



# Understanding Swine Feeding Programs<sup>1</sup>

R. O. Myer and W. R. Walker<sup>2</sup>

## Introduction

Since feed costs make up the largest expenditure in raising swine, (40-80% of total cost) proper feeding is very crucial for economic swine production. With many different commercial feeds, feed supplements, base mixes, and premixes on the market, feeding pigs can be quite confusing.

## Nutrients Usually Added to Corn in Swine Diets

The major component of swine rations are cereal grains such as corn. Most of the commercially available supplements and premixes on the market are designed to supplement corn (or other grain) to give a complete balanced diet.

Nutrients needed or commonly added to complement ground grain for swine diets (rations) are given in Table 1.

**Table 1.** Nutrients commonly added to grain for swine rations

Protein (amino acids)	Vitamins:
Calcium	Vitamin A
Phosphorus	Vitamin D
Salt	Vitamin E
Trace minerals:	Vitamin K
Zinc	Riboflavin
Iron	Niacin
Manganese	Pantothenic acid
Copper	Choline
Iodine	Vitamin B12
Selenium	(Biotin) **
	(Folic Acid) **
**Sometimes added.	

1. This document is Fact sheet AS117, one of a series of the Animal Science Department, Florida Cooperative Extension Services, Institute of Food and Agricultural Sciences, University of Florida. This document was originally published in 1989 as AS-41. Revised: Sept 2000. Please visit the EDIS web site at <http://edis.ifas.ufl.edu>.

2. Myer, Professor of Animal Science, North Florida Research and Education Center, Marianna, Florida; and Walker, Former Associate Professor, Extension Swine Specialist, Department of Animal Science; Animal Science Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

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The most common protein source used in swine diets is soybean meal. Other common protein sources include meat and bone meal, cottonseed meal, poultry by-product meal and peanut meal. Soybean meal is by far the most desirable supplemental protein source for swine diets since it has a good balance of amino acids (the building blocks of protein) that are complementary to the amino acids found in the protein of corn and other cereal grains.

The most common sources of calcium are calcium carbonate (ground limestone), dicalcium phosphate, monocalcium phosphate and de-fluorinated rock phosphate. The latter three are also the most common phosphorus sources in swine diets.

## Swine Feeding Programs

Most commercially available protein sources, supplements and premixes can be utilized in one of four basic programs (feeding systems). These are 1) the complete diet system 2) the complete supplement system 3) the basemix system and, 4) the premix system. What these systems are and their relationship to one another is outline in Table 2. Each system may have certain advantages and/or disadvantages for a particular swine operation.

### Complete Diet System

In this feeding system, complete commercially mixed diets are purchased from a feed manufacturer and delivered to the farm either in bulk or in bags and are fed directly without further processing. This eliminates the need for on-farm feed processing and shifts the burden of ensuring properly balanced diets to the feed manufacturer. The complete diet system is generally the most expensive, especially if purchased by the bag. This system is better suited to the smaller producer and hobby farmer. In some cases this system may be economical for larger producers especially if large amounts of mixed feed can be purchased and stored in bulk. In addition, purchases of small amounts of complex complete specialty feeds, such as baby pig prestarter diets, may be justifiable in certain swine operations.

**Table 2.** Major systems of supplying feed nutrients in swine rations.

<p><b>Premix System:</b></p> <p>Ground grain + Protein Source + Calcium and Phosphorus Sources + Salt + Vitamin Premix + Trace mineral premix</p> <p><b>Basemix System:</b></p> <p>Ground grain + Protein Source + Mineral and Vitamin Basemix</p> <p><b>Complete Supplement System:</b></p> <p>Ground grain + Complete Supplement</p> <p><b>Complete Diet (Ration) System:</b></p> <p>Complete Mixed Ration (i.e. 16% swine grower)</p> <p><b>Variations on the basic systems:</b></p> <ol style="list-style-type: none"> <li>1. Vitamin and trace mineral premixes may be purchased as one premix.</li> <li>2. Optional ingredients, (i.e. medications), may be included in the first three systems above - be sure to follow label mixing directions.</li> <li>3. Basemix may include separately packaged vitamins.</li> <li>4. Booster packs may be required for some ration types, especially for the basemix and complete supplement systems - follow manufacturers' directions.</li> </ol>
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### Complete Protein Supplement System

This is a popular system suited to most swine operations. In this system, a complete protein supplement is purchased and mixed with ground grain on the farm. The complete supplement provides supplemental protein as well as vitamins and minerals to complement corn or other grains either purchased or grown on the farm. These protein supplements usually contain 36-40% crude protein and the major ingredient is usually soybean meal. An example of information given on a feed-tag of a commercially available complete protein supplement is given in Table 3.

Complete supplements are used at varying levels in mixed diets to provide the nutrient specifications for each class of swine. For example, a diet for young, growing pigs from 40 to 120 lbs may call for a mixed diet of 450 lbs of complete supplement plus 1,500 lbs of ground grain to give a ton of complete feed. A diet for older finishing swine from 120 lbs to market weight of 230 lbs may call for a ration of 350 lbs of complete supplement plus 1,650 of ground grain. Instructions on the use of these complete supplements are usually printed on the feed tag or on the bag. **Be sure to follow manufacturers' directions.** Booster packs and/or special complete

**Table 3.** Guaranteed analysis and ingredients of 40% hog supplement (complete supplement).

Guaranteed Analysis	
Crude protein, min.	40.00%
Crude fat, min.	1.50%
Crude fiber, max.	10.00%
Calcium (Ca), min.	3.25%
Calcium (Ca), max.	4.25%
Phosphorus (P), min.	1.25%
Salt (NaCl), max.	3.25%
Salt (NaCl), min.	2.75%
Total added mineral ingredients, max.	9.00%
Ingredients	
Soybean meal, meat and bone scraps, dehydrated alfalfa meal, wheat middlings, riboflavin supplement, vitamin A palmitate, niacin, D-pantothenic acid, choline chloride, cane molasses, D-activated animal sterol (Vitamin D3), vitamin B12 supplement, salt, defluorinated phosphate, ground limestone, manganous oxide, magnesium oxide, copper sulfate, sodium selenite, cobalt carbonate, ferrous sulfate, zinc oxide, and calcium iodate.	
Mixing directions	
16%	14%

**Table 3.** Guaranteed analysis and ingredients of 40% hog supplement (complete supplement).

Ingredients	(grower)	(finisher)
Ground yellow corn (or other grain)	1,550 lbs	1,650 lbs
Supplement	450 lbs	350 lbs
Total	2,000 lbs	2,000 lbs

supplements are usually required for sow gestation and lactation diets and young pig starter diets.

The complete protein supplement system is simple and less expensive than the complete diet system. Disadvantages include the lack of flexibility in diet formulation and lack of knowledge about the quality of the supplemental ingredients.

### Basemix System

This is another popular system commonly used in swine operations. This system involves purchasing the vitamins, trace minerals, salt, supplemental calcium and phosphorus in a mixed premeasured form to be added to ground grain and a supplemental protein source. Generally, 40 to 100 lbs of the basemix is added to soybean meal and ground grain per ton of mixed feed. For example, a diet for young, growing pigs may involve 50 lbs of mineral-vitamin basemix plus 350 lbs of soybean meal and 1,600 lbs of ground grain to give a ton of mixed feed. The basemixes (sometimes referred to as mineral-vitamin premixes) are widely available from many different feed companies and come with mixing instructions. An example of information found on a typical basemix feed tag is given in Table 4.

The advantages of the basemix system is its relative flexibility, simplicity, and quality assurance. For those producers who can purchase soybean meal in bulk, this system can be more economical than either the complete diet or complete protein supplement system.

### Premix System

This system is the most complex but least expensive and involves the use of many different ingredients - vitamin and trace mineral premixes, salt, phosphorus source, calcium source, protein source and grain (Table 2). The advantages of this system are its economy, flexibility and control over ingredient quality. However, this system is usually better suited for larger operations as bulk purchases of the lesser used ingredients can result in significant savings in the mixed feed.

### Summary

For efficient swine production, supplemental protein plus various minerals and vitamin supplements must be added to grain in swine diets. There are various ways in which this can be done. A complete feed can be purchased, or various types of supplements can be purchased for on-farm mixing with ground grain. The two most popular on-farm mixing systems involve the use of a commercially available complete protein-vitamin-mineral supplement or soybean meal plus a commercially available vitamin-mineral basemix. **When using the commercially available products be sure to follow manufacturers' directions to ensure proper diet mixing for each class of swine.** Failing to do so could result in nutrient deficiencies and/or imbalances which can hurt animal performance and ultimately the pocketbook.

**Table 4.** Example swine mineral-vitamin basemix.

Guaranteed Analysis		
Calcium (Ca)	Minimum	21.50%
Calcium (Ca)	Maximum	25.50%
Phosphorus (P)	Minimum	10.00%
Salt (NaCl)	Minimum	13.75%
Salt (NaCl)	Maximum	16.50%
Fluorine (F)	Maximum	0.10%
Cobalt (Co)	Minimum	0.01%
Copper (Cu)	Minimum	0.16%
Iodine (I)	Minimum	0.009%
Iron (Fe)	Minimum	0.42%
Magnesium (Mg)	Minimum	0.54%
Manganese (Mn)	Minimum	0.22%
Potassium (K)	Minimum	0.10%
Sulphur (S)	Minimum	0.50%
Zinc (Z)	Minimum	0.42%
Selenium (Se)	Minimum	0.00033%
Vitamin A	Minimum	67,000 USP units per pound
Vitamin D3	Minimum	12,500 USP units per pound
Vitamin E	Minimum	250 USP units per pound
Riboflavin	Minimum	84 mg per pound
d-Pantothenic Acid	Minimum	260 mg per pound
Niacin	Minimum	350 mg per pound
Choline chloride	Minimum	1690 mg per pound
Vitamin B12	Minimum	0.335 mg per pound
Vitamin K activity	Minimum	68 mg per pound
Biotin	Minimum	3.1 mg per pound

**Table 4.** Example swine mineral-vitamin basemix.

Thiamine	Minimum	32 mg per pound
Folacin	Minimum	20 mg per pound
<b>Ingredients</b>		
Monocalcium Phosphate, Dicalcium Phosphate, Calcium Carbonate, Cobalt Carbonate, Copper Oxide, Calcium Iodate, Iron Oxide, Magnesium Oxide, Magnesium Sulfate, Potassium Sulfate, Manganese Sulfate, Manganous Oxide, Zinc Oxide, Sodium Selenite, Vitamin A Supplement, Vitamin D3 Supplement, Vitamin E Supplement, Riboflavin, d-Pantothenic Acid, Niacin, Choline Chloride, Vitamin B12 Supplement, Vitamin K Supplement, Mineral Oil, Iron Sulfate, Copper Sulfate, Zinc Sulfate, Thiamine, Folic Acid.		
<b>Mixing Directions</b>		
	16%	14%
<u>Ingredients</u>	(grower)	(finisher)
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	lbs	
Ground corn (9%)	1,525	1,640
Soybean meal (44%)	415	300
Base mix	<u>60</u>	<u>60</u>
Total	2,000	2,000
<u>Anaylsis:</u>		
Protein, %	16	14
Calcium, %	0.7	0.7
Phosphorus, %	0.6	0.6
Lysine, %	0.79	0.64
To change from 44% to 49% soybean meal, subtract 12% from soybean meal and add this quantity in corn.		