Nursery Phase Feeding Program

The purpose of phase feeding is to match the nutrient requirements and digestive capabilities of nursery pigs with the most economical diet possible to achieve optimal performance in the nursery. An example of a nursery phase feeding program is discussed in this fact sheet.

Feed budget

The phase feeding program is often matched to the weight of piglets at weaning using a feed budget. Generally, as pigs become heavier at weaning, the amount of the initial nursery diets is reduced. As an example, a 3-phase feeding program can be used in the nursery, consisting of phase 1 (12 to 15 lb), phase 2 (15 to 25 lb), and phase 3 (25 to 50 lb) diets. An intensive care diet can be used in the nursery for low weaning weight pigs (8 to 12 lb), health-challenged pigs, as well as be offered as a creep feed during the nursing phase.

Intensive care and phase 1 diets are more complex to improve feed intake and provide high-quality feed ingredients to weanling pigs, such as specialty protein and lactose sources. Intensive care and phase 1 diets are commonly provided as pellets or crumbles because of the impact of specialty ingredients on feed flowability. These diets are more expensive, but the use might be justifiable considering the low amount of feed use. Diet complexity rapidly reduces in phase 2 and 3 diets as feed intake is already established. Phase 2 and 3 diets can be provided either as meal, pellets, or crumbles. These diets represent most of the total feed use in the nursery and have a significant impact on total feed cost in the nursery. Adhering to the feed budget guidelines in **Table 1** helps to optimize performance in the nursery and minimize overfeeding of expensive initial nursery diets.

Table 1. Feed budget recommendations for nursery diets according to weaning weight

	Weaning weight, lb						
Diet, lb per pig	10	11	12	13	14	15	16
Intensive care	2	1	1	-	-	-	-
Phase 1	6	5	4	3	2	1	1
Phase 2	12 to 15						
Phase 3	45 to 50						

Diet complexity

Diet complexity refers to the use of highly-digestible specialty feed ingredients in nursery diets. Complex diets are typically fed to weanling pigs to provide high-quality feed ingredients and improve intake in the early post-weaning period. As complex diets are more expensive, diet complexity should be rapidly reduced during the course of the nursery.

Nutritional strategies in the nursery have been of great interest because it is generally assumed that pigs that grow faster in the nursery also grow faster in the finisher. However, not all dietary efforts to improve performance in the nursery are rewarded with improvements in growth rate in the finisher. An important distinction to make is whether the dietary effort is able to induce a fundamental or a transitory change in the nursery pig.

Weaning age is able to induce a fundamental change in the pig. The enhancement of nursery performance by increasing weaning age is typically maintained into the finisher as a consequence of increasing weaning weight (Main et al., 2004), but most importantly as a consequence of a physiological change in the pig, like improvements in digestive and immune functions (Moser et al., 2007; Smith et al., 2010; McLamb et al., 2013).

Most nutritional strategies induce a transitory change in the pig, with improvements in performance while being fed in the nursery, but not necessarily in the subsequent finisher period. Diet complexity typically generates this type of response, with significant improvements in feed intake and growth rate while the complex diet is being fed, but no performance advantages thereafter (Whang et al., 2000; Wolter et al., 2003; Skinner et al., 2014; Collins et al., 2017). This is also the case of amino acid concentration (Main et al., 2008), fat (Tokach et al., 1995), antibiotics (Skinner et al., 2014), or milk replacers (Wolter and Ellis, 2001) in nursery diets. In contrast, lactose is able to improve nursery performance with further improvements in finisher performance (Tokach et al., 1995).

Therefore, the value of diet complexity should consider the benefit gained during the feeding period but not projected additional benefit in the subsequent nursery or finisher periods.

Intensive care diet

The intensive care diet is typically fed to pigs from 8 to 12 lb of body weight. The purpose is to provide nutritional support for piglets that require intensive care, which typically are early-weaned, low-weight, or health-challenged piglets. These pigs represent approximately 10 to 12% of all nursery pigs. The intensive care diet can also be offered as a creep feed during the nursing phase.

The intensive care diet must provide high-quality feed ingredients to stimulate feed intake and match the digestive capabilities of weanling pigs. Typically, the intensive care diet contains high amounts of specialty protein sources such as fermented soybean meal, enzyme-treated soybean meal, soy protein concentrate, spray-dried plasma, or fish meal, among others. The level of lactose is also high, with at least 18% and up to 30% lactose.

Phase 1 diet

The phase 1 diet is typically fed to pigs from weaning at approximately 12 lb until approximately 15 lb of body weight. During this phase, it is important to provide high-quality feed ingredients to stimulate feed intake and match the digestive capabilities of weanling pigs.

Newly weaned pigs are able to easily digest lactose and specialty proteins but have limited ability to digest plant proteins and utilize fat. Pigs also have a hypersensitivity reaction to soybean meal induced by allergenic proteins and indigestible carbohydrates of soybeans. Pigs experience a transitory period of poor nutrient absorption and low growth performance following the first exposure to a diet with high amounts of soybean meal (Li et al., 1990). The effects are transitory and pigs develop tolerance after 7 to 10 days (Engle, 1994). The best approach to alleviate this problem is to expose weanling pigs to increasing levels of soybean meal in nursery diets to allow pigs to gradually overcome the hypersensitivity reaction. The early exposure to soybean meal reduces the potential for delayed-type hypersensitivity reaction and allows for greater inclusion levels in subsequent nursery diets without an impact on growth performance.

Soybean meal is commonly included at up to 16 to 18% in the phase 1 diet. Other specialty protein sources often used in combination are fermented soybean meal, enzyme-treated soybean meal, soy protein concentrate, spray-dried plasma, or fish meal, among others. Typically, the sources are used in combination to achieve the adequate amino acid profile in the diet and because most specialty protein sources cannot be the sole protein source in the diet without affecting palatability or performance.

Lactose is the carbohydrate component derived from milk and provides an easily digestible source of energy for pigs. The phase 1 diet typically contains around 18% lactose to improve growth rate of weanling pigs (Tokach et al., 1995; Mahan et al., 2004). Common sources of lactose are crystalline lactose, whey permeate, and dried whey, with whey products also providing a highly digestible source of amino acids. However, the addition of lactose products in the diet influences feed processing. The use of high levels of lactose in pelleted diets can increase friction during the pelleting process; and in meal diets can increase bridging and reduce flowability in bins and feeders.

Fat is not easily utilized by weanling pigs for growth performance. In the early post-weaning period, weanling pigs seem to require a more digestible fat source rich in unsaturated and short-chain fatty acids for an efficient energy utilization (Gu and Li, 2003). Vegetable oils like soybean oil and coconut oil are high quality sources of energy for weanling pigs (Weng, 2016), but cost often limits the use in nursery diets. Animal fat sources of good quality like choice white grease or beef tallow are usually more cost-effective to use in nursery diets. The addition of 3 to 4% fat is mainly used to improve the pelleting process of phase 1 diets with high levels of lactose.

Phase 2 diet

The phase 2 diet is typically fed to pigs from 15 to 25 lb of body weight. During this phase, feeding behavior is already established and, thus, diet complexity is reduced. The phase 2 diet is typically based on grain and soybean meal with low levels of specialty protein sources and lactose.

Soybean meal is often included at up to 20 to 24% of the diet. Other specialty protein sources often used in combination are fermented soybean meal, enzyme-treated soybean meal, or fish meal, among others. The level of lactose is reduced to around 7% lactose. Common sources of lactose are crystalline lactose, whey permeate, and dried whey, with whey products also providing a highly digestible source of amino acids. Fat begins to be utilized by the pig to improve growth performance and can be included at 1 to 3% in the diet. Common sources of fat are choice white grease or beef tallow, but other good-quality sources can be used if economically justifiable.

A phase 2 supplement is provided at KSU Premix & Diet Recommendations as an option instead of the addition of individual ingredients such as specialty protein and lactose sources in the diet.

Phase 3 diet

The phase 3 diet is typically fed to pigs from 25 to 50 lb of body weight. During this phase, feed consumption is the greatest and feed cost is critical, accounting for more than 50% of the total feed cost in the nursery.

The phase 3 diet is typically based on grain and soybean meal with no inclusion of specialty protein sources and lactose. Fat is utilized by the pig to improve growth performance and can be included at 1 to 3% in the diet. Common sources of fat are choice white grease or beef tallow, but other good-quality sources can be used if economically justifiable.

Example diets

Examples diets for phase 1, phase 2, phase 3, and intensive care are given at KSU Premix & Diet Recommendations.

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