PARITY SEGREGATION

Camille Moore
2505 Place Guilbault
St-Césaire, Québec
J0L 1T0
E-mail: camillemoore@videotron.ca

The evolution of the swine industry over the past 20 years has been quite phenomenal. Techniques like segregated early weaning (SEW) and three-site production were not in existence at all 20 years ago, yet they are probably the gold standard of pork production today in North America.

In the beginning, the dream of SEW was disease elimination. But in reality this technique is much more of a disease control technique than a disease elimination technique. The improvement in productivity was probably related to the true application of the all-in, all-out (AIAO) principle, and also the specialization of both staff and site.

Parity segregation aims to take those AIAO and specialization principles one step further to enhance the productivity of the overall system.

DEFINING PARITY SEGREGATION

There are basically two components to parity segregation: sow herd and progeny/offspring.

At the sow herd level, parity segregation is the segregation of gilts and first-parity (P1) sows from the older, second-parity and above (P2+) sows. The segregation of P1 sows can be done any time after a sow weans her first litter, and before she farrows her next and becomes a P2 sow.

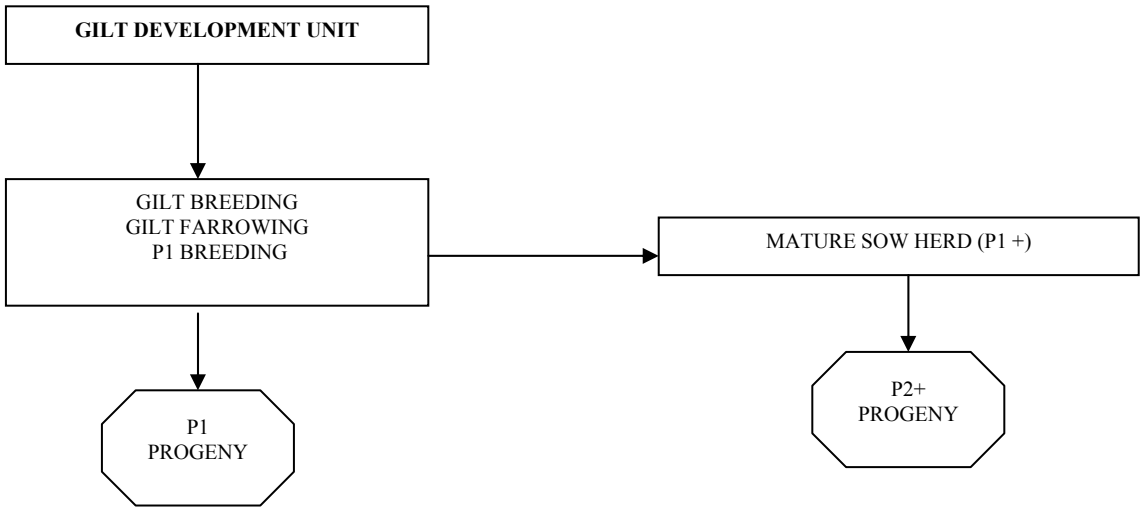
For the progeny of the sow, the goal is to achieve complete segregation between the offspring of the P1 sows and the offspring of all the other parity sows.

As with SEW and multi-site production systems, many options could exist within this general definition based on production goals, production status and problems to be solved.

In consequence, during the implementation of parity segregation, animals could be moved at different times of their cycle and many different scenarios would exist.

Figure 1 summarises the five main components of parity segregation. Within those five main production points, other subcomponents could be added based on needs,. Keep in mind that there may be advantages from using only a part of the total parity segregation system.

Figure 1. Five (5) main components of parity segregation.



In the first system where we developed parity segregation, the steps outlined below were followed:

- Early gilt exposure to the pathogens in the production system;
- Segregation of gilts during the rearing process;
- Gilt breeding and gestation;
- Farrowing of P1 sows and rebreeding;
- Introduction of P1 pregnant sows as replacement animals in the "old sows" breeding herd; and
- Complete flow segregation of the P1 and P2-plus offspring.

WHY PARITY SEGREGATION?

The original driving force for the establishment of parity segregation was a response to all of the problems related to gilt development, introduction, gestation and farrowing.

Based on the lessons learned from three-site technology, it was thought that this concept of segregation could be pushed one step further to enhance gilt development.

Advantages and reasons for parity segregation can be divided into three groups:

Focus on Gilts

Parity segregation will allow pork producers to raise gilts properly – providing them with the right feeding program, the right building and the right amount of space to grow properly.

After gilts have been grown out, it's crucial to focus on their final development. Parity segregation will ease the implementation of programs that support proper backfat deposition

on gilts and provide adequate boar exposure. These are critical to final reproductive development of gilts.

Regrouping gilts in one building with dedicated staff will allow for better estrus detection and make specific matings easier.

When all gilts are farrowed in the same barn, a specific lactation diet can be fed to take into account the normal lower feed intake during the first lactation.

And, it's a well-known fact that first-parity sows act completely different at weaning than older sows do. Regrouping the P1 sows will make usage of specific programs and mating patterns easier.

Health Advantages

Gilts can often be a destabilizing factor when they are introduced into a herd. In a designated gilt grower barn, having animals of the same age with a prolonged acclimatization period greatly helps to reduce the risk of destabilization in mature sow herds when P1 gestating sows are introduced. Gilt introduction normally acts as a destabilizing factor on most farms.

With parity segregation, herd health is stabilized, even in older sow herds dealing with porcine reproductive and respiratory syndrome (PRRS) virus.

Health problems related to gilts and their progeny at first farrowing are common. Undoubtedly, gilts and their progeny carry a lower immune status. Therefore, gilts are generally more susceptible to diseases like mastitis-metritis-agalactia (MMA), and their piglets are more prone to scouring.

Regrouping all gilt farrowings in one location makes the implementation of disease-specific prevention programs much easier.

Using parity segregation to control Mycoplasmal pneumonia in progeny from first-parity females has struggled but the problem seems to disappear in progeny from P2 and older sows even without the aid of vaccination.

For example, in one system looking at slaughter check lesions for enzootic pneumonia, a three-fold reduction was seen in the severity of lesions in the progeny of P2 sows vs. P1 sows. In that system, no vaccinations or medications were used on the P2 progeny, and both were provided to the P1 progeny.

Management Advantages

Another advantage to regrouping all gilts on a given farm allows for the development and usage of more specific equipment. For example, producers could use narrower and shorter gestation crates, as well as narrower farrowing crates. Because we know we will have to deal

with prolonged wean-to-first-service intervals in P1 females, more space can be provided in the breeding square, or hormonal therapy may be applied more aggressively.

Weaning weights of gilt progeny are normally lighter than those of older sows. This is probably due to lighter birth weights and to lower sow feed intake in lactation. Lower weights at weaning will usually result in lower weight gains in nurseries and finishers.

Keeping P1 litters together allows producers to design a system that builds in the extra space needed to reach optimum market weights while reducing variation within a barn.

Parity segregation can also help achieve consistent throughput. Designing a production system that allows gilt production to be segregated and maximized provides for a consistent supply of quality gilts into the breeding herd, enabling weekly farrowing targets to be met week after week.

BETTER PIGS THROUGH PROGENY SEGREGATION

Assessing the advantages of the offspring in a parity segregation system is not always easy. We have already mentioned some of the health advantages related to PRRS and mycoplasma control. Table 1 describes the differences in production seen between the P1 offspring and the P2 offspring in a given system over a two-year period. In this case, the advantages of the P2 offspring over their P1 counterparts add up to a $2.50 advantage.

Table 1. Production results for P1 and P2 + progeny.

	P1 Offspring	P2+ Offspring
Nursery Mortality (%)	2.96	1.52
Nursery ADG (g/day)	430	465
Nursery Drug Cost (US $)	1.37	0.53
Finisher Mortality (%)	3.8	3.25
Finisher ADG (g/day)	795	820
Finisher Drug Cost (US $)	1.07	0.77

Specifically, offspring segregation has:

- Allowed us to stabilize PRRS in the progeny. Today most nursery batches from the mature sow herd are negative for PRRS at the end of the nursery phase.
- Helped us to stabilize PRRS in the mature sow herds we oversee, where there hasn't been a PRRS break in the past three years.
- Improved control of mycoplasma. Vaccine is no longer used on the progeny of the P2-plus sow herd, while a strong vaccination program is still needed on the P1 progeny. As described earlier, lesions due to enzootic pneumonia have been reduced three-fold for the P2 progeny at slaughter.

As a caution, the figures for the two progeny groups in Table 1 were obtained from side-by-side comparisons, and do not provide a good basis for results obtained prior to the split of the two groups. However, a retrospective analysis of the records of that enterprise indicates that the results obtained today with P1 offspring are similar to those obtained when the two progeny groups were raised together.

Transportation costs of offspring segregation are not included in the cost structure.

All in all, there still appears to be a real cost of production advantage to using parity segregation on the offspring of P1 and P2-plus sows.

THE GILT AND P1 EXAMPLE

Acclimatization

Usually today there is a good difference in health status between the donor herd and the receiving herd. The greater the difference, the greater is the challenge. In our mind, it is a must that any setback related to health challenges after acclimatization needs to happen before 130 days of age. After that time, we will interfere with sexual development. We are also seeking for an animal on which immunity will be well developed prior to introduction. Depending on the disease, this immunity could need as much as 100 days to develop. In our system, we are using small dedicated finishing barns operated on an all-in, all-out basis. Our replacement gilts are moved into those buildings at around 25 kg of body weight.

Gilt Development

We look at the following:

- Giving them 0.9 square meters per animal in the finishing barn.
- Using a diet that will maximize protein deposition up to 135 days of age then using a diet that will lean more toward backfat deposition. Levels of minerals in those diets are also higher than what would be normally used for growing pigs.
- Focus on light pattern after 150 days of age (16 hours a day).
- All the needed vaccinations (Parvovirus as an example) are done toward the end of their stay in those barns.

Pre-Breeding for Gilts

At an average of 185 days of age or 125 kg of body weight those gilts are moved to our gilt breeding barn. They are placed in pens of 10 equipped with a self-feeder. Boar exposure is performed upon arrival with direct contact with vasectomized boars. Heat detection is performed twice a day and as soon as they are detected in heat gilts are moved to the breeding area. At time of movement they are individually weighed to assess if they will be mated at the subsequent heat or if we will skip one.

In the breeding area they are crated but in crates equipped with a self-feeder. They will remain fed at libitum until mating time. All incoming gilts that would not have shown estrus within 28 days post arrival will be automatically culled.

Gilt Breeding

Because previous estrus date had been recorded, we know when the next one should happen. Boar exposure starts 3 days prior to this date. Estrus is detected twice a day in an attempt to detect onset of estrus. First mating is done 12 hours after detection and then every 12 hours until she stands.

Immediately after the last insemination, gilts are moved to gestation. At that time they are weighed again and probed for backfat. We are using 3 different feeding regimes based on those results. This feeding regime is kept the same for the first 100 days of gestation. We are using smaller gestation crates.

Gilt Farrowing

Around 80 days of gestation, gilts are moved to our gilt farrowing barn. Specific pre-farrowing vaccination programs are used. At around 95 days of gestation, diet is increased by one kg per day.

At the proper time, they are moved to the farrowing crates. We are using smaller farrowing crates and also a specific, more dense lactation diet. Gilts are induced at 115 days of gestation (instead of 114 for mature sows).

After 6 days of lactation, if needed, milk replacer is provided in the farrowing crate for the piglets. We are also routinely removing one or two piglets two days prior to the expected weaning date.

P1 Breeding

At weaning, all P1 sows receive Regumate for 5 days. This treatment starts the day of weaning. They are crated, fed ad lib using individual self feeders and kept on the same lactation diet. There is no boar exposure while they are on Regumate.

When Regumate is stopped, boar exposure starts. They are mated 12 hours after onset of estrus and inseminated every 12 hours until they stand.

Animals that have not shown estrus within 20 days post Regumate treatment (25 days post weaning) are injected once with PG600. If they are not in heat within 10 days post PG600 injection, they are culled.

RISKS RELATED TO PARITY SEGREGATION

We have mentioned many advantages related to parity segregation, but as with any strategy, there are also risks and pitfalls related to the application.

First, parity segregation reduces the flexibility in a system. After the implementation of parity segregation and the use of P1 females as replacement animals for the older sow herd unit, the system becomes much more of a continuous-flow system and animals need to be moved on a regular basis. This reduces flexibility, mainly in the face of a disease outbreak.

The other danger of parity segregation is related to the biosecurity risk posed by making use of isolation units at each sow farm much more difficult to implement. However, if off-site gilt acclimatization is done well and the cooling-off phase properly set, this phase could easily become the isolation period for each group of animals.

Parity segregation in a system under expansion is more difficult to apply. When establishing a new herd, due to the fact that replacements will be brought in as P1s, we need to plan replacement matings at the same time that we are doing matings for herd establishment. This will increase the number of gilts needed and the space needed for the production of those animals.

Exposure to pathogens is also critical. Our goal is to expose animals to herd pathogens early to enhance herd health stabilization. If for some reason proper pathogen exposure does not occur, there is the possibility of introducing naive animals and placing the receiving herd at risk of infection.

Parity segregation increases the number of movements for animals, adding to transportation costs and increasing the risk of contamination.

Location also needs to be taken into consideration. The scientific community does not agree on proper separation distances between gilts, P1s and their offspring and the rest of the system. We recommend a minimum separation of two miles. Each pyramid should also have a dedicated transportation fleet.

With replacements being produced in a common location, a disease break at the site could potentially transfer problems to every production location.

CONCLUSIONS

We are still in the infancy of understanding all the pros and cons regarding parity segregation. However, the results obtained so far make this breeding/reproduction strategy attractive, and we expect to learn much more about its benefits within the next few years.