

Swine: Feeding¹

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Table 1. Maximum Amount of Different Feeds for Various Rations

Feed	% Complete Ration				
	Gestation	Lactation	Starter	Grower	Finisher
Alfalfa meal	90	10	0	5	5
Barley	80	80	25	80	90
Blood meal	3	3	0	3	3
Corn	85	85	70	80	90
Corn and cobmeal	70	10	0	0	0
Cottonseed meal	5	5	0	5	5
Dist. dried sol. corn	5	5	5	5	5
Fish meal	10	10	5	10	5
Fats and oils	0	5	5	5	5
Linseed meal	5	5	5	5	5
Meat and bone meal	10	10	5	5	5
Grain Sorghum	85	85	70	80	90
Molasses	5	5	5	5	5
Oats	70	15	10	30	30
Skim milk, dried	0	0	40	0	0
Soybean meal	20	20	30	25	20
Tankage	10	5	0	5	5
Triticale	85	85	70	80	90
Wheat	85	85	70	80	90
Whey, dried	5	5	20	5*	5*

* Recent research indicates higher levels may be fed without reducing performance.

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FEED SUBSTITUTIONS

See Table 2 for suggested feed substitutions.

MASS CONVERSION EQUIVALENTS

See Table 3 for metric system-mass conversion equivalents.

VITAMINS

Vitamins which are of concern and which should be added to swine rations include Vitamin A, Vitamin D, riboflavin, niacin, pantothenic acid, and Vitamin B12. Sometimes choline, biotin, Vitamin K and Vitamin E are added. Table 4 lists vitamin requirements for starting, growing and finishing swine. Table 5 contains suggested vitamin-trace mineral premix for swine.

PROTEIN

Protein is made up of a combination of amino acids linked together like a chain with links of different size and shape. There are 20 amino acids and 10 of these are essential or must be found in the diet at a particular level for optimum growth or performance. Essential amino acids are: arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine. Table 6 lists protein feed recommendations for swine. Lysine is the essential amino acid of most concern since this amino acid is usually in shortest supply in protein of typical swine diets.

MINERALS

Minerals are inorganic elements that are essential for many vital metabolic processes which take place in the animal and are important constituents of the skeleton. Table 7 lists mineral element recommendations for swine feed.

ESTIMATED FEED REQUIRED PER HOG BY PERIODS

Table 8 lists recommendations for feed required per hog by age periods.

PROTEIN, FEED INTAKE AND DAILY GAIN EXPECTED BIRTH TO MARKET

Table 9 lists the protein, feed intake and daily gain expected for growing and finishing pigs. Table 10 lists the protein, feed intake and daily gain expected for gilts, sows and boars. Table 11 lists free choices feeding of protein. Table 12 lists protein supplements for when feeding is free choice.

MINERAL SUPPLEMENTS

Table 13 contains an analysis of mineral supplements. Table 14 recommends mixtures for self-feeding minerals.

RECOMMENDED RATIONS

Table 15 recommends rations for the age group known as creep or early weaning (3 weeks) to market age/weight. Table 16 recommends rations for sows and boars.

Table 2. Feed Substitutions

Feed	Feeding Value Compared to Corn (%)	Corn in Diet it can Replace (%)	Initial Pigs' Weight Best Suited for Feed
Corn, No. 2	100	100	10
Barley	90-100	100	35
Beets, carrots or turnips	12-20	25	125
Bread	75-80	50	50
Fats and oils	175-225	5	10
Hominy Feed	95	50	100
Millet	85-90	50	125
Molasses, cane	70-75	20-40	100
Molasses, citrus	70-75	10-20	100
Oats	80-90	10-35	35
Peanuts*	120-125	100	35
Peas, dried	90-100	50	50
Potato (Irish)	25-28	25-50	125
Potato (Sweet)	20-25	35	100
Rice (rough)	80-85	50	75
Rice bran*	100	35	100
Rye	90	25-50	125
Sorghum (grain)**	90-95	100	10
Triticale	95-100	100	10
Wheat	95-100	100	10
Wheat bran	75	15-25	125
Wheat shorts	115-120	25	35
* High levels fed produce soft pork.			
** Two varieties: bird and non-bird resistant. Bird resistant may have a lower feed value.			

Table 3. Metric System - Mass Conversion Equivalents

Equivalents			
1 pound (lb) = 454 grams (g)	1 mcg/lb = 2 mg/ton		
1 kilogram (kg) = 2.2 lb = 1000 g	1 mg/lb = 2 g/ton		
1 g = 1000 milligrams (mg)	1 mg/lb = 2.2 ppm		
1 mg = 1000 micrograms (mcg)	1 mcg/g = 1 ppm		
1 mg/kg = 1 part/million (ppm)			
mg/g to mg/lb - multiply by 454	mg/lb to ppm - multiply by 2.2		
mcg/g to mg/g - divide by 1000	g/lb to % - divide by 4.54		
mcg/lb to mg/lb - divide by 1000	% to g/lb - multiply by 4.54		
mg/lb to mcg/g - divide by 0.454			
Conversion Table			
%	ppm	g/ton	mg/lb
0.0001	1.0	1.9	0.45
0.00011	1.1	1.0	0.5
0.001	10.0	9.1	4.55
0.0011	11.0	10.0	5.0
0.01	100.0	90.8	45.4
0.011	110.0	100.0	50.0
0.1	1000.0	908.0	454.0
0.11	1100.0	1000.0	500.0

Table 4. Vitamin Requirement of Starting, Growing and Finishing Swine

Vitamins		Vitamin Amount per Pound of Feed					
		10-25	25-45	45-130	130-240	Gestation	Lactation
Vitamin A	IU	1,000	800	600	600	1,800	900
Vitamin D	IU	100	90	90	70	90	90
Vitamin E	IU	7.0	5.0	5.0	5.0	10	10
Vitamin K	mg	.2	.2	.2	.2	.2	.2
Riboflavin	mg	1.6	1.4	1.2	1.0	1.7	1.7
Niacin	mg	7.0	6.0	6.0	4.0	5.0	5.0
Pantothenic Acid	mg	5.0	4.0	3.0	3.0	6.0	6.0
Vit. B ₁₂	mcg	8.0	7.0	4.0	2.5	7.0	7.0
Choline	mg	225	200	150	150	600	500
Thiamin	mg	.5	.5	.5	.5	.5	.5
Vit. B ₆	mg	.7	.7	.5	.5	.5	.5
Biotin	mg	.02	.02	.02	.02	.10	.10
Folacin	mg	.15	.15	.15	.15	.15	.15

Table 5. Suggested Vitamin-Trace Mineral Premix for Swine

Nutrient	Amount per pound of premix
Vitamin A	900,000 IU
Vitamin D	100,000 IU
Vitamin E	5,000 IU
Vitamin K (Menadione Equivalent)	660 mgs
Riboflavin	1,200 mgs
Pantothenic Acid	4,500 mgs
Niacin	7,000 mgs
Choline Chloride	20,000 mgs
Vitamin B12	5 mgs
Folic Acid	300 mgs
Biotin	40 mgs
Copper	.4 %
Iodine	.008 %
Iron	4.0 %
Manganese	.8 %
Zinc	4.0 %
Selenium	.012 %

1 - Vitamin and trace mineral mixes may be purchased separately. This is advisable if a combination vitamin-trace mineral premix is to be stored longer than three months. Vitamins may lose their potency in the presence of trace minerals if stored for a prolonged period.

2 - Premix is designed to be used at a rate of 5 lb. per ton of complete feed for sows and baby pigs and 3 lb. per ton of complete feed for growing-finishing swine.

Table 6. Protein Feeds

Feed	*Relative Value	Percent to Use in:		Evaluation as Protein Source
		Ration	Supplement	
Soybean Meal (44%)	100	5-25	50-90	high quality protein
Soybean Meal (48%)	112	5-5	50-90	high quality protein
Peanut Meal (47%)	75	0-5	0-30	low in lysine
Cottonseed Meal (41%)	70	0-5	0-30	gossypol (toxic if not processed properly, low in lysine)
Linseed Meal (35%)	70	0-5	0-30	low in lysine
Meat and Bone Meal** (50%)	75-85	0-5	0-30	low in lysine & tryptophan, high in mineral matter (ash)
Tankage (55%)**	85-90	0-5	0-30	low in tryptophan & isoleucine
Fish Meal (Menhaden) (60%)	100-110	0-10	0-30	high quality protein - expensive
Dry Skim Milk (34%)	100	0-20	0-20	excellent quality protein - expensive
Canola Meal (38%)	75	0-10	0-40	relatively high in fiber content

* When fed as recommended

** The value of Meat-Bone Meal and Tankage varies in quality - University of Florida tests in comparison to soybean meal has shown advantage to soybean meal.

Table 7. Mineral Element Recommendations for Swine

Mineral Elements	Amount or Percent Per Pound of Feed					
	10-25	25-45	45-130	130-240	Gestation	Lactation
Calcium %	.80	.70	.60	.50	.75	.75
Phosphorus %	.65	.60	.50	.40	.60	.50
Sodium %	.10	.10	.10	.10	.15	.20
Chlorine %	.08	.08	.08	.08	.12	.16
Potassium %	.28	.26	.23	.17	.20	.20
Magnesium %	.04	.04	.04	.04	.04	.04
Iron mg	45.0	40.0	30.0	20.0	40.0	40.0
Zinc mg	45.0	40.0	30.0	25.0	25.0	25.0
Manganese mg	2.0	1.5	1.0	1.0	5.0	5.0
Copper mg	3.0	2.5	2.0	1.5	2.5	2.5
Iodine mg	.06	.06	.06	.06	.06	.06
Selenium mg	.14	.12	.07	.05	.07	.07

Table 8. Estimated Feed Required Per Hog by Periods

	Amount (lb.)
<u>Weaning at 3 weeks:</u>	
Sow per year:*	
Lactation diet	550
Gestation diet	<u>1200</u>
Total	1750
Per pig to market weight:	
Creep feed	5
Nursery diet (weaning to 20 lb.)	15
Starter diet (20 to 40 lb.)	40
Grower feed (40 to 125 lb.)	230
Finisher feed (125 to 240 lb.)	<u>400</u>
Total	690
<u>Weaning at 5 weeks:</u>	
Sow per year:**	
Lactation diet	850
Gestation diet	<u>1050</u>
Total	1900
Per pig to market weight	
Creep feed	10
Starter feed (weaning to 40 lb.)	30
Grower feed (40 to 125 lb.)	230
Finisher feed (125 to 240 lb.)	<u>400</u>
Total	670
* Assuming 2.2 litters per sow per year	
** Assuming 2.0 litters per sow per year	

Table 9. Protein Content, Feed Intake and Daily Gain Expected for Growing and Finishing Pigs

Pig Size	Protein Content of Ration (%)	Average Daily Feed Intake (lb)	Expected Daily Gain
Creep feed (suckling), 5 to 40 lb	22	.5	0.70
Nursery diet (weaned), 10 to 20 lb.	22	----	0.30
Pig Starter (weaned), 20 to 40 lb	18-20	1.00	0.90
Grower, 40 to 125 lb	16	4.25	1.50
Finisher, 125 to 240 lb	13-14	7.00	1.80

Table 10. Protein Content, Feed Intake and Daily Gain Expected for Gilts, Sows and Boars

Pig Age	Protein Content of Ration (%)	Average Daily Feed Intake (lb)	Expected Daily Gain (lb.)
Gestation			
Gilts	14	3.5 to 6.0	0.60
Sows, first 2/3	14	3.0 to 4.5	0.35
Sows, last 1/3	14	3.5 to 5.5	0.45
Lactating Sows	15 to 16	12.00	
Boars*			
Young (less than 15 mo.)	14	2.0 to 6.0	
Mature (over 15 mo.)	14	2.0 to 6.0	
* Regulate as needed during breeding season.			

Table 11. Free Choice Feeding of Protein Supplement

Live Weight	Crude Protein, %	Supplement to Corn Ratio	Daily Protein Supplement
Pigs in Confinement			
40 to 125 lb.	16	1-3.2	.8
125 to 240 lb.	14	1-5.0	.8
Pigs On Pasture			
40 to 125 lb.	15	1-3.5	.8
125 to 240 lb.	13	1-7	.6
These figures are based on corn that contains 8.5 to 9.0% protein and supplements that contain 38-42% protein. If the quantity or quality of pasture is low, use confinement recommendations.			

Table 12. Protein Supplements (When feeding protein supplement free choice)

Supplement	Free Choice Feeding			For Use In	
	Sow Breeder Rations	Pig Up To 125 Lb	Hog 125 Lb And Up	Complete Grower 16%	Mix Diets Finisher 14%
Protein percent	38.5	42	40	44	42
Soybean meal (48%)	1100	1200	1200	1780	1740
Meat and bone scraps, tankage or fishmeal	340	440	340		
Alfalfa meal (dehydrated)	400	200	300		
Minerals					
Defluorinated Phosphate	80	80	100	200	180
Salt	40	40	50	40	50
Vitamin - Trace Mineral Additions					
Suggested Vitamin-Trace Mineral Swine Premix**	12	15	10	20	15
* Prefer 60% meal if Meat and Bone scraps or Tankage are used.					
** Refer to Table 5.					

Table 13. Analysis of Mineral Supplements

	Calcium %	Phosphorus %	Sodium %
Bone Meal	24.0	12.0	0.46
Calcium Carbonate	38.0	--	0.06
Defluorinate Phosphate	32.0	18.0	5.0
Dicalcium Phosphate	22.0	18.5	0.08
Monoammonium Phosphate	0.5	24.0	0.05
Mono-Dicalcium Phosphate	16.0	21.0	0.07
Phosphoric Acid	--	23.8	--
Rock Phosphate, Low Fluorine	36.0	14.0	0.6
Sodium Tripolyphosphate	--	25.0	31.0
Tricalcium Phosphate	32.0	18.0	5.0

Table 14. Self-Feeding Minerals

The following mineral mixture is recommended when mineral is self fed:		
(1)	Ground limestone	2 parts
	Steamed bonemeal or dicalcium phosphate	2 parts
	Trace mineral salt mix	1 part
(2)	Defluorinated phosphate	4 parts
	Trace mineral salt	1 part
A three-compartment mineral box can be used and the limestone, bonemeal or dicalcium phosphate and the trace mineral salt can be fed in separate compartments.		
When "hogging" peanuts, calcium is the mineral likely to be deficient. Keep ground limestone and trace mineral salt before them in a mineral box.		

Table 15. Suggested Swine Diets (lb/ton)

Ingredient	Starter ¹ 20 to 40 lb.	Grower 40 to 125 lb.	Finisher 125 to 240 lb.
Ground corn or grain sorghum	1245	1570	1680
Soybean meal (48%)	500	380	270
Dried whey	200	--	--
Base mix ²			
Calcium carbonate	13	15	15
Dicalcium phosphate ³	30	25	25
Salt	7	7	7
Vitamin-trace mineral premix*	5	3	3
	2000	2000	2000
Total Calculated Analysis:			
Crude protein, %	20.0	16.0	13.9
Lysine, %	1.0	.79	.62
Calcium, %	.75	.65	.62
Phosphorus, %	.65	.55	.52
* Suggested vitamin-trace mineral premix given in Table 5.			
1 For pigs under 20 lb (i.e., 3 week weaned pigs), a nursery diet is suggested. It is best that this diet be purchased as they are rather complex and only a small amount is required. This diet should contain 20-24% crude protein (1.1 - 1.4% lysine) and include dried skim milk as one of its ingredients. This diet type may also be called baby pig feed or prestarter.			
2 A complete mineral-vitamin premix or complete mineral premix and separate vitamin premix may be used instead of the suggested base mix. Follow manufacturer's guidelines. If needed, increase or decrease the grain portion of the ration so that the total would equal 2000 lb.			
3 Defluorinated phosphate or mono-dicalcium phosphate, if available, may be substituted for dicalcium phosphate. However, if a substitution is made, the rations need to be reformulated since these products contain different calcium and phosphorus levels than does dicalcium phosphate see Table 13			

Table 16. Suggested Sow (and boar) Diets (lb/ton)

Ingredient	Gestation ¹	Lactation ²
Ground corn or grain sorghum	1625	1585
Soybean meal (48%)	300	350
Base mix ³		
Dicalcium phosphate ⁴	40	30
Calcium carbonate	20	20
Salt	10	10
Vitamin-trace mineral premix*	5	5
	2000	2000
Total Calculated Analysis:		
Crude protein, %	14.3	15.4
Lysine, %	.66	.74
Calcium, %	.90	.80
Phosphorus, %	.70	.60
1	It is suggested that this ration be fed at a level of 3 to 6 lb. per head per day. The exact level to feed during gestation depends on weight, age and condition of the animal and climatic conditions. Sows should gain about 30 to 60 lb and gilts should gain about 70 to 100 lb during gestation. For bred sows and gilts on good quality pasture, 2 to 4 lb per head per day should suffice. For feeding bred sows that are maintained in confinement in individual pens or are tethered, an additional 100 lb of soybean meal and 15 lb of dicalcium phosphate should be added to the gestation ration at the expense of grain since these sows usually receive 1/2 to 1 lb less feed per day.	
2	The suggested lactation ration could also be fed during gestation for those who want to use a single gestation-lactation ration. During lactation, the ration should be limit fed during the first few days following farrowing. Increase the daily feed gradually up to full feed or slightly less by 3 to 7 days after farrowing. If constipation is a problem around farrowing time, substitute approximately 20% wheat bran, 40% oats or 10% ground good quality hay or alfalfa meal for grain in the lactation ration starting 3 to 4 days before farrowing and continuing 2 to 5 days following farrowing. Constipation may also be treated by adding 15 to 20 lb potassium chloride or magnesium sulfate per ton of lactation ration.	
3	A complete commercial mineral-vitamin premix or a complete mineral premix and separate vitamin premix may be used instead of the suggested base mix. Follow manufacturer's guidelines. If needed, increase or decrease the grain portion of the ration so that the total would equal 2000 lb.	
4	Defluorinated phosphate or mono-dicalcium phosphate, if available, may be substituted for dicalcium phosphate. However, if a substitution is made, the rations need to be reformulated since these products contain different calcium and phosphorus levels than does dicalcium phosphate (see Table 13).	
5	See Table 5.	