

Market weight variation in the pork industry

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This Primefact reviews the difficult problem of market weight variation in the pork industry and the latest strategies to minimise its impact on profitability.

Introduction

Variation in the market weight of pigs is of major concern in pork production systems due to the application of tight marketing grids by processors. With 'all-in, all-out' (AIAO) facilities, the impact of slower growing pigs becomes obvious and 'tail-end' pigs become more difficult to manage. Therefore, management of

variability has become an essential component of successful pork production.

Variation can be assessed by calculating the coefficient of variation (CV), which is a measure of variation from average performance. Variation typically declines as pigs approach market weights.

A CV of 12% to 15% can be expected for groups of pigs entering an AIAO facility at 20–25 kg liveweight. If pigs entering the facility are within 1 week of each other in age, variation can be reduced to 10% when pigs are first marketed.

If market weight variation is above 12%, changes in the production system can be expected to improve performance. However, if the CV is less than 12% it is difficult to achieve further reductions. Therefore, the best strategy

MINIMISING MARKET WEIGHT VARIABILITY

Many attempts to reduce the amount of variability within groups of pigs have failed. Studies have found that:

- Sorting pigs prior to entering weaner or grower facilities have failed to reduce variability and it has often had an adverse impact on overall performance.
- Only severe restriction to feed access or severely limiting amino acids in diets will increase variability.
- Changing stocking rates often has little effect on variability.

If market weight variation is above a coefficient of variation (CV) of 12%, changes in the production system can be expected to improve performance.

MANAGING MARKET WEIGHT VARIABILITY

Managing the piggery to minimise the impact of variability appears to be the best strategy rather than reducing the level of variability:

- Sort pigs either prior to abattoir or after slaughter to match carcass specifications with market outlets.
- House boars, gilts and barrows separately.
- Herd health and management strategies will help minimise market weight variability.
- Negotiate carefully with marketing outlets to maximise profitability.

If market weight variation is below a CV of 12%, it is difficult to achieve further reductions — it is generally easier to manage the variability.

TROUBLESHOOTING

High average pig performance + low carcass weight variability (CV < 10%)	=	optimal growing conditions
Low average pig performance + high carcass weight variability (CV > 12%)	=	suboptimal growing conditions
Low average pig performance + normal carcass weight variability (CV 10% to 12%)	=	suboptimal growing conditions

Whether optimal or suboptimal conditions exist, all pigs are generally affected uniformly.



is to manage the variability. It is generally easier to achieve improvement in **all** pigs than to reduce the variation **between** pigs.

A suggested CV benchmark for market weight is 10% for groups of pigs within 1 week of age of each other.

Producers often sort pigs prior to market in order to maximise the number of sale pigs classified as prime grade. With deep-litter systems, the lighter pigs have the greatest impact on profitability, as they indicate when sheds can be emptied. Hence, attention to average herd growth rate and the range of growth rates within a herd are important. (For further information on deep-litter systems, see [Primefact 68 Deep-litter housing for pigs.](#))

Economic impact

Excess market weight variation has been found to impact profitability through inefficiencies in:

- management — resulting from sort losses;
- shed use — increases housing costs per pig place;
- feeding programs — it is difficult to formulate diets to efficiently cater for groups of pigs with a large weight variation;
- health programs — due to differences in susceptibility to disease and increased veterinary costs;
- processing — a large variation in carcass size, shape and composition affects the handling of carcasses and the uniformity of their products.

Marketing strategies

Most processors will accept a wide variation in carcass weights and backfat but usually impose price penalties on carcasses outside prime specifications.

It may be possible to market pigs on an AIAO basis by selling pigs to the most appropriate buyer if there is access to processors with different market requirements. This approach may incur additional sorting and transport costs, but is likely to be a cost-effective option that meets market demands.

Many producers, however, do not have access to a variety of markets and must address the problem of variation by selectively marketing pigs over time. Autosort systems allow effective selling of the fastest growing pigs in the group and reduce weight discounts for overweight pigs. This strategy reduces the number of out-of-range carcasses and enables the average carcass weight of the group to be increased. The cost of production can be reduced by 3% to 5% using this marketing strategy.

Removing the heaviest pigs from a pen of pigs due for slaughter increases the growth rate of the remaining pigs. This is due to an increase in feed intake which may be partly due to increased floor and feeder space.

The most effective methods for reducing the impact of variation in weight gain are to:

- negotiate a wide sort window;
- sell to different outlets that have different requirements;
- increase the weight gain of all pigs through improved management.

Taking this approach is likely to be more profitable than attempting to reduce variation.

Management strategies

Reducing variability can be achieved by managing the environment and managing the pig. Improvements in breeding, nutrition, housing, stock management and health will allow the lowest potential CV to be achieved. However, management decisions to improve profitability should be based on good record keeping, ensuring that expected improvements in performance are achieved.

Examples of strategies that can reduce market weight variability include the following.

Breeding

The performance characteristics of different breeds can cause considerable variation in the market weight of pigs. Differences of 2–3 mm in backfat and 50–60 g/d in daily gain have been found to occur between Large White, Landrace and Duroc breeds. Using rotational breeding programs with several breeds can also increase the variability of market pigs.

However, different breeds or lines within breeds are essential for future selection programs. Methods for reducing market weight variation through breeding programs include:

- use of terminal parents in a single specific cross;
- use of sires with similar indexes;
- using fewer sire lines;
- purchasing replacement stock from single lines;
- using artificial insemination to distribute semen from single boars over a greater number of females.

Nutrition

Market weight variation can increase when there are fluctuations in daily feed intake and poor feeding management.

Daily intake can vary because of factors such as changes in temperature, disease status and stocking rate. This can be further influenced through poor feeding management due to:

- inadequate supply of the pigs' nutritional requirements;
- poor sow-feeding management in the dry sow and farrowing accommodation;
- accidental feeding of incorrect diets;
- abrupt changes to feed formulations or use of different ingredients;
- contamination of ingredients during storage;
- inadequate particle size of feed mixes, and poor mixing;
- separation of feed ingredients;
- inadequate access to water.

Good feeding management can help minimise market weight variation. Strategies include phase and split-sex feeding. However, it is necessary to closely monitor dietary specifications in relation to pig requirements. It may be necessary to increase dietary specifications, depending on economic viability, to match the highest performing pigs. Each batch of pigs should ideally be in as tight a weight range as possible.

Increasing the growth rate of the entire group will not reduce variation or the need to sort pigs at market. This strategy will only increase the weight of the slow-growing pigs. Profitability will improve through increasing the quantity of product available for sale over a given time period.

Quality assurance measures are necessary at all stages of feeding management in order to minimise poor and/or inconsistent feed quality and to accurately target feed intakes.

Housing

The adoption of deep-litter housing systems can result in improved herd health and increased growth rates. However, it is important that pigs have adequate warmth and protection to minimise the effects of seasonal variation in climate. Generally, pigs slaughtered in late summer and early autumn are lighter and leaner than those slaughtered in winter and early spring.

For deep-litter housing, the amount of litter required will depend on climate, pig age and penning arrangements. An adequate supply of litter throughout the year will ensure potential performance is achieved.

Stock management

Errors in handling stock and equipment failure can contribute to increased variation. Hence, it is important for management to be vigilant at all times to minimise environmental impact on pig performance. Specific management strategies to improve pig performance include the following.

'All-in, all-out' (AIAO)

Pigs demonstrate decreased variation in growth rate in AIAO management systems when compared to continuous flow systems. Improved performance could be due to improved respiratory health and higher hygiene standards.

Suckers

The smallest 20% of pigs at birth grow significantly more slowly after weaning than the other piglets. They are responsible for the majority of variation in pig weights after weaning. Procedures to increase the weight gain of the smallest pigs in the group include:

- split nursing and split weaning;
- use of complex diets;
- use of supplemental milk;
- shifting the most competitive piglets to other sows.

Aggressive cross-fostering will also reduce variation but the growth rate of the entire farrowing group will be reduced.

The reduction in variation through using these strategies appears to be due to a reduction in growth rates of the fastest growing pigs. It is generally not through increasing the growth rate of the smallest pigs in the litter. The weight gain of small pigs may increase slightly but this may only result in a small reduction in market weight variation. The economics must be monitored closely.

Weaners

Weaning age and the number of pigs weaned have some of the largest impacts on market weight variation. Variation increases with weaning age reduction, and younger pigs grow more slowly than older pigs. Variation in the total number of pigs weaned impacts on stocking rates which, in turn, affect market weight variability.

An effective method to reduce the number of light weight pigs at weaning is to increase the average weaning weight. Also, heavier pigs at weaning generally maintain their weaning weight advantage through to market weight.

A suggested target weaning weight is 4.5 kg or higher, as heavier pigs will achieve best growth rates, feed intakes and mortality rates. This can be achieved by maintaining the weaning age above 21 days and this will generally result in an improved 'wean to finish' growth performance.

Variation can be reduced by removing pigs that fail to meet minimum requirements and growing them out in a separate facility. However, this strategy may not improve pig performance or decrease variation at market weight.

There may be a potential for understocking or overstocking of grow-out facilities if there is a weekly variation in the number of males and females born. A strategy to maintain an even flow of pigs through grow-out facilities is to set weekly targets and to divert any surplus production to an alternative facility.

Separate-sex accommodation

Males and females grow at different rates, therefore housing them separately would allow males to be marketed first and females to remain until they achieve similar market weights. Alternatively, females could be marketed at lighter weights. At 23 weeks of age, a one-week age range can show a difference of more than 12 kg between the weight of the youngest females and the weight of the oldest males within a group. However, holding gilts longer may improve the market value of the group.

Group size

Good performance has been achieved with large groups of weaners, growers and finishers on deep-litter housing. However, it is essential to provide adequate litter, feed, water and floor space.

Increasing group size alters behaviour, social interaction, and activity of pigs. Pigs in larger group sizes tend to have a slight reduction in overall average daily gain. Performance is generally not inferior to that of pigs maintained in smaller groups. Pigs first marketed are mostly those pigs that were heaviest at farrowing.

Overstocking does not appear to increase variation. However, correct stocking rates will reduce days to market.

A [diagram of a shed layout](#) for a continuous automatic sorting for large groups is shown on the final page of this Primefact.

Parity segregation

Gilt litters grow faster if reared separately, compared to litters of multiple-parity sows.

Rearing the offspring of gilts separately from the offspring of sows will reduce variation. This could be due to health improvements of the different groups.

Sorting pigs by weight when forming groups may cause a reduction in average daily gain with little impact on variation. Also, sorting by sex does not appear to have an adverse effect on performance.

Removal of the heaviest pigs from a pen or shed increases the growth rate of the remaining pigs through an increase in feed intake, with no effect on feed efficiency. The increase in performance may be only partly due to increased floor and feeder space allowance. Market weight variation for the remaining pigs may also be reduced.

Growing smaller pigs separately can cater for specific nutrition/management strategies. Variation in the total group will not be reduced but there will be a reduction in market weight variability of individual sheds.

Automatic sorters allow pigs to be automatically weighed and sorted as they move through the unit. Pigs can then be easily marketed at their target weights. This technology provides advantages but there are also some challenges.

Advantages of automatic sorting

- There are increased margins due to decreased variability.
- Accurate marketing is enhanced.
- Light and heavy pigs can be fed different diets, which leads to improved throughput.
- Products such as Paylean® can be used with increased precision.
- Tail biting and fighting are minimised, which reduces mortality rates.
- There appears to be less stress on pigs in the shed and at loading.
- Feed can be withdrawn from market weight pigs.
- Sorters can sort up to five ways and can be linked to portable computers for transfer of information.
- Less labour is required for sorting.
- Job satisfaction is increased.



Examples of automatic sorters:
Left: Supreme Sorter, by Stockyard Industries. Right: Fast II automatic sorter, by Farmweld.

Challenges with automatic sorting

- Equipment must be set up correctly.
- Durability of sorters is an issue when there are a lot of moving parts, and electronics are situated in the grower facility.
- It is necessary to establish the best method of treating sick pigs and removing dead animals.
- There is a phase-in period required for staff and pigs to learn how to use new equipment.

The payback period for purchase of automatic sorters may be about 2 years but will vary from farm to farm.

Health

Disease can have a marked effect on market weight variation. For example, the variation in growth in pneumonia-affected growers is far greater than in healthy pigs. Stock obtained from a single source with a known health status will minimise the health risk. However, in the event of any disease challenge it is essential to provide prompt treatment to increase recovery rates and to reduce the risk of spread.

Products such as Tylosin can increase pig growth rates. Larger responses are obtained from smaller pigs and the end result is less variation at final weight, lower mortality rates and fewer tail-end pigs. Similarly, the use of feed additives such as Paylean® (ractopamine hydrochloride) can be used for increased growth rates, improved feed efficiency, increased carcass leanness, fewer 'tail-end' pigs and increased dressing percentage of finisher pigs.

Further reading

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Payne, HG et al. 1999, 'A review — variation in pig production and performance', *Manipulating Pig Production VII*, Australasian Pig Science Association, December 1999.

Tokach, M 2004, 'Dealing with variation in market weight', *Advances in Pork Production*, Prairie Swine Centre, Saskatoon.

A wide range of information sources can also be found on many pig industry websites.

Australian Pork Limited (APL) is the national representative body for Australian pig producers. It is a producer-owned, not-for-profit company combining marketing, export development, research, innovation and strategic policy development to assist in securing a profitable and sustainable future for the Australian pork industry. Resources and contacts are listed on their website:

<http://www.australianpork.com.au/>

or they can be contacted on 1800 789 099.

NSW Farmers' Association's NSW Pork Committee has resources and contacts listed on their website:

<http://www.nswfarmers.org.au/pig>

or they can be contacted on 02 8251 1700.

Queensland Department of Primary Industries and Fisheries (QDPI&F) have a

large range of fact sheets available on their website, and their [PigTech Notes](#) can also be obtained on CD.

A number of **pig-specific magazines and newspapers** also exist, including:

- *Australian Pork Newspaper*, (07) 3286 1833
- *The Pork Producer*, (07) 4690 9253
- *Pork Journal*, (02) 9798 3078
- *Pig Industry News*, (08) 8372 5222

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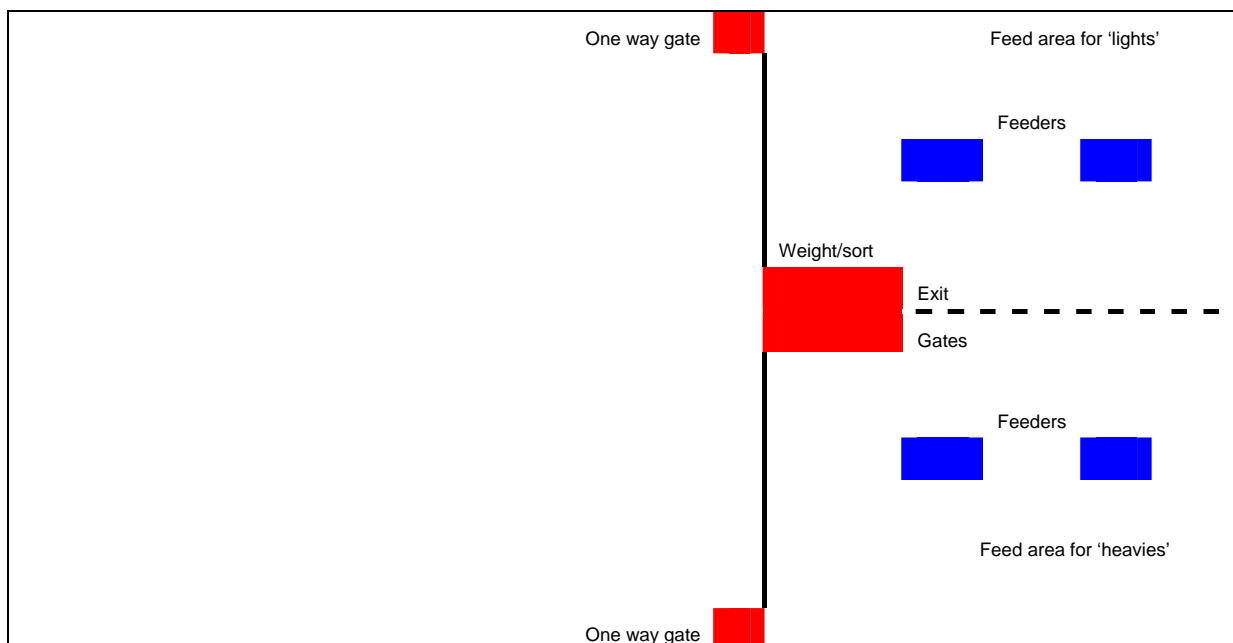
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Example of a shed layout for a continuous automatic sorting for large groups (VIDO Swine Technical Group, 2004)