

Multi-site segregation

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Biosecurity practices were first introduced to swine production 20 years ago. Multi-site production, a cornerstone of biosecurity, is a promising technology for reducing the prevalence of several growth-suppressing diseases. Recently, Dr. Brad Thacker met with Drs. Tom Alexander, Joe Connor, Jerry Torrison, and Warren Wilson to discuss the merits and limitations of multi-site production.

What is the definition of multi-site segregation?

Jerry: 'Multi-site' means all-in—all-out (AIAO) by site, with or without multiple sow sources but with several nursery sites and several finishing sites; that is the precise multi-site definition. You can have two-site or three-site production, but the terminology would not be 'multi-site'—that would be called segregated site.

Joe: There are different criteria for breeding companies than for commercial herds. The difference might center around what is practical for a commercial herd, whereas breeding herds are more concerned with the ideal segregated system. A commercial company, unless it is operating on a very large scale, must put this type of production into its local area. A breeding stock company would not be looking at a pig-dense area, and thus the larger separation becomes more practical.

Tom: Yes, the big commercial operations look for a region to put their facility where it is cheap to build, with cheap labor, where waste disposal is no problem, planning permission is attainable, and taxes are favorable. A breeding company, on the other hand, looks for isolated areas away from other pigs. The commercial company's main aim is consistently high productivity. A breeding company's main aim is consistently high health status.

What diseases is site segregation aiming to control?

Tom: Commercial producers, if they've got any sense, are not interested in precisely what disease agents multi-site production will eliminate. They're interested in growth rate and feed conversion, and not having to medicate pigs all the time. They're interested in whether diseases are doing any harm.

Jerry: The one instance when a commercial company might be affected by a specific disease agent is when it is trying to move pigs between states and PRV restrictions are in place — so regulatory concerns could become an issue.

Tom: Right. You could count on one hand what a breeding company is interested in: pseudorabies (PRV), *Actinobacillus pleuropneumoniae*, atrophic rhinitis, transmissible gastroenteritis (TGE), *Mycoplasma hyopneumoniae*, swine dysentery, mange, and possibly porcine reproductive and respiratory syndrome (PRRS). So the breeding company has specific disease agents it's aiming to be free from — the commercial company doesn't have such specific aims. What it wants is consistency of production. Even if something it would like to eradicate gets through, the pigs still perform much better, because there is only one pathogen instead of a mixture. A mishmash of pathogens act together to exacerbate respiratory disease. If only one gets through, it's not such a problem. With the pathogens that breeding stock companies are trying to get rid of — PRV, PRRS — substantial site segregation is very important. Sites probably don't have to be very far away from each other to control swine dysentery, or atrophic rhinitis, or possibly *A. pleuropneumoniae*, either — just down the road.

Joe: On a commercial basis, it gets back to what you're concerned about. In existing herds, you are concerned with doing segregation primarily to eradicate *A. pleuropneumoniae*, and sometimes *M. hyopneumoniae*. That's the most cost-effective way versus depopulating the sow herd.

Brad: But for *A. pleuropneumoniae* the site segregation of the nursery is not critical, is it? I would think that on most farms, you could keep it out of the nursery even if it's not segregated as long as grow-finish pigs are on another farm. If you take the finishing pigs away, I don't see the sow herd as a source of *A. pleuropneumoniae*. The finishing herd is the source. For *M. hyopneumoniae*, the source is both the sow herd and the finishing herd.

Tom: No, I would say the sow herd is not the source of *M. hyopneumoniae*. That's the point of the system. The main source is the buildup after weaning.

Brad: But where does the organism come from? Does it come from the sows? Or does it come from the finishing pigs? If you've got the nursery pigs, where do those organisms come from?

Tom: From other nursery pigs, normally. The great majority of the sows aren't shedding but are passing on their immunity. The first pig gets it from the young gilts or from neighbors.

Brad: What about for *A. pleuropneumoniae*?

Tom: Again, I think it's from pig to pig in the nursery, and the first pig might have got it from another farm, but it could have got it from the young gilts.

Brad: ...or from a finishing pig on farm.

Jerry: Which begs the question—if you're looking at a two-site system, which site do you want the nursery on?

Tom: You want it on the finishing end.

Jerry: But if the finishing pigs tend to be the source of contamination...

Brad: You're not going to put those nursery pigs onto a contaminated site. You're going to sequentially depopulate within the system to establish a clean site.

Jerry: If you imagine that with a continuous-flow by two-site system—you don't AIAO by site in nursery or finisher and have the nursery and finisher together—over time there will be degradation of the health of that population.

Brad: The assumption that site segregation is going to eliminate disease is incorrect. What it allows is the flexibility to depopulate the facility and clean it up. We do that within farrow-to-finish farms with walls. We can stop *A. pleuropneumoniae* outbreaks and even TGE within chronic nursery situations. In nurseries it helps to have separate buildings versus a common hallway, but it's a probability of transmission. With multi-site systems, you've got the ability to do something about it.

Jerry: I think one of the key elements that needs to be explained when someone is investing in land is that if you're moving pigs in and out repeatedly over time, it will break down and you'll have to clean it up.

Joe: As an example, if you have 3000 sows' production flowing pigs into one commingled nursery building, with 8 weeks of capacity, your flexibility to manipulate pig flow is limited. Thus, I'd rather have two buildings than one building.

Warren: Then you've got to be real adaptable, too. You have to take each farm on an individual basis and be creative.

Joe: Yes, segregated production is another method of managing pig flows.

What is the ideal age for commingling?

Tom: If you commingle at 3 weeks of age, you can decrease the incidence of disease considerably, particularly if you are going into an AIAO nursery, either as a site, as separate buildings, or even as separate rooms—you'll be much better off.

Joe: With commingling, you have to look at the end objective, which is to allow you to get more pigs to fill a finisher building or room. Even when the pigs are in the same room, death loss will differ by sow herd source.

Warren: Which pigs have more problems—those from the stable herd or those from the unstable herd?

Joe: It can be both. For example, if you mix PRRS-positive pigs in a nursery with PRRS-negative pigs, that has been a problem. We routinely remove the PRRS-positive sow herds from the flow of these multi-site nurseries until we can get the sow herd immunity stabilized.

Warren: So that you don't have viremic pigs coming in from the farrowing barn.

Joe: Correct. If the sow herds are all positive and you had a good, stable herd immunity, you might not have to remove those herds from the flow.

Jerry: You can carry that out to finishing performance, as well. In some work looking at multi-sources in sow herds, where *M. hyopneumoniae* was a factor, if you separated out the sow herd and did the appropriate adjustments for finisher type and location and things, there was an effect based on which sow herds contributed to a particular pool of pigs. So, it's not going to cure all the sins...

Tom: I was just looking at plans for a multi-site operation, and they took off the smaller pigs and didn't put them through the system. About 10% of the pigs went off to a different site altogether.

Joe: It really gets back to unit size—if you're talking about a smaller herd that's trying to use off-site production, they struggle more with what to do with the bottom-end pigs. If we were to design a new system, we would design the nurseries and finishers to only take 90% of the pigs. The bottom percentage would always go through a different system. But you have to get enough scale to do that.

Tom: How many sows do you think you'd need?

Joe: I think it needs 25,000 if you want to take advantage of all of the benefits of multi-site production. The last advantage is to be able to fill sites by sex. If you don't fill sites by sex, it would be about half that. But filling sites by sex is worth quite a bit of money, because you can meet optimum market weight between the barrows and the gilts. Otherwise, you can't empty those sites out.

Tom: You could still separate genders by pen or building, rather than by site.

Tom: 25,000 sows is a big number. I think you can make use of multi-site with considerably fewer sows.

Joe: You can—it depends. If you want to get *all* the benefit out of the system, you need that many.

Brad: Joe, you're assuming that you have to raise those smaller pigs with the same objectives as the other pigs. Maybe there's a different objective or a different market that we need to be moving those pigs toward.

Joe: If you are trying to empty buildings by site, and you've got them in the same site, you just can't turn those facilities. You can market light pigs to a light market. But if you can get the barrows and gilts the optimum weight, weight spreads are between 220 lb and 280 lb.

What's the best way to move to segregated-site production?

Joe: On a smaller scale, the objective is flexibility of pig flow and to be able to empty one of those sites by doubling up the other one, so that the smaller farm (300 sows and up) can eliminate disease problems that come into the system. Two nursery sites would be ideal, but one would work—you can wean and empty that nursery into the finisher and sell feeder pigs. It's probably more important to have two finishing sites than it is to have two nursery sites.

Tom: How much cooperation among farmers is there in the midwest now to set up a joint nursery?

Joe: Actually, quite a bit.

Tom: It's sensible if you could find three or four farmers with 1000 sows each and then set up a nursery site among them.

Joe: There's quite a few of those going in, either with new sow sites or with new nursery sites, and then they convert their own facilities to finishers. The terms used are 'networking' or 'cooperatives'. In Minnesota and Iowa, there are several of them.

Tom: Is it not practical to convert a sow building into a nursery if you need another building?

Brad: The easier conversion with older facilities is to make them into farrowing barns, because on most farms, building technology is most efficient in nursery and grow-finish: nurseries because of ventilation and penning systems, and grow-finish because of feeding systems and setting up flow for phase feeding and feeding by sex.

Tom: If farmers get together you could also design a sow vaccination protocol so you could pretty well stabilize the herds and you could mix them.

Jerry: A key element in that system would be to have them genetically matched so that the carcass and the growth rate would be similar.

What have been the primary drawbacks to multi-site production?

Joe: To me, it's been hard to evaluate the success of multi-site technology with the presence of PRRS. We've had performance difficulties in those off-sites.

Brad: Do you think an alternative strategy for control would be nursery depopulation?

Joe: I think that has to be tied in with the sow strategy. If we just depopulate the nursery without stabilizing sow immunity, then ours have broken down again in 6 months or less. Sow herd stabilization must be combined with depopulating the nursery to be successful.

Brad: The traditional model has been site segregation at feeder pig weight; i.e., 8–10 weeks, 40–60 lb bodyweight. Now, I think people are looking at site segregation at weaning time, which has been shown to probably be more effective. How many weeks of

production should you plan for in a segregated nursery? If you're budgeting at 6 weeks to start with it would take away some of your flexibility to empty buildings and get them cleaned up. Flexibility is an essential feature of any kind of AIAO system, even one within a farm. It gives you the ability to empty facilities and clean them up.

Joe: I think the weeks in the nursery gets back to how it's going to match your finishing sites. We would typically go 8 weeks in the nursery, but we have clients in Iowa who are going nursery to finisher in the same building and it's been very successful—take the move out of there. It's a matter of matching up how you want the flexibility of sites and what you can handle in the finishing facility.

Brad: When you say 'site,' could that be four buildings on one site?

Joe: In my experience, if you get a health problem in a multiple-building site, the site does end up with the same health status. If you've got 4 weeks of nursery on a site, you most likely are not going to react quickly enough to keep a disease out of the other three buildings. The building separation makes it much more easy to segregate the buildings and eliminate it out of a building once you've got it.

How are pathogens transmitted within a multi-site operation?

Tom: Flies, mice, rats, dust, aerosol transmission — there are so many ways it can get from one building to another.

Brad: Okay, but the transmission on the front end occurs before you even know it's there is one issue. The other issue is that you can take that same set of facilities and get rid of it by sequentially depopulating each building.

Joe: Part of it is that it takes you 2–3 weeks to make a decision when something gets in. Pigs have to move. And with atrophic rhinitis, I don't think without using extremely young weaning ages you can prevent it from moving.

Tom: Even if you vaccinate the sows?

Joe: Right. We've got one group where we're weaning at 8.5 days—there are quite a number of sows—and we have moved *Pasteurella multocida* type D over. There's just enormous variability in farm management. This farm has excellent biosecurity. But if you're weaning three and four times a week, moving hundreds of pigs, that's a little bit different situation than our group trials, which would be successful at that age. It gets back to the flexibility of eliminating it, so that it's not a chronic problem. But we've got systems set up very well, and agents do move over time even with very acceptable biosecurity for a commercial system.

Tom: Are you talking about once a herd breaks down or once it's stabilized? When a herd breaks down, there's nothing you can do to stop it getting through. But once it's stabilized, does it still move?

Joe: It still moves, at least with atrophic rhinitis. Again, we have PRRS underlying that, so if we stabilize PRRS, then maybe that will

be the key. We haven't had the ability to stabilize PRRS until now. Stabilization may get back to parity. We have a 50% replacement rate in these herds. So stabilization has to be done through vaccination on an ongoing basis. I think that's probably the big learning curve that we're still on in the industry. We'll probably move back to more sow vaccinations and trying to stabilize sow immunity.

Warren: How effective has it been to isolate on-farm by separate buildings? If you separate the nurseries completely on the same site.

Joe: We've done very little on site. What we've done is put the nursery across the lagoon, trying to make a true people-flow break there. That's been successful for us. They might be 300 yards or 1000 feet apart—I'm not sure those are magic numbers, though. I'm a little concerned that if you go closer, you can't control the people. It gets back to the strategy of how to be successful eliminating disease with that break and using a shower and flowing them on through. We have tried even on the smaller farms as they have expanded to get somewhere around 1000 feet. On the finishing site, we'd only be 100 feet between buildings. The objective there is to allow us to empty out a building and do our segregation if it's needed.

Tom: 100 feet is not very far with those big animals you've got in there.

Joe: But the problem is always cost— even putting hallways 100 feet is quite expensive. It's much more expensive in Minnesota than in our location. If they don't put in hallways, then people have to go out in the weather and then you risk tracking in TGE, etc.

Tom: But that's climate-based. If you're in North Carolina you can put them a lot further apart.

To what extent is Great Britain using multi-site production now?

Tom: The pig industry in the United Kingdom is only just waking up to the idea, although some have practiced three-site production without knowing it. Twenty percent of production in the United Kingdom is outdoors right now. They are really all two- or three-site operations. They take them off the field usually at 4 weeks of age, and because they are outside with a low stocking density, they are very healthy pigs. But they haven't traditionally been using this system as a way to reduce disease—that's just a byproduct. They adopted the outdoor system for economic reasons—lower capital input. There's also a premium for rearing "outdoors." Actually, those pigs aren't raised outside. They wean a whole batch into moveable, open-sided huts, and then they go to finishing. The huts are moved onto fresh ground all the time, so you don't have to do any cleaning. In a way, they are all-in—all-out, but they weren't intentionally designed to be that.

Jerry: Is that a market-driven premium?

Tom: Yes—at the supermarket level. Consumers like the idea of free-range pigs. Pasture-raised pork is quite a bit more expensive to buy. But people buy it.

