A Review of Segregated Early Weaning

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Segregated early weaning is the process of taking baby pigs from the farrowing crate at an early age and then rearing them in a different building on the farm, or better yet, at an off-site nursery. This group of pigs is then raised segregated from the rest of the pigs on the farm in an all-in/all-out fashion. This method of rearing pigs was developed in an effort to minimize the transmission of infectious diseases from the dams to their offspring.[1] If this goal can be accomplished and segregation of the group maintained, these pigs will have less disease pressure in the nursery, the grower, and the finisher and thus reach market weight sooner and more economically. [14] This is important considering the current hog market trend of decreasing profit margins.

The origin of early weaning to a separate nursery site dates back to a study published by T.J.L. Alexander and his associates in February of 1980. Dr. Alexander called his production innovation "medicated early weaning," as both the sows and baby pigs in the study were given large doses of several antibiotics. He performed the study with the hope of finding a cheaper and more practical way to repopulate a diseased herd than the specific-pathogen-free technique or Cesarean derivation of disease-free pigs. He reasoned that the colostral antibodies a baby pig received would protect it from infection by many of the infectious agents that may be present in the sow for the first few days of its life. He weaned the baby pigs at five days of age and removed them to an off-site nursery. Eventually these pigs would again be moved to a third site, were they then finished. Dr. Alexander heavily medicated both the sows and the baby pigs with broad-spectrum antibiotics in his study. This was done in an attempt to decrease the shedding of infectious organisms by the sows and also in an attempt to increase disease resistance in the baby pig while it was still in the farrowing crate. In his study, Dr. Alexander was able to keep the baby pigs from becoming infected with *Mycoplasma hyopneumoniae* and *Bordetella bronchiseptica,* even though the sows were from an infected herd.[2] One major problem that Dr. Alexander encountered was an extremely high (12- 25%) post-weaning mortality of these early-weaned baby pigs.[6] This might not have been such a serious problem if he had used a diet in the nursery that was specifically tailored to the digestive needs and capabilities of these young pigs. Today, the nutrition of these early weaned pigs has been much improved.[21] In addition to high post-weaning mortality, he also encountered high labor and pharmaceutical costs.[6]

Many professionals were involved in the further refinement of Dr. Alexander's original idea, yet the person who solidified the concept so that it could be used by producers was Dr. D. L. Harris in the late 1980's.[3] Dr. Harris called his method of multiple site production with early isolated weaning "Isowean" or "modified medicated early weaning." He was able to wean baby pigs at an older age (10-21 days) with less use of medications and still keep them from becoming infected by many of the agents in the source herd. He determined that isolation was more important than the age of weaning when attempting to halt disease transmission from dam to baby pig. He also suggested that a distance of one to two miles is needed between nursery site and the original site due to aerosol transmission of some of the infectious agents.[4,5]

Dr. Harris then continued the use of isolated sites and all-in/all-out methods until these pigs went to slaughter. He developed models which used two, three, or multiple sites in which these pigs were isolated until they reached market weight. In his studies, Dr. Harris also found that the baby pigs which had been weaned early and isolated gained weight faster than their littermate controls when compared at all stages of growth. Dr. Harris had thus taken medicated early weaning and developed it into a concept that producers could use to increase the health status and performance of pigs

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and eliminate some disease transmission from the sow herd to their offspring.[3,4,5]

Today, segregated early weaning is modified and adapted in many different ways to meet the specific goals and available facilities of a particular producer. Even though it is often modified, a segregated early weaning program always adheres to two principles: first, weaning by 21 days of age; and second, maintain segregation by age after weaning.[1]

The first principle is that the pigs are early weaned at 21 days of age or less. This is a guide-line for segregated early weaning because pigs which receive a sufficient amount of a high quality colostrum in the first 24-36 hours after birth will still have high levels of protective maternal antibodies at this weaning age and are thus more resistant to disease.[7] This means the producer may need to hand mate to cluster farrowings to provide larger groups of pigs of a similar age. Management is further aided by controlling breeding and/or parturition by injection of prostaglandin F2 alpha to synchronize estrus or to induce the sow to farrow in approximately 22-26 hours post-injection.[8,9] This will allow attended farrowing, ensuring that all in the litter have equal access to the sow's colostrum. With segregated early weaning, baby pigs must be removed from the sow at a maximum age of 21 days before colostral immunity becomes low. [4,11,20]

The weaning age used by a particular producer is dependent upon which infectious agents are to be eliminated from the offspring. Some infectious agents require earlier weaning ages than others to halt transmission from the sow to the baby pigs.[7,9,20] (See Table 1.)

The second principle of segregated early weaning is that these early weaned pigs are then grouped together, with no more than seven days of age variation between the youngest and the oldest in the group. Each group is then kept separated and isolated from the rest of the herd until they go to slaughter.[1]

The amount of distance that is needed between sites for group isolation is dependent upon many environmental and local weather factors. Some of these factors include prevailing wind direction and velocity, atmospheric pressure, and relative humidity.[6] Most importantly, the group must be segregated from other pigs. Seperate herdsmen,

Table 1 [10, 8, 9, 10, 16]

Disease	Weaning Age Needed to Attempt to Halt Transmission from Sow to Baby Pigs
Streptococcus suis	Unable to halt transmission using SEW.*
Haemophilus parasuis	< 10 days of age plus use of multiple antibiotics.
Mycoplasma hyopneumoniae	< 21 days of age
Actinobacillus pleuropneumonia	< 21 days of age
Pasteurella multocida type D	< 10 days of age
Bordetella bronchiseptica	< 10 days of age
Salmonella choleraesuis	< 12 days of age
Serpulina hyodysenteriae	< 21 days of age
Pseudorabies virus	< 21 days of age
PRRS virus	< 21 days of age if in a herd that continuously uses segregated early weaning.
TGE virus	< 21 days of age if sow has been exposed to virulent virus and developed sufficient colostral antibodies.
Sarcoptic Mange	< 14 days of age

* It is believed that we are unable to halt transmission of *Streptococcus suis* from the sow to the baby pig, using segregated early weaning, because the baby pig becomes infected with this particular agent at five days of age or even younger.[13] Due to the high post-weaning mortality we avoid weaning a baby pig at such a young age.[6]

minimal traffic and strict biosecurity is also important.[15] Researchers working on the development of segregated early weaning techniques still are not in agreement as to how far apart the separate sites should be in order to stop disease transmission between them. It has been reported that these sites should be at least two miles apart.[4,11] This two mile distance has been proposed based on disease transmission via wind, insects, birds, and rodents.[7] This distance is not very practical for the average Iowa pork producer. There are not many places in this state [Iowa] which are at least two miles from a hog lot or hog confinement building.[11] Other researchers and swine practitioners, at the same time, are recommending a distance of at least one-half mile between sites. These same researchers also suggest that a distance as little as two-hundred feet between total confinement buildings can work if steps are taken to ensure practically no air contamination occurs between the buildings.[12] The nursery should not be located downwind or downhill from the farrowing barn and the exhaust fan from the farrowing barn should not be directed towards the nursery.[7] If segregated early weaning sites are going to be located within two-hundred feet of each other then their manure handling systems must be trapped.[12] Control of rodents also becomes a higher priority when the segregated early weaning sites are all located on the same farm location.[7] Clearly, more research needs to be done involving optimum segregated early weaning site distances to stop disease transmission between them.[6] We do know that the closer the sites are to each other the higher the levels of disease are on the farm. The larger the producer's total pig population is on the farm, the more likely segregated early weaning will fail.[11]

Isolation of the segregated early weaning sites, especially the nursery, is more important than physical distance between sites.[15] If the same people are working in both the farrowing barn and the isolated nursery, they must follow strict sanitation practices such as shower-in/shower-out to avoid transmitting disease from one site to another.[19] At a minimum, these people must change into clean coveralls and boots and wash their hands. The flow of vehicle traffic into and out of these sites must also be closely

Table 2 [7]

An Example Segregated Early Weaning Protocol

Sow Vaccinations and Medications

Five and Two Weeks Pre-farrowing
- *Haemophilus parasuis*
- *Actinobacillus pleuropneumonia*
- *Streptococcus suis* type 2
- *Pasteurella multocida A* and D
- *E. coli*
- TGE - Corona virus
- Rotavirus
- *Bordetella bronchiseptica*
- *Clostridium* spp.
- *Erysipelas*
- *Mycoplasma hyopneumoniae*

Ten Days Pre-farrowing
- Ivermectin

Five Days Pre-farrowing
- Oxytetracycline

Baby Pig Vaccinations and Medications

Day One
- Iron
- Ivermectin

Day Seven
- Ivermectin

Two Consecutive Days Pre-weaning
- Ceftifur sodium (extra-label)
- Tiamulin water medication

Six Weeks of Age
- *Haemophilus parasuis*

Eight Weeks of Age
- *Erysipelas*
- *Haemophilus parasuis*

This protocol is for one specific producer. This table is not meant to be used on other farms.

controlled. It does not benefit the producer to have a large physical distance between the farrowing barn and nursery if diseases are being transmitted between the two sites on clothing, boots, hands, and vehicle tires.[l5] Isolation also requires that the site is physically separated from other producers' herds. Be sure the seperate nursery site is not located in a position where it could become infected with diseases from a herd of a neighboring farm.[7]

Antibiotics and vaccines can be used to combat transmission of certain diseases. To decide what vaccines should be used, the disease or pathogens a producer wants to eliminate from his operation must be identified.[20] This is done with various diagnostic techniques and the help of a diagnostic laboratory. The sows are then vaccinated twice prefarrowing against the identified pathogens so that high levels of protective antibodies will be present in the colos-trum at farrowing. The first dose of vaccines for these sows is administered at approximately five weeks pre-farrowing. The second dose of the same vaccines is administered to the sows at two to three weeks prior to farrowing. The timing of these vaccin-ations allows the immune system to develop high levels of antibodies before the baby pigs are born.[17] (Table 2 is an example of some of the vaccines that were used in one producer's program.)

Antibiotics are often used in a segregated early weaning protocol but it has been stated that, "the antibiotic accounts for twenty percent of the success of segreated early weaning." [21] This means that the actual isolation of the early weaned pigs is much more important than the use of particular antibiotics.[18] Medications are used in the baby pig with the goal of providing additional protection against infection from any pathogens the sow may be shedding.[6] Again, the pathogens present in the herd must be identified so that an antibiotic to which the organisms are sensitive can be chosen.[20] Antibiotics have also been used in the sow pre-farrowing with the hope that this will decrease shedding from the sow at farrowing. Medications other than antibiotics have been proposed for use in baby pigs that are weaned early and isolated, such as immune stimulants, vaccines, and porcine or bovine antiserum.[6]

When choosing antibiotics for a particular segregated early weaning protocol, a few important criteria should be considered. The current availability of the medication and the expected future availability of the product, the current approved uses of the medication (important because in the future it may become difficult to use products off-label), and the cost of the antibiotic are extremely important to today's producer.[18] As was stated earlier the antibiotic sensitivity pattern of the resident pathogen population on the farm must be investigated and should be used to determine the most appropriate antibiotic(s).[18,20] (Table 2 shows an example of antibiotics used in a segregated early weaning protocol.)

Segregated early weaning can be used by some producers as an effective way to increase the health status of their herd and possibly rid their herd of some specific pathogens. It is not a "magic bullet" that can be used by producers and veterinarians to rid a herd of all diseases. This disease fighting tool also is not meant to be used by all producers, as it will not be successful on all farms. A segregated early weaning program takes a long-term commitment on the part of both the producer and the veterinarian because it is not a one-time, quick fix. In order to keep the herd at a high health status, segregated early weaning needs to become the rule on the farm. All farms which are going to attempt segregated early weaning must devise their own specific protocol, depending on the targeted pathogens and the available facilities. This can only be done with the producer and the veterinarian working together, which provides an excellent opportunity for the veterinarian to help the producer plan a preventive medicine program specifically for his or her farm, which will decrease disease and increase the productivity of the herd. This also increases the relationship of trust between the producer and the veterinarian. Ideally, the producer will become a loyal client with a profitable, high health status swine herd. ■

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