

# Swine Handbook

## Nutrition & Feeds

### Introduction

Swine have a relatively simple digestive system, similar to humans. They are unable to utilize vast quantities of hay, silage, or pasture grasses. Therefore, hog rations are made up primarily of farm-grown grains, plus a protein supplement that includes vitamins and minerals.

Young animals use most of the feed they eat for growth and maintenance. Mature animals use feed primarily for maintenance and reproduction. Digested feed which is not needed for growth, maintenance, or reproduction is stored as body fat.

### Uses of Swine Feed

1. Growth: Mainly an increase in size of bone, muscle and skin cells.
2. Maintenance: Energy for normal animal activities and repair of worn body tissue.
3. Reproduction (Gestation): Growth and development of unborn pigs, from mating to farrowing.
4. Milk Production (Lactation): Producing milk requires a high-level feeding of quality feed.
5. Fattening: Formation and deposition of fat tissue under the skin, around muscles and in the body cavity.

### Swine Feed Nutrients

Over 100 different nutrients or feed substances have been discovered by research scientists which are necessary for desirable pig growth. These nutrients can be classified into five main groups -- energy, protein, minerals, vitamins, and water.

### Nutrients of Swine Rations

Food Nutrients Common Sources

- T Energy: Farm grown or purchased grains
- T Protein: Soybean meal/commercial sources
- T Minerals: Commercial/ farm-mixed minerals
- T Vitamin: Commercial vitamin supplements
- T Water: Pure and clean--from wells or lakes

1. Energy -- from carbohydrates and fats in the feed. Farm grown grains are usually the cheapest source of energy for hogs. Corn and milo (grain sorghum) are popular feed grains. Wheat, oats, and barley may also be used for feeding hogs.

Energy Sources for Swine

Ground Grain	Feed Value	Max Ration Content For Sow and Pigs
Corn	100%	100%
Milo	95%	*50-75%
Wheat	95%	*50-75%
Oats	80%	25-50%
Barley	90%	25-50%

\* For finishing hogs -- maximum is 100%

2. Protein -- from soybean meal, fish meal, meat scraps, tankage, or commercial protein concentrates. The amount of protein in a ration and the quality (balance of amino-acids) of protein are extremely important in swine rations.

Feed Protein Levels Required by Swine

Ration	Protein %
Creep Feeding	18-20%
Growing (50-125 lbs)	15-16%
Finishing (125-240 lbs)	13-14%
Young gilts-boars	15-16%
Older sows-boars	13-14%

Over 20 different amino acids are found in various swine feeds. Ten are considered essential and must be included at appropriate levels in rations for desirable pig performance. The essential amino acids are arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine. Amino acids are body-building blocks.

3. Minerals -- from grain and protein sources but primarily from mineral supplements. Over 15 different minerals are essential for swine growth. Calcium, phosphorus and iodized salt (iodine, sodium, and chlorine) make up the largest mineral requirement. The other important minerals (iron, copper, zinc, and manganese) can be supplied in a trace-mineralized salt combination.

**Mineral Mixture--Pasture Self Feeding**

40 pounds Feed grade limestone
40 pounds Dicalcium phosphate
20 pounds Trace mineralized salt

Confinement rearing of hogs dictates that all of the required major and minor minerals be included in swine rations. A calcium-phosphorus deficiency or imbalance can create serious health problems within confined sow herds.

4. Vitamins -- from direct sunshine, dehydrated alfalfa meal, green pasture, or synthetic sources such as vitamin premixes. Vitamins regulate many body functions and are essential for rapid growth of pigs. Vitamin A affects the eye and normal vision, Vitamin D particularly affects phosphorus-calcium metabolism, and the B-Vitamins are responsible for the nervous system. Vitamins must be included in the ration of confinement-reared animals.

5. Water -- from clean wells or lakes. Water is the most important ingredient of all. It is necessary to maintain body temperature, to carry digested feed throughout the body and to remove body wastes. Water consumption will vary with environmental temperatures. Pigs will normally drink twice as much water on a pound basis as their daily feed consumption.

**Approximate Daily Water and Feed Consumption**

Pig	Pounds	
	Water	Dry Feed
50	8.0	4.0
100	11.0	5.5
150	14.0	7.0
200	17.0	8.5
250	20.0	10.0

8 pounds of water is about one gallon.

6. Additives -- from antibiotics, arsenicals, and sulfa or copper compounds. Feed additives are used in pig rations to improve daily gain and feed efficiency. When antibiotics are needed, two different kinds can be combined for greater effectiveness and used in rotation to increase responsiveness. Arsenicals and sulfa compounds are frequently used in combination with antibiotics. Copper compounds may be used for "spot treatment" situations rather than as a routine feed additive.

Pigs use dry feed before weaning more efficiently than in later growth stages. Several commercially prepared, early-weaning (three to four weeks) and creep rations are available. Select a pelleted feed if possible. Feeds with sugar or artificial sweeteners mixed within the pellet are preferred to sugar coated pellets. The rations shown below may be used when farm-mixed rations are preferred.

**Farm Mixed Pig Rations (lbs.)**

Young Pig 18%		Baby Pig 20%	
1000	Yellow Corn	900	
200	Rolled Oats	200	
250	Dried Whey	250	
500	Soybean Meal	600	
50-100	Vitamin/Mineral Pack	50-100	

Farm grown pigs usually respond to weaning stress and initial feeding with less difficulty than do purchased "feeder pigs." In either case, the digestive tract must adjust to totally dry feed intake. A 16 percent protein ration is normally recommended for the 45- to 50-pound pig until it reaches 125 pounds. Some successful feeders have used 200 pounds of whole oats in a ton of ground mixture in order to reduce digestive disturbances at the beginning of this feeding period.

**Suggested Rations-- Different Protein Sources**

Ingredient (lbs.)	16%	14%
Yellow corn (8%)	1556	1667
Soybean meal (44%)	444	333
Mineral/Vitamin Pre mix	50-100	50-100
Yellow corn (8%)	1500	1625
Supplement (40%)	500	375
Mineral/Vitamin Pre mix	50-100	50-100
Yellow corn (8%)	1429	1571
Supplement (36%)	571	429
Mineral/Vitamin Pre mix	50-100	50-100

Complete mixed rations containing 14 percent crude protein provide essential nutrients for optimum growth during the finishing stage. Smaller-framed, finer-boned type animals frequently need to be marketed at 215-220 pounds where as large-framed individuals may grow to 245-250 pounds before becoming obese.

Approximate Feed Requirement For Weight Changes

Weight Change in Pounds	Pounds Feed per Pounds Gain
25 to 75	2.0-2.5
75 to 125	3.0-3.5
125 to 175	3.5-4.0
175 to 225	4.0-4.5
225 to 275	4.5-5.0

Feeding hogs during the finishing stage (125 pounds to market weight) is a low-labor enterprise when self-feeders and automatic waterers are utilized. In extremely hot weather, heat stress can be serious since hogs have a poorly developed sweating mechanism. Water from flush alleys and/or sprinkler systems will allow animals to lose body heat, due to evaporation.

Forty- to 50-pound pigs require three to four square feet per head in confined facilities with slotted floors or flush alleys and 10 to 12 square feet on solid concrete floors. Placement of feed on the pen floor during the initial seven to 10 days will normally stimulate pigs to develop desirable housekeeping habits in flush-type buildings. A 20- to 30-gallon barrel or self-waterer can be used to provide medicated water to young pigs when an in-line system is not available.

Suggested Space for Confined Pigs

Animal Wt. (lbs.)	Sq feet/pig*
25 to 50	3
50 to 100	4
100 to 150	6
150 to 250	8
* Under hot-humid conditions additional space or increased air flow is desirable.	

Farrow-to-finish operators frequently develop high quality sow herds when performance tested, purebred boars are utilized in rotational, cross-breeding programs. These producers are usually able to sell their market-weight hogs at a price advantage, especially where grade-yield marketing programs are available. Regardless of marketing alternatives, hog producers should weigh animals prior to loading for market in order to calculate feed efficiency, measure animal gain and understand liveweight shrinkage.