor intensity in the breeding/gestation and farrowing facility. With batch farrowing, instead of weekly matings, farrowings, weanings, everything is concentrated in a 2 week period with the other 2 weeks having a relatively light labor demand. Management of the gilt pool, recycling females, etc. also present challenges to those who have enjoyed the relative steady labor demand and female flow associated with weekly farrowings.

■ **Paylean®**

With the recent approval for dietary inclusion of ractopamine (Paylean®, Elanco Animal Health, Indianapolis, IN) in finishing diets in Canada, growers in both the US and Canada can now use this product to improve daily gain and carcass lean. While variation in the response exists, inclusion of Paylean® in the diet at 5 ppm for the 28 to 35 day period prior to slaughter

generally improves daily gain 10% or more for this time period. In addition, the response is not affected by crowding (Brumm et al, 2004). While use of Paylean® in late finishing diets will improve pig flow from finishing rooms, it doesn't solve space issues associated with overcrowding in the nursery.

■ Make Existing Pens Larger

Some producers have considered converting from rooms with many small pens and a central alley/passage way to rooms with 2 large pens and no alley. For purposes of this discussion, assume that the nursery pens are 1.53 m (5 ft) wide and the grow-finish pens are 3.05 m (10 ft) wide. If the aisle is 0.6 m (2 ft) wide in each room, making the aisle usable pen space adds 3.7 m² (40 ft²) of space in the nursery and 7.4 m² (80 ft²) in the grow-finish rooms. There is now 66.2 m² (713 ft²) of total pig space available in each nursery room and 174.9 m² (1883 ft²) in each finisher room. With 275 pigs weaned, space per pig increases from 0.23 m²/pig to 0.24 m²/pig in the nursery and from 0.61 m²/pig to 0.64 m²/pig in the grow-finish rooms (Table 2).

Table 2. Increasing pen space by eliminating alley way

	Nursery Room		Grow-Finish Room	
	m ² /pig	ft ² /pig	m ² /pig	ft ² /pig
With alley way	0.23	2.5	0.61	6.6
Eliminate alley way	0.24	2.6	0.64	6.9

The 4% increase in pen space in the nursery would be expected to improve daily gain just over 1% (Gonyou et al, 2006). Offsetting this possible increase in gain is data that suggests that when weaned pigs are housed in large group sizes, daily gain may be decreased slightly for the first 6-8 weeks (Wolter et al, 2001).

In the grow-finish rooms, the 4.9% increase in space with the large pen arrangement would be expected to improve daily gain just over 1.5% (Gonyou et al, 2006). The change in group size from 31 pigs per pen to 125 pigs per pen is expected to have minimal impact on grow-finish performance (Payne et al, 2006). In both the nursery and grow-finish rooms, the relatively small increase in space availability from the conversion of aisle space to pen space does little to reduce the tremendous impact on performance from severe space restrictions. For many producers, the issue of large versus small pens becomes a people issue more than a pig performance issue. How to identify and treat individual pigs, how to sort-off pigs identified for slaughter, etc. are all concerns for producers utilizing large pen facilities.

■ Investment in More Facilities

As highlighted in option 1 (Constant Room Size and Altered Room Fill Schedules), investment in either nursery or grow-finish facilities doesn't solve the pig flow problems of increased pig numbers weaned every week. The site still has rooms sized for 250 pigs with 275 pigs weaned. Any new construction of either nursery or finisher space still results in partially filled rooms, etc., leading to large capital investments with little expectation of a reasonable payback due to high operating costs associated with partially filled rooms, etc.

■ Future Options

As illustrated above, pig flow problems can become very real as the industry makes genetic and management progress. While all-in/all-out pig flow is desired for maximizing pig health and minimizing disease transfer between multiple ages of pigs in a production system, the reality is that space becomes a very real limit to performance as productivity increases.

In the US, the adoption of wean-finish facilities has been driven in part by pig flow issues. With wean-finish facilities, producers are very often double stocking at weaning and removing 50% of the pigs at some point (often 5-10 weeks post weaning). The advantage of this management practice is that the decision regarding movement to grow-finish with 50% of the pigs is not a strict time function. That is, producers don't have to move pigs by a given date to make room for the next group of weaned pigs.

In addition, space per pig is not an issue for wean-finish pigs double stocked for 5-10 weeks. If the final stocking density is $0.67 \text{ m}^2/\text{pig}$ ($7.2 \text{ ft}^2/\text{pig}$) when 50% of the pigs are removed, this translates to $0.33 \text{ m}^2/\text{pig}$ ($3.6 \text{ ft}^2/\text{pig}$) during the double stock period.

However, while pen space is not a limit to performance during double stocking, group size, feeder space and drinker space do present limits. A best guess is that during the double stock period, daily gain is reduced 35-45 g/d (0.08 to 0.10 lb/day).

While this reduction in gain results in a slight increase in the number of days to reach slaughter weight for double fill versus single fill pig flows, the options for pig flow management become a big consideration when investing in new facilities.

■ Conclusion

Future investments in facilities must include consideration of pig flow options so that improvements in reproductive performance and/or further increases in sale weight can be accommodated more readily than is possible with current fixed flow systems.

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