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Management and Nutrition of Newly Weaned Feeder Pigs - Pork Industry Handbook
Michigan State University Cooperative Extension Service
Frank Aherne, University of Alberta; Maynard G. Hogberg, Michigan State University;
E.T. Kornegay, Virginia Polytechnic Institute and State University; Gerald C. Shurson,
University of Minnesota
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pork industry handbook

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Management and Nutrition of the Newly Weaned Pig

Authors

Frank Aherne, University of Alberta
 Maynard G. Hogberg, Michigan State University
 E. T. Kornegay, Virginia Polytechnic Institute and State University
 Gerald C. Shurson, University of Minnesota

Reviewers

Michael and Susan Brocksmith, Vincennes, Indiana
 Gilbert R. Hollis, University of Illinois
 James E. Pettigrew, University of Minnesota

In general, earlier weaning can result in increasing the number of pigs weaned per sow per year and may allow for heavier pigs at 8 weeks of age. Because of this potential and our increased knowledge of the nutritional and environmental needs of the young pig, weaning between 2 and 4 weeks of age has now become the normal practice in many herds, with most herds weaning at about 24 days of age.

Successful weaning starts before weaning with: 1. A sound breeding and feeding program with the gestating sow to ensure large, healthy pigs at birth. There is a highly positive relationship between birth weight and weight at weaning. 2. Good baby pig and sow management during lactation to ensure heavy and healthy pigs at weaning.

Creep Feeding

The percentage of the suckling pig's daily nutrient requirements coming from sow milk or creep feed changes with stage of lactation. At 3 weeks, only about 5% of the pig's nutrient requirements are being met by creep feed intake, whereas at 5 weeks of age, creep feed may supply one-third of the pig's nutrient requirements.

Even though there doesn't appear to be an advantage in creep feeding pigs weaned at 3 weeks, there may be an advantage in offering a creep feed to those pigs weaned later than 3 weeks of age starting as early as 10 days of age.

The creep feed is intended to allow the pig to maintain optimum growth rate after the sow's milk yield starts to decline at 3 to 4 weeks after farrowing. For pigs weaned after 21 days of age, creep feed also may stimulate earlier develop-

ment of the digestive system, induce digestive enzyme secretions, stimulate hydrochloric acid (HCl) secretion in the stomach and in many other ways prepare the pig for weaning to a dry, cereal grain, vegetable protein-based diet. There is some evidence that use of a palatable, digestible creep feed with fast growing pigs weaned at 24 to 28 days of age will significantly improve weight at weaning and improve feed intake and growth rate in the first two weeks after weaning.

If a creep feeding program is to be successful, feed should be fresh (changed frequently) and the diet must be highly digestible and palatable. Because most of the suckling pig's amino acid requirements are met by milk proteins, a creep feed may be formulated to contain only 15% to 16% protein. Ingredients commonly used to meet these requirements are dried whey, dried skim milk, fish meal and dehulled rolled oats.

Before weaning, a suckling pig will consume approximately 0.55 lb of milk dry matter per day, allowing a growth rate of 0.70 lb per day. After weaning, feed intake can fall to about 0.2 lb per day and then increase by about 0.1 lb per day, but will generally not reach the preweaning level of nutrient intake until 8 to 10 days after weaning.

Post Weaning

The performance of the pig after weaning is determined by age and weight at weaning, genetic potential for growth, quality of management and environment, nutritional program and disease status. Management and environment are more often the limiting factors to producing good feeder pigs than are

nutrition and genetics. Weaning at any age is stressful for young pigs, but the younger and lighter the pig is at weaning, the higher its temperature requirement, the lower the ability to digest grains and vegetable proteins, the lower its appetite, and the lower its resistance to disease.

Age and Weight at Weaning

A successful weaning program depends on choosing an age at weaning that suits the facilities, nutritional program and management skills of the producer. In general, the heavier the pig at weaning, the more developed its digestive and immune system, the better it is able to cope with the stresses of weaning and the better its post-weaning growth rate. With good housing, feeding and management, pigs weaned at about 14 lb can average 0.8 to 1.2 lb of gain per day from weaning to eight weeks of age with a feed conversion of 1.4 to 2.0 (Table 1). For the best herds, a target of 70 lb pigs at 60 days of age is attainable.

Table 1. Performance targets for weaned pigs from 14 to 45 lb bodyweight.

	Good	Better	Best
Average daily gain, lb	0.75	1.0	1.20
Average daily feed intake, lb	1.55	1.70	1.70
Feed conversion	2.00	1.70	1.40
Mortality, %	2.50	1.50	0.50

Nutrition

After weaning, there is a sudden change in the pig's diet from 16 regular meals a day of a very palatable, highly nutritious and digestible milk diet to a dry feed based on less digestible and less palatable ingredients. When the pig is weaned, its ability to digest solid food and resist digestive upset is greatly reduced. The limited capacity of the digestive system of the pig is even further reduced by damage caused to the gut wall by the stress of weaning. The result is a period of reduced feed intake after weaning, the extent and duration of which depends on the palatability and digestibility of the feed, the management system of weaning and the weight of the pig.

In some circumstances, the period of low feed intake is followed by consumption of large quantities of feed which may overload the digestive system and result in outbreaks of diarrhea. To avoid or minimize postweaning diarrhea, it is sometimes suggested that feed intake be restricted for a few days after weaning. Although restricted feeding may reduce the incidence and severity of postweaning diarrhea and gut edema, it also reduces growth rate of the pigs so that in general the performance of pigs fed free-choice is superior. Therefore, the aim should be to provide an environment and a management system along with a diet that can be fed free-choice without causing problems of diarrhea and that will minimize the postweaning growth lag.

The nutrient requirements of the weaned pig depend on its weight at weaning and its subsequent level of performance. A guide to the nutrient allowances recommended for pigs of different weights and specific targeted performance levels is shown in Table 2.

Table 2. Nutrient allowances*

Item	Weight, lb	
	10 to 25 lb	25 to 45 lb
Weight gain, lb/day	0.55	1.0
Feed conversion	1.80	2.11
Feed intake/day, lb	1.00	2.10
Kcal ME/lb	1500	1500
Protein, %	20.00	18.00
Lysine, %	1.25	1.00
Calcium, %	0.85	0.75
Phosphorus, %	0.70	0.65

*Adapted from NRC (1988)

The energy level recommended in Table 2 will maximize growth rate, but feed efficiency may improve with increases in energy up to 1650 kcal ME/lb. These diets supply about 5.5 and 4.5 grams of lysine per pound of diet or 3.0 and 3.8 grams of lysine per 1,000 calories, respectively. Synthetic lysine supplementation can be used to reduce diet protein concentration by about 2% while maintaining lysine levels. Maintaining methionine plus cystine, threonine and tryptophan at 55%, 65% and 18% respectively of the lysine level to produce an ideal protein ratio is recommended.

Starter Diet Composition

Digestibility of the postweaning diet is the key factor in improving feed intake and achieving higher growth rates without increasing the incidence of diarrhea. Therefore, the ingredients used in the starter diet must be suited to the digestive capacity of the pig. Diets based on milk products, fish meal, blood products and cooked cereals are most suitable for supplying the nutrient requirements of the early weaned pig, but these ingredients also are expensive. Thus, the nutrition of the newly weaned pig is usually a matter of compromise between economics and the needs of the pig. However, the pig's digestive system changes quickly, as do its nutrient requirements (Table 2). Therefore, with early weaning, a two or three phase starter diet sequence can be used to reduce cost and improve pig performance. An example of a phase feeding program is shown in Table 3. By the time the pig weighs 25 lb, it can be fed a traditional grain-soybean meal starter diet.

Nutrient Sources

Diets containing dried whey are superior to simple grain-soybean diets for pigs of less than 15 lb at weaning. Performance is optimized when whey is included at 15% to 20% of the diet and the largest response from adding whey is during the first 10 to 14 days after weaning. Pig performance is superior when an edible grade whey rather than a feed grade whey is used. Reduction in feed grade whey quality appears to be due to excessive drying temperatures and high ash and salt content. A 25% lower level of available lysine has been shown in roller dried compared with spray dried whey. It appears that the response to whey is both a lactose and a protein effect. Therefore, it is recommended that weaned pigs be fed an edible grade, high-lactose whey.

Table 3. Key elements of a three phase starter program.*

	Phase 1	Phase 2	Phase 3
Time	10 days prior to weaning & 7 days after weaning	day 7 to day 14 after weaning	day 14 after weaning to 45 lb
Weight	up to 15 lb	15 to 25 lb	25 to 45 lb
Protein, %	24	20	18
Lysine, %	1.40	1.25	1.10
Metabolizable energy, kcal/lb	1550	1500	1475
Fat, added, %	3	3	4
Whey, %	20	10	--
Skim Milk, %	15	--	--
Fish meal, %	4	2	--
Copper sulfate**	+	+	+
Antibiotic	+	+	+
Physical form	1/8 in pellets	1/8 in pellets	meal

*Based on corn, wheat, barley, oat groats, grain sorghum.

**Copper levels beyond the nutritional requirements.

Because whey is very expensive and soybean meal is not well-digested by starter pigs, there has been considerable interest in using processed soybean protein products such as soy protein concentrate, soy flour and isolated soy protein. These products, although generally too expensive to use, are more easily digested by the young pig and produce less intestinal damage than soybean meal. These products improve pig performance compared with soybean meal in the first 14 days after weaning but not thereafter.

Spray-dried porcine plasma (SDPP), a by-product of blood obtained from pork slaughter plants, contains about 68% protein and 6% lysine. Spray-dried porcine plasma, up to a maximum level of 8% to 10%, with or without the addition of lactose to the diet, can effectively replace some or all of the dried skim milk in the diet of starter pigs. Supplemental methionine and lactose may be needed when SDPP is added to the diet.

Fat

The ability of the young pig to efficiently utilize fat increases with age. Although fat supplementation does not significantly improve pig performance during the first one or two weeks after weaning, it does reduce fat loss during that period. For the first two weeks after weaning, it is recommended that the level of supplemented fat should be limited to 2% to 3% of the diet. Soybean oil, coconut oil, corn oil, peanut oil, canola oil, or a mixture of these oils are relatively well-utilized by the weaned pig. Fat is added to the diet as an aid to the pelleting process.

The digestibility of fats or oils improves from about 69% in the first week after weaning to 88% by four weeks after weaning. By 3 to 4 weeks after weaning, the level of fat in the diet can be increased to 4% to 5%, and for that age pig, fat will result in improved growth rate and feed efficiency. At that age, there is no significant difference in the digestibility of fats or oils.

The response to fat supplementation by the newly weaned pig is greater when the protein and lysine level of the diet is increased to maintain a constant energy-protein ratio.

Feed Additives

The development of low pH (about 4) in the pig's stomach will help to ensure efficient digestion of the feed and help in controlling the proliferation of potentially harmful bacteria. The ability to secrete hydrochloric acid in the stomach is not well-developed in the 3 to 4 week old pig. It is, therefore, recommended that ingredients with a high acid-binding capacity, such as ground limestone, be kept to a desirable minimum. A level of 0.85% to 0.90% calcium in the starter diet should be adequate for weaning pigs. The addition of 1% to 2% organic acids, such as fumaric, lactic, citric or propionic acid, may result in a 4% to 5% improvement in feed efficiency, but they may not be economical. The response to the addition of organic acids is greater with grain-soybean meal based diets than with dried whey supplemented diets and during the first two weeks after weaning. In most cases, the addition of organic acids is not cost effective because of the high cost of the acids.

Addition of antibiotics to the starter diet will generally improve pig growth rate by 10% to 20% and increase feed efficiency by 5% to 10%. Similar but slightly lower responses in growth and feed efficiency have been obtained with the addition of copper sulfate to the diet. A combination of an antibiotic plus copper sulfate at 125 ppm gives better pig performance than either alone.

Addition of probiotics to the starter diet generally has not produced an improvement in pig performance. Supplementation of starter diets with digestive enzymes such as amylase, sucrase, beta glucanase, protease, lipase or cellulase also does not consistently improve the performance of weaned pigs.

Recent research involving a single B vitamin complex injection has shown performance benefits for pigs weaned at 17 to 28 days. However, addition to the diet of folic acid, thiamin, biotin or ascorbic acid (Vit C) in general does not result in improved pig performance when pigs are weaned at 17 to 28 days of age.

Flavors, sweeteners and aroma enhancers are used widely in commercial starter diets. When pigs have a choice, they will eat more of a diet containing feed flavors than an unflavored diet. However, although these additives may help to improve intake in some circumstances, the benefits in most cases are small.

Medicated Early Weaning (MEW)

Medicated early weaning is a method of reducing the exposure of pigs to a wide spectrum of pathogens with the aim of reducing the incidence of diseases in pigs. This system is based on the principle that in a closed, well-managed herd, the balance between immunity and infection tends to reach a stable equilibrium. The MEW technique involves (1) medicating the sow diet with broad spectrum antibiotics before farrowing and until weaning, and (2) removing pigs at an early age (10 days or less) from the sow and placing them at a new location, and (3) giving the litter appropriate medication (broad spectrum antibiotics) from birth until five days after weaning.

MEW has been found to be effective in eliminating the organisms responsible for enzootic pneumonia, swine dysentery, pseudorabies and one of the organisms responsible for atrophic rhinitis (*Bordetella bronchiseptica*) and other organisms. Postweaning mortality is increased (ranging up to 12% to 25%) and there are additional costs due to off-site sow facilities and extra labor. However, substantial beneficial effects have been reported in the finishing performance of MEW pigs: 14% increase in average daily gain and 9% improvement in feed efficiency.

Producers interested in MEW should consult with their swine veterinary practitioner and Extension swine specialist for appropriate procedures and to determine if MEW is a viable practice for their operation.

Environment

The common environmental stresses experienced by the pig at weaning are chilling, drafts, temperature fluctuations, poor sanitation, and inadequate housing and penning conditions such as feeder space, floor type, pen size, number of water nipples, and their location and flow rate.

Chilling. The reduced feed intake and loss of body fat after weaning make the newly weaned pig very sensitive to cold. The recommended environmental temperatures for pigs weaned at 3 to 5 weeks of age are shown in Table 4. The younger and smaller the pig, the higher and more stable the temperature required. Daily variations of more than 4°F during the first week after weaning can cause outbreaks of diarrhea and poor performance. Room temperature should be read at pig level because temperature at eye level can be 9°F higher than at ground level. Thermostats also should be hung at a low level and the sensory coils should be kept free of dust. Temperatures in excess of those shown in Table 4 will cause a restriction of feed intake. Research has shown that night time temperature in the nursery can be lowered about 10°F after the first or second week after weaning without affecting the performance of the pigs.

Table 4. Temperature requirements of weaned pigs.

Pig weight, lb	Initial temperature, °F
8 to 12	85
12 to 17	80
17 to 27	76
27 to 40	70

Drafts. Air movement at the level of the pig should be kept as low as possible. A scarcely noticeable air speed will chill a pig as much as a drop in temperature of 5°F. On slatted floors, up-drafts are very common and an overlay should be used. It has been shown that pigs in a draft-free environment grow 6% faster on 26% less feed than do pigs exposed to drafts. The use of bedding, such as straw, can help the pig create a microclimate that can reduce heat loss. However, the use of bedding has been abandoned by most producers because of labor costs and incompatibility with many manure management systems. Wet concrete floors also can increase chilling of the young pig and can be equivalent to a drop in temperature of 5°F to 10°F. Huddling with penmates also reduces heat loss, but excessive huddling should be taken as an indication of an unsatisfactory pig environment.

Sanitation. The young pig's immunity to disease is not well-developed until it is 5 to 6 weeks of age. Before weaning, the pig is provided with immunoglobulin A (IgA) in the milk which helps it to combat enteric diseases such as diarrhea. After weaning, the pig does not have this protection; therefore, it is very important that pigs are moved to a clean, dry, warm environment and fed a palatable, digestible diet fortified with an appropriate antibiotic. Use of an all-in, all-out system of management improves pig performance and reduces the incidence and severity of scours.

Stockmanship. There is some evidence that keeping litters intact after weaning reduces the incidence of diarrhea, improves performance and reduces postweaning mortality. The general recommendation is for 3 sq ft per pig for pigs from weaning to 45 lb on solid floors and 2 sq ft per pig on

slatted floors. If pigs are crowded, growth rate and feed intake will be reduced. Optimum group size appears to be about 12 to 16 pigs per pen. With larger group size, growth rate tends to decline and variation within the pen increases. Research has shown little if any difference in the performance of pigs raised in single, double or triple decks. For best weaning pig performance, select flooring that has excellent cleaning qualities, provides a comfortable surface for pig movement and sleeping, and minimizes the heat loss. Even though there are growth performance differences among floor types, other more subjective features of flooring materials such as durability, ease of cleaning and pig comfort, as well as cost should be considered.

Feeding System. No advantage in feed intake or pig performance has been shown from floor feeding pigs for the first three days after weaning, but feed wastage will be much greater with floor feeding. Feed wastage can amount to 8% to 15% of the feed from poorly designed and unadjusted self-feeders. Feed wastage is less from feeders with feeder holes, easily adjustable feed plates and lips that prevent feed from flowing out of the front or sides. Use of single-space, wet-dry feeders is not recommended for newly weaned pigs because the pigs play with the water nipples in the feeders and flood the trough, resulting in feed wastage and reduced pig performance for the first week after weaning.

Nipple drinkers are the preferred watering system for weaned pigs. They do lead to increased water waste, but they are easier to keep clean. The orifice should be at least 3 mm and the flow rate should be one cup per minute for pigs 10 lb to 25 lb and two cups per minute for pigs 25 lb to 50 lb. It is suggested that there be at least one nipple drinker for each 6 to 8 pigs, or one bowl for each 12 pigs. The drinker height should be adjustable and should be set 4 inches to 6 inches above the pigs back at an angle of about 45 degrees.

Summary

- Feed a well-balanced, high-energy, palatable diet.
- Keep feed fresh and clean.
- Temperature at pig level should be 85°F for pigs 8 to 12 lb and 80°F for pigs 12 to 17 lb.
- Provide clean, dry, disinfected pens.
- Allow one water nipple for every 6 to 8 pigs.
- Use an all-in, all-out system.
- Provide draft-free environment and use overlays on slatted floors.
- Number of pigs per pen should be 16 or less.
- Water flow rates should be checked and nipple height adjusted regularly.
- Adjust pen-mates within a weight range of 2 lb to 3 lb.
- Provide adequate floor space per pig.

Reference to products is not intended to be an endorsement to the exclusion of others which may be similar. Persons using such products assume responsibility for their use in accordance with current directions of the manufacturer.