1997

Segregated Early Weaning of Pigs: Dietary Challenges and Opportunities

Stacy Norin
University of Nebraska-Lincoln

Duane Reese
University of Nebraska-Lincoln, dreese1@unl.edu

Austin Lewis
University of Nebraska-Lincoln, alewis2@unl.edu

Segregated Early Weaning of Pigs: Dietary Challenges and Opportunities

Stacy L. Norin
Duane E. Reese
Austin J. Lewis[1]

Summary and Implications

Segregated early weaning (SEW) technology is being adopted by many producers in the pork industry. With the implementation of this technology come many challenges and opportunities to exploit the lean-growth potential and health status of the SEW pig. This review provides insight into some of the reasons for these challenges and discusses some possible ways of utilizing the unique characteristics of the SEW pig to reduce production costs.

Early weaning technology (typically at 10 to 16 days of age) is becoming increasingly common in the pork industry. At this age, the immune status of the pigs is still high because of the antibodies received from sow colostrum and milk. If they are then separated from older pigs, the combination of segregation and early weaning offers substantial protection against disease infection. Segregated early weaning is being used to help control infectious diseases in swine herds while minimizing medication and vaccine use. By reducing the disease challenge to pigs, their genetic potential for growth can be realized in the growing-finishing phases.

However, SEW presents several new environmental and nutrition challenges because of the stress of weaning at a young age. This review will describe some of the dietary challenges and opportunities of SEW. Advances in nutrition have helped increase success in herds implementing SEW by developing diets that facilitate the transition from a milk diet to a solid nursery diet.

Digestive Tract Developments

Diets for SEW pigs must be highly digestible and contain specialty ingredients (i.e., milk products, etc.) be-

cause specific digestive enzymes are present only at low levels in pigs less than three weeks of age. These pigs have the enzyme needed to digest milk sugar (lactase) but limited amounts of enzymes needed to digest proteins (proteases) and starches (amylase and maltase). To increase digestibility and acceptability, diets for SEW pigs are pelleted.

Digestion of diets by SEW pigs is also affected by changes in gut morphology that occur at weaning. The small intestine, the primary site of digestion and absorption of nutrients, contains numerous finger-like projections called villi. These villi create a large and efficient surface area for nutrient absorption. However when the pig is weaned, the villi become much shorter and absorptive and secretory area of the intestine is reduced. Any dietary modifications that help to maintain the villus height should improve nutrient digestibility and absorption.

Disruption of the intestinal tract can be compounded by certain feedstuffs such as soybean meal, which contain factors antigenic to young pigs. These antigenic factors cause an inflammatory response in the intestinal mucosa of the early weaned pig impairing nutrient absorption. Exposure to antigens also activates the pig's immune system and may disrupt growth processes.

Dietary Opportunities

Because anorexia (low feed intake) is a leading cause of morbidity and mortality in SEW pigs, stimulating their feed intake is crucial. Feed intake has been shown to be increased with decreased immune challenge. This results in increased dietary protein consumption and increased efficiency of protein utilization. Certain feed ingredients, such as spray-dried porcine plasma also exert positive effects on feed intake of weanling pigs.

Because of the biological changes in enzymatic activity, gut morphology and the influence of immune challenge on the SEW pig, intensive management is crucial. However, along with the management challenges involved in SEW operations, some new advantages of early weaning suggest there may be more opportunities than originally thought to exploit the lean growth potential and high-health status of SEW pigs.

It has been suggested SEW pigs have the ability to utilize diets containing lower proportions of milk products and other expensive ingredients than previously believed possible. Feed companies are beginning to offer specialized feeding programs specific to SEW and conventionally-raised pigs exploiting this theory.

Although there is a lack of conclusive evidence as to why a less complex diet may be adequate for SEW pigs, there are some possible explanations. One theory is that although the transition to a more simple diet may be stressful, a drastic change in the diet may force the pig's digestive system to develop more rapidly than would occur otherwise. The digestive system is highly adaptable and will alter enzymatic secretions with changing diet composition. Therefore, somewhat less digestible diets may promote development of the intestinal tract. A simple diet may also ease the transition from the early nursery diet to a subsequent simple, corn-soybean meal diet. It is possible these impacts on the digestive system, facilitated by a less complex diet, may be more pronounced in SEW pigs due to their high health status.

Current Research Thrust

Research at the University of Nebraska is currently exploring the elimination or reduction of antigenic factors in feedstuffs to better suit them for incorporation into SEW diets. Extrusion of soybeans is one example. The antigenic factors, glycinin and b-conglycinin, present in soybean meal limit its use in the diets of young pigs. These antigenic factors cause an inflammatory response, resulting in decreased gains and feed efficiency. However, with extrusion of soybeans these antigenic factors can be lessened to levels that cause reduced allergic responses in young pigs versus that seen with soybean meal. This research offers one possibility for reducing the cost of SEW diets by substituting plant protein sources for more expensive animal protein sources in the SEW diet.

---

[1]Stacy L. Norin is a Graduate Student, Duane E. Reese is an Associate Professor and Austin J. Lewis is a Professor, Department of Animal Science, University of Nebraska-Lincoln.