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Swine Diets

Michigan State University

Cooperative Extension Service

Authors:

William G. Luce, Oklahoma State University

Allen F. Harper, Virginia Tech

Donald C. Mahan, Ohio State University

Gilbert R. Hollis, University of Illinois

Reviewers:

Richard Coffey, University of Kentucky

Joe d. Crenshaw, Quincy, Illinois

Mark A. Crenshaw, Mississippi State University

Gerald Gehlbach, Lincoln, Illinois

July 1997

12 pages

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# pork industry handbook

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MICHIGAN STATE UNIVERSITY EXTENSION

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(Key Words: Swine, Diets, Nutrition, Feeding)

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A dependable and economical source of feed is the backbone of a profitable swine operation. Because 55 to 65% of the total cost of swine production is attributed to feed costs, the pork producer should be aware of all aspects of swine nutrition and commodity buying.

The pig is an efficient converter of feed to meat. Today's meat-type hog can be produced using 3 lb or less of feed per pound of gain from 40 lb to market. To achieve maximal feed efficiency, it is necessary to feed well-balanced diets designed for specific purposes and matched to the genotype produced.

### Composition of Feedstuffs

Values for crude fiber (CF), metabolizable energy (ME), crude protein (CP), calcium (Ca), phosphorus (P) and five of the amino acids most likely to be limiting are presented in Table 1 for the feedstuffs used in formulating the diets suggested in this publication. Pork producers are cautioned, however, to recognize that feedstuffs vary not only in nutrient content but also in the availability of these nutrients. Table 1 lists average nutrient values for each feedstuff. When the nutrient content of a particular feedstuff differs as indicated by chemical analysis from that shown in Table 1, adjustments should be made to the suggested diets in Tables 4 through 17.

There also are limits on the amounts of certain individual feedstuffs that should be included in swine diets. PIH-3 Dietary *Energy for Swine* lists recommendations on the maximum amounts of various feedstuffs to be used in diets for different classes of swine. Pork producers are cautioned to use only quality feedstuffs that are free of molds, foreign materials, etc.

Dicalcium phosphate was used in all diets as a major source of both calcium and phosphorus, but other calcium and phosphorus sources (Table 2) may be substituted. However, if a substitution is made, adjustments will be necessary since other sources contain different levels of calcium and phosphorus and the biological availability of the phosphorus may differ from that of dicalcium phosphate.

Recommended nutrient allowances for different classes of swine are presented in Table 3. Nutrient allowances are recommended for both average producing sows (8 pigs weaned) vs. high producing sows (9-11 pigs weaned). Different nutrient allowances also are suggested for barrows or gilts of a high-lean genotype vs animals of an average genotype.

### Sow Diets

The diets in Table 4 are designed for bred gilts and sows using either corn, barley, sorghum grain (milo), or wheat as the primary energy source. It is suggested that diets for bred sows be fed at a daily level of 4 lb to 5 lb per head. The exact level of feed during gestation will vary depending on the weight, age, body (fat) condition of the sow, method of housing, age of pigs to be weaned, and climatic conditions or environmental temperature. Sows should gain 65 lb to 90 lb and gilts should gain 90 lb to 110 lb during gestation.

Suggested diets in Table 5 and 6 are formulated for lactating sows. Diets in Table 5 are designated for sow herds that wean an average of 8 pigs or less whereas those diets formulated in Table 6 are for the herd weaning an average of 9 pigs or more per litter. These

recommended diets assume that lactating sows are full-fed and that the sows consume at least 12 lb of feed per day. Swine producers often experience difficulty in getting lactating gilts or sows to consume 12 or more lb of feed per day, especially during hot weather. There are several management practices a producer can adopt to enhance feed intake. These include:

- Keep the farrowing house temperature at 70 F or lower and use zone heating for the pigs.
- Use drip coolers or air vents directed to the sow's snout or shoulder during the summer.
- Provide an adequate supply of fresh drinking water. Lactating sows can consume as much as 7 gallons of water daily.
- Keep feed fresh by feeding at least twice per day.
- Use feeders that allow the sow easy access to the feed with plenty of head-room.

If constipation is a problem around farrowing time, incorporate approximately 20% wheat bran, 10% dehydrated alfalfa meal, or 10% beet pulp into the pre-farrowing diet and continue feeding up to 1 week following farrowing. Some producers have had success in reducing constipation by adding 20 lb (1%) of magnesium sulfate (Epsom salts) or 15 lb (0.75%) of potassium chloride per ton of feed.

## Boar Diets

The lactation diets in Table 6 are adequate for mature boars. A common feeding level is 5 lb to 6.5 lb per day under most environmental conditions. The amount to feed per day will vary according to the boars weight and body condition, and climatic conditions. Young boars less than 1 year of age may need more feed than older boars because they are still growing.

## Baby Pig Diets

Weaning pigs at 3 weeks of age or less is becoming common in indoor swine production systems. Nutritional requirements for early weaned pigs change rapidly during the early postweaning period. A phased feeding program is essential to minimize the postweaning lag problem, to reduce feed costs, and to get pigs converted to a grain-soybean meal diet as quickly as possible.

The segregated early weaning (SEW) diets shown in Table 7 are designed for pigs weaned at approximately 2 weeks of age and weighing 10 lb or less. SEW often is practiced by large producers having a three-site production system that minimizes infectious disease exposure by weaning the pigs from the sow at an early age. The type and level of antibiotics incorporated in the diet depends on individual situations and recommendations by the producer's veterinarian.

Adequate water consumption by all pigs, but especially early-weaned pigs, is crucial in getting pigs off to a good start after weaning. Wet feeding can help tremendously if early weaned pigs are not drinking adequately from nipple waterers.

Suggested three phase starter diets for early weaned pigs (18-24 days) are presented in Table 8. Phase I diets are to be fed for approximately 7 days to 10 lb pigs weaned at 18 to 24 days. Phase II diets are to be fed from

8 to 14 days postweaning or from approximately 14 lb to 20 lb. Phase III diets are designed for pigs weighing approximately 20 lb to 45 lb. The type and level of antibiotics in all of the three phase starter diets again depends on individual situations and veterinary recommendations. High levels of zinc oxide (3000 ppm) have been shown to improve starter pig performance but the levels should be lowered if the pigs are removed from the nursery.

Each of the suggested SEW diets in Table 7 and Phase 1 diets in Table 8 are complex and many swine producers may find it difficult to purchase and store all the necessary ingredients in a feasible manner. Consequently, many producers purchase commercial pre-starter diets. Many SEW and Phase 1 diets are expensive and are not feasible to be fed for an extended period. Lower cost diets may result in reduced performance, but the differences may be small enough to justify feeding the less expensive diet. However, reduced performance of pigs exiting the nursery may carry-over into the growing and finishing period and prolong days to market.

## Growing-Finishing Diets

Consumer demand for lean meat has resulted in greater efforts by breeding stock suppliers to produce animals with improved lean gain potential (fast growing, lean muscular animals). High lean gain pigs are defined as having a minimum gain of 0.75 lb of lean pork per day from approximately 40 to 240 lb. However, if these superior high lean gain pigs are to achieve their lean growth potential, specially formulated diets with higher amino acid levels must be fed to these improved genotypes.

Gilts also require higher dietary concentration of amino acids than barrows for optimum lean gain. Thus, diets in tables 9 through 17 are specifically designed for most of the sex, genotype and weight categories given in Table 3. No suggested formulations are provided for high lean gain gilts 45 lb to 75 lb or average barrows 140 lb to market, so minor reformulation of the diets given is necessary for most appropriate feeding of these two classes of pigs.

Yellow corn is the primary energy source for the diets formulated in Tables 9 through 11 whereas sorghum grain or barley are the primary energy sources in Tables 12 through 14. The diets in Tables 15, 16 and 17 utilize hard or soft winter wheat blended with other grain sources.

Pigs may not gain as efficiently on barley diets as on corn diets because of the lower energy and higher fiber content of barley, but cost of gain may be lower in areas where barley is grown. Lightweight barley (less than 46 lb/bu) has a higher fiber content which may result in a lower total energy consumption and a reduction in rate of gain. Pelleting barley improves feed conversion regardless of the bushel weight. If bushel weight of barley is greater than 46 lb, performance of pigs fed a pelleted barley diet should be similar to that of pigs fed a ground corn diet. Economics usually favors pelleting barley diets. Pigs are slightly less efficient in feed to gain ratio when fed sorghum grain diets as compared to corn diets.

Dietary nutrient levels shown in the recommended

growing and finishing diets will need adjustment in the future if repartitioning agents such as porcine somatotropin or ractopamine are approved for use. Research has shown that growing-finishing pigs treated with these agents require diets of greater nutrient density for optimum performance.

## Vitamin and Trace Mineral Premix

The levels of vitamins and trace minerals in the diets are based on the composition of the premix presented in Table 18. Be sure to check the composition of the premix used and the manufacturer's recommendations and adjust the amount in the suggested diets accordingly. Most commercial vitamin-trace mineral premixes are manufactured to be added at the rate of 2 lb to 10 lb per ton of complete feed.

Do not keep more than a month supply of the vitamin-trace mineral premix in storage. Vitamins lose their potency over time, especially in the presence of trace minerals. It is essential to store all premixes in a cool, dry place.

## Antibiotics and Other Feed Additives

Specific recommendations for antibiotics and other feed additives have not been included in the diet formulations since the choice of additives varies among farms. The greatest benefits from antibiotics or other feed additives are achieved when added to the diet of weaning and growing pigs. The advantages are less for finishing pigs. Antibiotics often are included in sow diets especially at breeding time and just before and after farrowing. When using feed additives be sure to follow label guidelines for the specific levels to feed, and adhere to the withdrawal times on the label. For a more complete discussion on feed additives see PIH-31, Feed Additives for Swine.

## Feed Processing

Whenever animal feeds are prepared, either on the farm or by feed companies, it is crucial to properly process, handle, mix and deliver feed to animals in a manner that will provide the intended nutrients for a particular stage of production. Refer to PIH-71, Feed Processing for Swine, for proper storage, handling, processing, mixing and delivery guidelines for managing swine feeds.

**Table 1. Average nutrient content of common feedstuffs<sup>a</sup>.**

Ingredient	Nutrient <sup>b</sup>								
	CF %	ME kcal/lb	Ca %	P %	CP %	Lys %	Try %	Thr %	Met+Cys %
Alfalfa hay, suncured	29.0	800	1.20	0.20	15.0	0.55	0.25	0.50	0.35
Alfalfa meal, dehydrated, 17%	24.0	775	1.40	0.23	17.0	0.80	0.34	0.70	0.56
Barley	5.0	1425	0.05	0.34	12.5	0.44	.18	0.40	0.37
Blood meal, flash dried	1.0	1200	0.40	0.30	86.0	7.00	1.00	3.60	2.00
Blood meal, spray dried	.5	1200	0.40	0.30	90.0	9.37	1.62	4.27	2.05
Canola meal	11.4	1200	0.68	1.17	38.0	2.30	0.44	1.68	1.66
Corn gluten meal, 60%	1.8	1630	0.07	0.44	61.2	1.03	0.30	2.25	2.79
Corn, yellow	2.5	1550	0.02	0.25	8.5	0.24	0.09	0.32	0.40
Fat <sup>c</sup>	—	3585	—	—	—	—	—	—	—
Fish meal, menhaden	.9	1500	5.20	2.88	61.0	4.75	0.65	2.50	2.33
Meat and bone meal, 50%	2.8	1035	9.40	4.58	50.0	2.80	0.28	1.60	1.14
Milk, dried skim	—	1620	1.25	1.00	33.0	2.50	0.45	1.57	1.30
Oats	10.7	1240	0.08	0.33	11.8	0.40	0.14	0.38	0.37
Oat groats	2.5	1550	0.07	0.40	15.8	0.50	0.18	0.44	0.41
Plasma protein, spray dried	.3	1500	0.14	0.13	70.0	6.10	1.33	4.13	2.77
Sorghum, grain	2.2	1480	0.02	0.27	8.9	0.22	0.09	0.27	0.29
Soy protein concentrate	4.5	—	0.35	0.81	64.0	4.16	0.90	2.75	1.80
Soybeans, full-fat (cooked) <sup>d</sup>	5.2	1640	0.25	0.58	36.7	2.25	0.52	1.42	1.01
Soybean meal, (solvent)	7.3	1460	0.30	0.60	44.0	2.90	0.63	1.70	1.18
Soybean meal, (solvent, dehulled)	3.4	1535	0.20	0.65	48.0	3.12	0.64	1.90	1.41
Tankage, 60%	2.0	980	4.60	2.50	60.0	3.80	0.58	2.48	1.25
Wheat, hard winter	2.6	1475	0.05	0.30	12.2	0.38	0.17	0.37	0.50
Wheat, soft winter	2.3	1500	0.05	0.35	11.4	0.30	0.12	0.32	0.35
Wheat, hard red spring	2.4	1515	0.04	0.39	13.5	0.44	0.18	0.37	0.45
Wheat, durum	2.5	1505	0.10	0.40	12.7	0.39	0.16	0.43	0.45
Wheat bran	11.0	980	0.13	1.15	15.0	0.56	0.25	0.41	0.43
Wheat middlings	7.5	1340	0.13	0.80	16.0	0.68	0.19	0.54	0.41
Whey, dried	—	1405	0.85	0.70	13.0	0.90	0.17	0.80	0.49

<sup>a</sup> All values are on a 90% dry matter basis.

<sup>b</sup> Nutrient abbreviations are for crude fiber, metabolizable energy, calcium, phosphorus, crude protein, lysine, tryptophan, threonine, methionine and cystine, respectively.

<sup>c</sup> Different fat sources may contain different ME levels.

<sup>d</sup> Soybeans should be cooked or roasted to a temperature of 240-260°F for 2 1/2 to 3 1/2 minutes to destroy the trypsin inhibitor. The values above are for heat treated soybeans.

**Table 2. Composition of various calcium and phosphorus sources used in swine diets and the comparative biological value of phosphorus.**

Mineral Source	Percent of mineral		Biological value of P <sup>a</sup>
	Calcium	Phosphorus	
Limestone (calcium carbonate)	38	0	—
Limestone (Dolomite)	22	0	—
Dicalcium phosphate	20-24	18.5	100
Monocalcium-dicalcium phosphate	15-18	21	105-110
Defluorinated phosphate	30-36	14-18	95-100
Monosodium phosphate <sup>b</sup>	0	22	
Sodium tripolyphosphate <sup>c</sup>	0	25	95-102
Steamed bone meal	24-28	12	90-100

<sup>a</sup> The value expressed is the relative availability of phosphorus, using dicalcium phosphate as the standard (100).  
<sup>b</sup> This product contains approximately 16% sodium.  
<sup>c</sup> This product contains approximately 31% sodium.

**Table 3. Recommended nutrient allowances for swine<sup>a</sup>.**

Swine Classification	Nutrient						
	CP %	Lys %	Try %	Thr %	Met+Cys %	Ca <sup>b</sup> %	P <sup>b</sup> %
Gestating sow	14	.65	.13	.43	.40	.90	.70
Lactating sow, average producing <sup>c</sup> (8 pigs weaned)	16	.75	.14	.48	.43	.90	.70
Lactating sow high producing <sup>c</sup> (9-11 pigs weaned)	17	.85	.16	.52	.50	.90	.70
Baby Pigs-Early weaned (18-24 days)							
Phase 1-Day 1 to 7 (10 to 14 lb)	19	1.50	.21	.85	.70	.95	.85
Phase 2-Day 8-14 (14 to 20 lb)	18	1.30	.18	.71	.60	.90	.80
Phase 3-Day 15 to 45 lb	17	1.15	.16	.66	.50	.80	.70
Growing-finishing pigs							
High lean gain barrows <sup>d</sup>							
45 to 75 lb	17	.85	.14	.50	.45	.70	.60
75 to 140 lb	16	.80	.13	.45	.40	.65	.55
140 lb to market	14	.65	.11	.43	.38	.60	.50
High lean gain gilts <sup>e</sup>							
45 to 75 lb	18	.95	.15	.60	.50	.75	.65
75 to 140 lb	17	.85	.14	.50	.45	.70	.60
140 lb to market	16	.80	.13	.45	.40	.65	.55
Average barrows <sup>f</sup>							
45 to 75 lb	17	.85	.14	.50	.45	.70	.60
75 to 140 lb	16	.75	.13	.45	.40	.65	.55
140 lb to market	13	.62	.11	.40	.36	.60	.50
Average gilts <sup>g</sup>							
45 to 75 lb	17	.90	.14	.50	.45	.70	.60
75 to 140 lb	16	.80	.13	.45	.40	.65	.55
140 lb to market	14	.65	.11	.43	.38	.60	.50

<sup>a</sup> Nutrient allowances are based on a grain-soybean meal mixture. If the diet includes feedstuffs where nutrient availability is low or if dietary fat is added, the allowance will need to be adjusted.  
<sup>b</sup> Replacement gilts should receive an additional .10% Ca and P from 45 lb to breeding.  
<sup>c</sup> Assumes a daily feed intake of 12.0 lb. If daily feed intake is above or below this value, the diet should be adjusted accordingly.  
<sup>d</sup> Assumes less than 1.1 inch (10th rib) backfat thickness at 230 lb and a lean gain/day of > .75 lb.  
<sup>e</sup> Assumes less than 1.0 inch (10th rib) backfat thickness at 230 lb and a lean gain/day of > .75 lb.  
<sup>f</sup> Assumes greater than 1.1 inch (10th rib) backfat thickness at 230 lb and a lean gain/day of .6 to .75 lb.  
<sup>g</sup> Assumes greater than 1.0 inch (10th rib) backfat thickness at 230 lb and a lean gain/day of .6 to .75 lb.

**Table 4. Suggested gestation and pre-farrowing diets for gilts and sows.**

Ingredient	Gestation (breeding to farrow)								Pre-farrow <sup>a</sup>	
	1	2	3	4	5	6	7	8	1	2
	<b>Pounds</b>									
Corn	1607	1631	1642	1559	—	—	1024	802	1182	1275
Barley	—	—	—	—	—	1670	—	—	—	—
Wheat, hard red winter	—	—	—	—	—	—	—	802	—	—
Wheat, soft winter	—	—	—	—	—	—	600	—	—	—
Sorghum	—	—	—	—	1596	—	—	—	—	—
Soybean meal, 44%	315	—	213	305	327	195	300	261	440	147
Soybean meal, 48%	—	290	—	—	—	—	—	—	—	—
Soybeans, full fat	—	—	—	—	—	—	—	—	—	400
Meat & bone meal, 50%	—	—	100	—	—	—	—	—	—	—
Alfalfa meal, dehy, 17%	—	—	—	60	—	—	—	60	—	—
Wheat middlings	—	—	—	—	—	—	—	—	200	100
Fat	—	—	—	—	—	60	—	—	100	—
Calcium carbonate	19	20	8	17	20	21	20	17	21	21
Dicalcium phosphate	44	44	22	44	42	39	41	43	42	42
Salt	10	10	10	10	10	10	10	10	10	10
Vitamin-trace mineral mix <sup>b</sup>	5	5	5	5	5	5	5	5	5	5
Antibiotic <sup>c</sup>	+	+	+	+	+	+	+	+	+	+
Total, lb	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis										
Protein, %	13.76	13.89	14.16	13.85	14.30	14.73	14.37	14.55	16.30	16.79
Lysine, %	.65	.65	.65	.65	.65	.65	.65	.65	.85	.85
Tryptophan, %	.17	.17	.15	.18	.17	.21	.18	.20	.21	.22
Threonine, %	.52	.54	.52	.53	.49	.50	.51	.52	.62	.64
Methionine + cystine, %	.51	.53	.51	.51	.42	.42	.49	.53	.54	.56
Calcium, %	.91	.91	.91	.91	.91	.90	.90	.91	.95	.95
Phosphorus, %	.70	.71	.70	.70	.70	.70	.70	.70	.75	.75
M.E., kcal/lb	1475	1486	1479	1454	1419	1439	1462	1426	1550	1490

<sup>a</sup> Diets can be fed from approximately day 100 of pregnancy to farrowing to provide extra fiber and fat.

<sup>b</sup> See Table 18.

<sup>c</sup> Antibiotics may be added to control disease occurrence and maintain performance.

**Table 5. Suggested lactation diets for sows weaning 8 pigs or less.**

Ingredient	1	2	3	4	5	6	7	8 <sup>a</sup>	9 <sup>a</sup>
		<b>Pounds</b>							
Corn	1532	1562	1642	1146	—	—	766	1365	1380
Barley	—	—	—	—	—	1565	—	—	—
Wheat, hard red winter	—	—	—	—	—	—	760	—	—
Wheat, soft winter	—	—	—	400	—	—	—	—	—
Sorghum	—	—	—	—	1521	—	—	—	—
Soybean meal, 44%	392	—	275	379	404	281	340	453	140
Soybean meal, 48%	—	360	—	—	—	—	—	—	—
Soybeans, full fat	—	—	—	—	—	—	—	—	400
Alfalfa meal, dehy, 17%	—	—	—	—	—	—	60	—	—
Lysine	—	—	4	—	—	—	—	—	—
Fat	—	—	—	—	—	80	—	100	—
Calcium carbonate	19	21	19	20	20	21	18	19	20
Dicalcium phosphate	42	42	45	40	40	38	41	48	45
Salt	10	10	10	10	10	10	10	10	10
Vitamin-trace mineral mix <sup>b</sup>	5	5	5	5	5	5	5	5	5
Antibiotic <sup>c</sup>	+	+	+	+	+	+	+	+	+
Total, lb	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis									
Protein, %	15.14	15.28	13.03	15.49	15.66	15.96	15.88	15.77	16.29
Lysine, %	.75	.75	.75	.75	.75	.75	.75	.82	.82
Tryptophan, %	.19	.19	.16	.19	.20	.23	.22	.20	.21
Threonine, %	.58	.59	.50	.57	.55	.55	.57	.60	.62
Methionine + cystine, %	.54	.57	.49	.52	.46	.46	.56	.54	.56
Calcium, %	.90	.91	.91	.90	.90	.90	.91	.95	.96
Phosphorus, %	.70	.70	.70	.70	.70	.70	.70	.75	.75
M.E., kcal/lb	1473	1486	1473	1464	1420	1463	1425	1567	1499

<sup>a</sup> Because of added energy, these diets are calculated to contain higher levels of lysine, calcium and phosphorus.

<sup>b</sup> See Table 18.

<sup>c</sup> Antibiotics may be added to prevent disease occurrence.

**Table 6. Suggested lactation diets for sows weaning 9 to 11 pigs per litter<sup>a</sup>.**

Ingredient	Diets								
	1	2	3	4	5	6	7	8 <sup>b</sup>	9 <sup>b</sup>
	<b>Pounds</b>								
Corn	1460	1494	1569	1069	—	—	726	1304	1294
Barley	—	—	—	—	1516	—	—	—	—
Wheat, hard red winter	—	—	—	—	—	—	726	—	—
Wheat, soft winter	—	—	—	400	—	—	—	—	—
Sorghum	—	—	—	—	—	1448	—	—	—
Soybean meal, 44%	465	—	350	457	—	478	415	217	525
Soybean meal, 48%	—	430	—	—	330	—	—	—	—
Soybeans, full fat	—	—	—	—	—	—	—	400	—
Alfalfa meal, dehy, 17%	—	—	—	—	—	—	60	—	—
Lysine	—	—	4	—	—	—	—	—	—
Fat	—	—	—	—	80	—	—	—	100
Calcium carbonate	19	21	19	20	23	20	18	20	19
Dicalcium phosphate	41	40	43	39	36	39	40	44	47
Salt	10	10	10	10	10	10	10	10	10
Vitamin-trace mineral mix <sup>b</sup>	5	5	5	5	5	5	5	5	5
Antibiotic <sup>c</sup>	+	+	+	+	+	+	+	+	+
Total, lb	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis									
Protein, %	16.44	16.67	14.37	16.88	17.40	16.96	17.15	17.66	17.05
Lysine, %	.85	.85	.85	.85	.85	.85	.85	.92	.92
Tryptophan, %	.21	.20	.18	.22	.24	.22	.24	.23	.22
Threonine, %	.63	.65	.55	.62	.62	.60	.62	.68	.65
Methionine + cystine, %	.57	.60	.52	.55	.51	.49	.59	.59	.57
Calcium, %	.90	.90	.90	.90	.90	.90	.91	.96	.97
Phosphorus, %	.70	.70	.70	.70	.70	.70	.70	.75	.75
M.E., kcal/lb	1470	1487	1471	1462	1476	1420	1424	1497	1565

<sup>a</sup> These diets should be adequate for mature boars if fed at a rate of 5 to 6.5 lb per day.  
<sup>b</sup> See Table 18.  
<sup>c</sup> Antibiotics may be added to prevent disease occurrence.

**Table 7. Suggested segregated early weaning (SEW) diets for pigs weighing 10 lb or less.<sup>a</sup>**

Ingredients	Diets	
	1	2
Corn, yellow	704	601
Soybean oil	100	100
Soybean meal, 44%	200	205
Fish meal, menhaden select grade	100	80
Lactose, edible grade	—	100
Dried skim milk, food grade	200	200
Dried whey, edible grade	500	500
Spray dried blood meal	—	25
Spray dried plasma protein	150	140
Lysine, 78% L-lysine	4	3
DL-Methionine	1	1
Dicalcium phosphate	30	34
Copper sulfate	1	1
Salt	5	5
Vitamin-trace mineral mix <sup>b</sup>	5	5
Antibiotic <sup>c</sup>	+	+
Total, lb	2000	2000, lb
Calculated analysis, %		
Protein, %	22.23	22.13
Lysine, %	1.70	1.70
Tryptophan, %	.31	.32
Threonine, %	1.07	1.07
Methionine + cystine, %	.89	.86
Calcium, %	.98	.97
Phosphorus, %	.85	.85
M.E., kcal/lb	1571	1564

<sup>a</sup> Diets should be pelleted.  
<sup>b</sup> See Table 18.  
<sup>c</sup> Use antibiotic of choice.

**Table 8. Suggested three phase starter diets for early weaned pigs (18-24 days).<sup>a</sup>**

Ingredient	Phase I (10-14 lb)			Phase II (14-20 lb)			Phase III (20-45 lb)					
	1	2	3	1	2	3	1	2	3	4	5	6
Corn, yellow	585	771	715	1034	1152	765	978	933	1152	1112	1296	1256
Oat groats	200	—	200	—	—	300	200	200	—	—	—	—
Soybean oil	80	80	80	40	40	40	—	—	—	—	—	—
Fat (choice white grease)	—	—	—	—	—	—	—	40	—	40	—	40
Soybean meal, 44%	130	130	135	335	165	305	560	565	585	585	635	635
Fish meal, menhaden select grade	90	100	120	150	150	150	—	—	—	—	—	—
Latose	200	200	—	—	—	—	—	—	—	—	—	—
Dried skim milk, food grade	100	105	145	—	—	—	—	—	—	—	—	—
Dried whey, edible grade	400	400	500	400	400	400	200	200	200	200	—	—
Spray dried blood meal	40	40	60	—	50	—	—	—	—	—	—	—
Spray dried plasma protein	120	120	—	—	—	—	—	—	—	—	—	—
Lysine, 78% L-lysine	3	3	5	4	4	4	2	2	2	2	2	2
DL-Methionine	—	—	1	—	—	—	—	—	—	—	—	—
Calcium carbonate	—	—	—	1	—	3	14	13	13	13	14	14
Dicalcium phosphate	40	39	27	24	27	21	32	33	34	34	39	39
Copper sulfate	2	2	2	2	2	2	2	2	2	2	2	2
Salt	5	5	5	5	5	5	7	7	7	7	7	7
Vitamin-trace mineral mix <sup>d</sup>	5	5	5	5	5	5	5	5	5	5	5	5
Antibiotic <sup>c</sup>	+	+	+	+	+	+	+	+	+	+	+	+
Total, lb	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis, %												
Protein, %	19.92	19.52	19.64	18.94	17.95	19.51	19.36	19.28	19.07	18.90	19.48	19.31
Lysine, %	1.50	1.50	1.50	1.30	1.30	1.30	1.15	1.15	1.15	1.15	1.15	1.15
Tryptophan, %	.28	.28	.26	.23	.23	.24	.26	.25	.25	.25	.26	.26
Threonine, %	.93	.93	.87	.80	.78	.80	.76	.75	.76	.76	.75	.74
Methionine + cystine, %	.71	.72	.73	.68	.65	.67	.62	.61	.62	.62	.63	.63
Calcium, %	.96	.97	.96	.90	.90	.91	.80	.80	.81	.80	.80	.80
Phosphorus, %	.86	.85	.85	.81	.81	.80	.70	.70	.70	.70	.71	.71
M.E., kcal/lb	1542	1543	1546	1511	1508	1513	1462	1502	1460	1501	1467	1508

<sup>a</sup> It is recommended that Phase I diets be pelleted.

<sup>b</sup> See Table 18.

<sup>c</sup> Use antibiotic of choice.

**Table 9. Suggested high nutrient density diets for growing swine using corn as the major grain source (suggested for average and high lean gain barrows 45 to 75 lb. and high lean gain gilts 75 to 140 lb.).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Corn, yellow	1454	1503	1307	1329	1365	1083	1182	1583	1417	1500	1476	1526
Wheat middlings	—	—	—	—	—	400	400	—	—	—	—	—
Soybean meal, 44%	492	—	—	516	—	418	—	—	—	392	—	—
Soybean meal, 48%	—	442	—	—	478	—	367	357	424	—	352	376
Soybean, full-fat (cooked)	—	—	640	—	—	—	—	—	—	—	—	—
Meat and bone meal, 50%	—	—	—	—	—	—	—	—	—	80	—	—
Canola meal	—	—	—	—	—	—	—	—	—	—	120	—
Tankage, 60%	—	—	—	—	—	—	—	—	—	—	—	50
Fat	—	—	—	100	100	50	—	—	100	—	—	—
Lysine, 78% L-lysine	—	—	—	—	—	—	—	3	2	—	—	—
Calcium carbonate	15	16	16	15	17	20	22	16	16	6	17	13
Dicalcium phosphate	29	29	27	30	30	19	19	31	31	12	25	25
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	17.00	17.00	17.30	17.00	17.28	17.00	17.03	15.30	16.21	17.00	17.00	17.00
Lysine, %	.89	.87	.88	.91	.91	.87	.85	.86	.91	.86	.86	.86
Tryptophan, %	.22	.21	.23	.22	.21	.22	.21	.19	.20	.20	.21	.20
Threonine, %	.65	.66	.66	.65	.67	.64	.65	.59	.63	.64	.67	.66
Methionine + cystine, %	.58	.61	.58	.57	.61	.55	.58	.57	.58	.58	.64	.60
Calcium, %	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70
Phosphorus, %	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
Metabolizable energy, kcal/lb	1486	1504	1537	1586	1605	1501	1466	1501	1603	1490	1486	1496

\* See table 18.

**Table 10. Suggested moderate nutrient density diets for growing swine using corn as the major grain source (suggested for average and high lean gain barrows 75 to 140 lb., average gilts 75 to 140 lb., and high lean gain gilts 140 lb. to market).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Corn, yellow	1514	1558	1367	1412	1447	1140	1222	1632	1511	1550	1520	1580
Wheat middlings	—	—	—	—	—	400	400	—	—	—	—	—
Soybean meal, 44%	435	—	—	457	—	364	—	—	—	346	—	—
Soybean meal, 48%	—	391	—	—	421	—	332	312	353	—	293	318
Soybean, full-fat (cooked)	—	—	583	—	—	—	—	—	—	—	—	—
Meat and bone meal, 50%	—	—	—	—	—	—	—	—	—	80	—	—
Canola meal	—	—	—	—	—	—	—	—	—	—	140	—
Tankage, 60%	—	—	—	—	—	—	—	—	—	—	—	60
Fat	—	—	—	80	80	50	—	—	80	—	—	—
Lysine, 78% L-lysine	—	—	—	—	—	—	—	3	3	—	—	—
Calcium carbonate	16	16	17	15	17	21	22	16	16	6	17	13
Dicalcium phosphate	25	25	23	26	25	15	14	27	27	8	20	19
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	16.00	16.00	16.51	16.05	16.25	16.05	16.35	14.43	14.90	16.20	16.14	16.15
Lysine, %	.81	.80	.82	.83	.83	.80	.80	.80	.85	.80	.80	.80
Tryptophan, %	.21	.20	.21	.21	.20	.20	.20	.17	.18	.19	.19	.19
Threonine, %	.61	.62	.63	.61	.63	.60	.62	.56	.58	.61	.64	.63
Methionine + cystine, %	.56	.59	.57	.55	.59	.52	.56	.55	.55	.56	.63	.58
Calcium, %	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65
Phosphorus, %	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55
Metabolizable energy, kcal/lb	1491	1507	1538	1572	1588	1507	1470	1505	1586	1495	1487	1498

\* See table 18.

**Table 11. Suggested diets for finishing swine using corn as the major grain source (suggested for high lean gain barrows 140 lb. to market and average lean gain gilts 140 lb. to market).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Corn, yellow	1631	1663	1582	1401	1474	1267	1330	1714	1657	1659	1609	1687
Wheat middlings						400	400					
Soybean meal, 44%	321		331	312		250				253	188	
Soybean meal, 48%		289			278		227	235	252			214
Meat and bone meal, 50%										60		
Canola meal											160	
Oats				200	200							
Tankage, 60%												60
Fat			40	40		40			40			
Lysine, 78% L-lysine								2	2			
Calcium carbonate	16	16	15	16	17	21	22	16	16	9	17	13
Dicalcium phosphate	22	22	22	21	21	12	11	23	23	9	16	16
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	14.00	14.00	14.00	14.00	14.11	14.08	14.30	12.92	13.09	14.12	14.02	14.10
Lysine, %	.66	.65	.67	.66	.65	.65	.65	.65	.67	.65	.65	.65
Tryptophan, %	.17	.17	.18	.18	.17	.17	.17	.15	.16	.16	.14	.16
Threonine, %	.53	.54	.53	.53	.54	.52	.54	.50	.50	.53	.55	.55
Methionine + cystine, %	.52	.54	.51	.50	.53	.48	.51	.51	.51	.52	.57	.53
Calcium, %	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
Phosphorus, %	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50
Metabolizable energy, kcal/lb	1499	1511	1539	1509	1480	1505	1473	1509	1549	1502	1480	1501

\* See table 18.

**Table 12. Suggested high nutrient density diets for growing swine using sorghum grain and(or) barley as major grain sources (suggested for average and high lean gain barrows 45 to 75 lb. and high lean gain gilts 75 to 140 lb.).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Sorghum grain	1472	1506	1321	1340	1384			784	709			
Barley						1632	1486	783	709	786	705	1488
Corn, yellow										786	705	
Soybean meal, 44%	475			506			361		428		436	
Soybean meal, 48%		439			460	315		379		374		261
Soybeans, full-fat (cooked)			626									
Canola meal												100
Fat				100	100		100		100		100	100
Calcium carbonate	16	17	17	15	17	19	17	18	16	17	16	19
Dicalcium phosphate	27	28	26	29	29	24	26	26	28	27	28	22
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	17.00	17.23	17.37	17.10	17.20	17.76	17.23	17.48	17.00	17.22	17.00	17.47
Lysine, %	.85	.85	.85	.88	.87	.85	.85	.85	.87	.85	.87	.85
Tryptophan, %	.22	.21	.22	.22	.21	.25	.25	.22	.23	.22	.23	.24
Threonine, %	.60	.62	.62	.61	.62	.63	.60	.62	.60	.64	.62	.63
Methionine + cystine, %	.49	.53	.51	.49	.53	.54	.50	.53	.50	.57	.54	.55
Calcium, %	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70
Phosphorus, %	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
Metabolizable energy, kcal/lb	1436	1452	1491	1540	1560	1405	1502	1429	1521	1456	1546	1500

\* See table 18.

**Table 13. Suggested moderate nutrient density diets for growing swine using sorghum grain and(or) barley as major grain sources (suggested for average and high lean gain barrows 75 to 140 lb., average gilts 75 to 140 lb., and high lean gain gilts 140 lb. to market).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Sorghum grain	1514	1546	1375	1419	1444	—	—	805	733	—	—	—
Barley	—	—	—	—	—	1675	1532	804	732	806	743	1525
Corn, yellow	—	—	—	—	—	—	—	—	—	807	743	—
Soybean meal, 44%	437	—	—	451	—	—	319	—	385	—	385	—
Soybean meal, 48%	—	404	—	—	424	277	—	342	—	337	—	209
Soybeans, full-fat (cooked)	—	—	577	—	—	—	—	—	—	—	—	—
Canola meal	—	—	—	—	—	—	—	—	—	—	—	120
Fat	—	—	—	80	80	—	100	—	100	—	80	100
Calcium carbonate	17	17	17	16	18	19	18	18	17	18	16	19
Dicalcium phosphate	22	23	21	24	24	19	21	21	23	22	23	17
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	16.35	16.57	16.70	16.24	16.60	17.11	16.60	16.83	16.31	16.56	16.26	16.83
Lysine, %	.80	.80	.80	.81	.82	.80	.80	.80	.80	.80	.81	.80
Tryptophan, %	.21	.20	.21	.21	.20	.24	.24	.21	.22	.21	.22	.23
Threonine, %	.58	.59	.60	.57	.60	.60	.58	.59	.57	.61	.59	.60
Methionine + cystine, %	.48	.51	.49	.47	.51	.52	.48	.51	.47	.55	.52	.54
Calcium, %	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65
Phosphorus, %	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55
Metabolizable energy, kcal/lb	1439	1454	1490	1523	1538	1406	1504	1430	1524	1458	1529	1499

\* See table 18.

**Table 14. Suggested diets for finishing swine using sorghum grain and(or) barley as major grain sources (suggested for high lean gain barrows 140 lb. to market and average lean gain gilts 140 lb. to market).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Sorghum grain	1629	1653	1526	1575	1609	—	—	860	816	—	—	—
Barley	—	—	—	—	—	1791	1705	859	815	862	818	1641
Corn, yellow	—	—	—	—	—	—	—	—	—	862	819	—
Soybean meal, 44%	325	—	—	329	—	—	190	—	263	—	256	—
Soybean meal, 48%	—	300	—	—	303	164	—	235	—	229	—	97
Soybeans, full-fat (cooked)	—	—	429	—	—	—	—	—	—	—	—	—
Canola meal	—	—	—	—	—	—	—	—	—	—	—	120
Fat	—	—	—	50	40	—	60	—	60	—	60	100
Calcium carbonate	17	17	17	16	18	19	18	18	17	18	17	19
Dicalcium phosphate	19	20	18	20	20	16	17	18	19	19	20	13
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	14.39	14.56	14.65	14.24	14.44	15.13	14.83	14.83	14.51	14.54	14.24	14.86
Lysine, %	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65
Tryptophan, %	.18	.17	.18	.17	.17	.21	.21	.23	.19	.19	.19	.21
Threonine, %	.50	.51	.51	.49	.51	.51	.50	.51	.50	.53	.51	.52
Methionine + cystine, %	.43	.45	.44	.42	.45	.46	.44	.46	.43	.50	.47	.48
Calcium, %	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
Phosphorus, %	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50
Metabolizable energy, kcal/lb	1443	1454	1480	1495	1495	1402	1461	1428	1484	1458	1512	1495

\* See table 18.

**Table 15. Suggested high nutrient density diets for growing swine using various grains blended with wheat as the major grain source (suggested for average and high lean gain barrows 45 to 75 lb. and high lean gain gilts 75 to 140 lb.).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Wheat, hard winter	760	778	691	695	775	687	698	—	—	—	—	—
Wheat, soft winter	—	—	—	—	—	—	—	750	767	683	735	765
Corn, yellow	761	778	691	696	—	—	—	750	767	684	—	—
Sorghum grain	—	—	—	—	775	688	699	—	—	—	—	765
Barley	—	—	—	—	—	—	—	—	—	—	735	—
Soybean meal, 44%	424	—	—	455	—	—	449	447	—	480	—	—
Soybean meal, 48%	—	390	—	—	396	—	—	—	412	—	377	417
Soybeans, full-fat (cooked)	—	—	565	—	—	572	—	—	—	—	—	—
Fat	—	—	—	100	—	—	100	—	—	100	100	—
Calcium carbonate	16	16	16	15	17	17	15	17	18	16	19	18
Dicalcium phosphate	29	28	27	29	27	26	29	26	26	27	24	25
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	17.19	17.42	17.52	17.20	17.68	17.75	17.24	17.29	17.52	17.35	17.83	17.78
Lysine, %	.85	.85	.85	.87	.85	.85	.86	.85	.85	.88	.86	.85
Tryptophan, %	.23	.23	.24	.23	.23	.24	.23	.22	.21	.22	.23	.21
Threonine, %	.62	.64	.64	.63	.62	.63	.61	.62	.64	.63	.62	.62
Methionine + cystine, %	.59	.63	.60	.58	.59	.56	.54	.54	.58	.54	.54	.54
Calcium, %	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70
Phosphorus, %	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
Metabolizable energy, kcal/lb	1461	1476	1509	1563	1449	1485	1539	1470	1486	1572	1543	1460

\* See table 18.

**Table 16. Suggested moderate nutrient density diets for growing swine using various grains blended with wheat as the major grain source (suggested for average and high lean gain barrows 75 to 140 lb., average gilts 75 to 140 lb., and high lean gain gilts 140 lb. to market).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Wheat, hard winter	783	850	719	730	847	754	731	—	—	—	—	—
Wheat, soft winter	—	—	—	—	—	—	—	772	839	719	811	836
Corn, yellow	783	850	719	730	—	—	—	772	839	720	—	—
Sorghum grain	—	—	—	—	848	755	732	—	—	—	—	837
Barley	—	—	—	—	—	—	—	—	—	—	811	—
Soybean meal, 44%	384	—	—	409	—	—	407	408	—	432	—	—
Soybean meal, 48%	—	244	—	—	249	—	—	—	267	—	245	273
Soybeans, full-fat (cooked)	—	—	513	—	—	440	—	—	—	—	—	—
Fat	—	—	—	80	—	—	80	—	—	80	80	—
Lysine, 78% L-lysine	—	4	—	—	4	2	—	—	4	—	3	4
Calcium carbonate	16	16	17	16	17	17	16	17	18	17	19	18
Dicalcium phosphate	24	26	22	25	25	22	24	21	23	22	21	22
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	16.56	14.65	16.86	16.57	14.93	16.04	16.68	16.66	14.76	16.66	15.58	15.04
Lysine, %	.80	.80	.80	.82	.80	.80	.81	.80	.80	.82	.80	.80
Tryptophan, %	.22	.19	.23	.22	.19	.21	.22	.21	.17	.21	.20	.18
Threonine, %	.60	.53	.61	.60	.51	.55	.58	.59	.52	.60	.52	.51
Methionine + cystine, %	.58	.55	.58	.57	.51	.52	.53	.53	.50	.52	.47	.46
Calcium, %	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65
Phosphorus, %	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55
Metabolizable energy, kcal/lb	1465	1473	1509	1547	1444	1476	1522	1475	1485	1556	1518	1456

\* See table 18.

**Table 17. Suggested diets for finishing swine using wheat or various grains blended with wheat as the major grain source (suggested for high lean gain barrows 140 lb. to market and average lean gain gilts 140 lb. to market).**

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Wheat, hard winter	1822	1832	1688	—	—	—	843	876	878	—	—	1693
Wheat, soft winter	—	—	—	1769	1783	1638	—	—	—	830	865	—
Corn, yellow	—	—	—	—	—	—	843	—	—	830	—	—
Sorghum grain	—	—	—	—	—	—	—	877	—	—	865	—
Barley	—	—	—	—	—	—	—	—	878	—	—	—
Canola meal	—	—	—	—	—	—	—	—	—	—	—	160
Soybean meal, 44%	129	—	227	184	—	279	268	—	—	294	—	—
Soybean meal, 48%	—	118	—	—	170	—	—	198	136	—	222	42
Fat	—	—	40	—	—	40	—	—	60	—	—	60
Lysine, 78% L-lysine	3	3	—	3	3	—	—	2	2	—	2	2
Calcium carbonate	16	17	16	19	20	19	17	17	17	18	19	18
Dicalcium phosphate	20	20	19	15	14	14	19	20	19	18	17	15
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Trace mineral-vitamin mix*	3	3	3	3	3	3	3	3	3	3	3	3
Totals	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Calculated analysis												
Protein, %	13.94	14.01	15.29	14.13	14.24	15.47	14.62	14.00	14.10	14.72	14.11	14.38
Lysine, %	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65
Tryptophan, %	.20	.19	.21	.16	.16	.19	.19	.18	.19	.18	.16	.19
Threonine, %	.45	.45	.51	.44	.45	.50	.52	.47	.48	.52	.47	.49
Methionine + cystine, %	.53	.54	.56	.42	.43	.45	.54	.49	.48	.48	.43	.59
Calcium, %	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
Phosphorus, %	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50
Metabolizable energy, kcal/lb	1430	1442	1482	1461	1467	1504	1471	1447	1485	1481	1459	1485

\* See table 18.

**Table 18. Suggested vitamin-trace mineral mix.<sup>1</sup>**

Nutrient	Amount per <sup>2</sup> pound of premix	Suggested source
Vitamin A	2,000,000 IU	Vitamin A palmitate-gelatin coated
Vitamin D	200,000 IU	Vitamin D <sub>3</sub> - stabilized
Vitamin E	10,000 IU	dl-tocopheryl acetate
Vitamin K (Menadione Equivalent)	800 mgs	Menadione sodium bisulfite
Riboflavin	1,200 mgs	Riboflavin
Pantothenic acid	4,500 mgs	Calcium pantothenate
Niacin	9,000 mgs	Nicotinamide
Choline chloride	20,000 mgs	Choline chloride (60%)
Vitamin B12	5 mgs	Vitamin B12 in mannitol, (.1%)
Folic acid	300 mgs	Folic acid
Biotin	40 mgs	D-Biotin
Copper	.4 %	CuSO <sub>4</sub> ·5H <sub>2</sub> O
Iodine	.008 %	KIO <sub>3</sub>
Iron	4.0 %	FeSO <sub>4</sub> ·2H <sub>2</sub> O
Manganese	.8 %	MnSO <sub>4</sub> ·H <sub>2</sub> O
Zinc	4.0 %	ZnO (80% Zn)
Selenium	.012 %	NaSeO <sub>3</sub> or NaSeO <sub>4</sub>

<sup>1</sup> 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 30 days. Vitamins may lose their potency in the presence of trace minerals.

<sup>2</sup> 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.

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