



# pork industry handbook

COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

## Swine Diets

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A dependable and economic source of feed is the backbone of a profitable swine operation. Since 55 to 70% of the total cost of swine production is feed, 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 3.3 lb. or less of feed per pound of gain from 40 lb. to market. To obtain maximum feed utilization, it is necessary to feed well-balanced diets designed for specific purposes.

### 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 it is known that the nutrient content of a particular feedstuff differs considerably from that shown in Table 1, adjustments should be made in the suggested diets, supplements and base mixes in Tables 3 through 20.

There are limits on the amounts of individual feedstuffs that should be included in swine diets. PIH-3 *Energy for Swine* lists suggestions on the recommended maximum amounts of various feedstuffs for different classes of swine. Pork producers are also cautioned to use only good quality feedstuffs, free of molds, foreign materials etc. Animal performance may depend on the quality of the feedstuff.

Dicalcium phosphate was used in all the diets as the major source of Ca and P. Other calcium and phosphorus sources (Table 2) may be substituted for dicalcium phosphate. 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 phosphorus may differ from dicalcium phosphate.

### Sow Diets

The diets shown in Tables 3 and 4 are designed for both bred and lactating sows. For the diets in Table 3, yellow corn is the primary grain source; for those in Table 4, sorghum grain, barley, or wheat is the primary grain source.

For bred sows, it is suggested that diets be fed at a daily level of 4 to 5 lb. per head. The exact level of feed during gestation depends on weight, age, condition of the sow, method of housing, age of pigs to be weaned, and climatic conditions or environmental temperature. Sows should gain between 50 to 75 lb. with gilts gaining 70 to 100 lb. during gestation. For bred animals on good quality legume pasture (i.e. alfalfa or ladino), 2 to 3 lb. per head per day of one of the gestation diets presented in Tables 3 or 4 may suffice.

During lactation, diets may be limit-fed during the first few days following farrowing. Increase the daily feed gradually to full-feed or slightly less by 5 to 7 days after farrowing. If you feed one of the suggested diets that does not contain much bulk (i.e. fiber), such as diets 1,2,6, and 7 (Table 3), constipation may be a problem around farrowing time. If constipation is a problem, substitute approximately 20% wheat bran or 10% dehydrated alfalfa meal and continue up to 1 week following farrowing. Some producers avoid this problem by adding 20 lb. of magnesium sulfate (Epsom salts) or 15 lb. of potassium chloride per ton of diet.

### Baby Pig Diets

Baby pig diets in Table 5 may be used as either creep or starter diets. Diets 1 through 6 are formulated for pigs weighing 10 to 25 lb., while diets 7 through 12 are formulated for pigs weighing 25 to 40 lb. Diet 7 is commonly called a simplified starter since it is formulated around a corn-soybean meal base. Pigs may not perform quite as well on this diet as compared with performance on the more complex ones also shown in Table 5. However, the simplified diet may be more economical since it is cheaper to mix and ingredient inventory requirements are less.

When postweaning scours are a problem, the substitution of 200 to 400 lb. of ground oats for corn or sorghum grain in diets 7, 8, 9, 10, and 12 (Table 5) for the first 2 or 3 weeks after weaning may be helpful.

## Growing Diets

The diets in Tables 6, 7, and 8 are designed for pigs weighing between 40 and 125 lb. Yellow corn is the primary energy source for the diets in Table 6; whereas sorghum grain and barley are the primary energy sources in Table 7. Table 8 contains various grains blended with wheat as the primary energy sources. Several diets in these tables contain fat or full-fat cooked soybeans. Since the metabolizable energy content is considerably higher in these diets, the protein, lysine, calcium, and phosphorus content is also increased to provide a nutrient : calorie ratio similar to the other diets.

Pigs may not gain as efficiently on barley diets as on corn diets because of the lower energy and higher fiber content of barley. Lightweight barley (less than 46 lb./bu.) contains more fiber which may result in reducing energy consumption and rate of gain. Pelleting of barley improves feed conversion regardless of bushel weight. If bushel weight is greater than 46 lb., performance of a pelleted barley diet should equal that of a ground corn diet. Economics usually favor pelleting barley diets. Pigs may also gain slightly less efficiently on sorghum grain diets as compared to corn diets.

Dietary nutrient levels shown in the recommended growing and finishing diets may need adjustment in the future if repartitioning agents such as porcine somatotropin or ractopamine are approved for use.

## Finishing Diets

Diets shown in Tables 9, 10, and 11 are formulated for pigs weighing from 125 lb. to market weight and destined for slaughter. Replacement gilts for the breeding herd should be separated from the market pigs when weighing 150 to 200 lb. and fed a sow diet presented in Tables 3 or 4. For diets shown in Table 9, yellow corn is the primary grain source. As shown in Table 10, barley or sorghum grain is the primary energy source. Table 11 shows diets containing wheat or various grains blended with wheat as the major grain source. The comments previously made about barley and sorghum grain for growing swine also apply to finishing swine.

## Supplements

Some pork producers prefer to mix a supplement or have it custom-mixed at a commercial feed mill and then later mix it with grain. Suggested supplements for market hogs are shown in Table 12. It is impossible to formulate supplements with a fixed level of calcium and phosphorus to use for all classes of hogs if we want a balanced and economical diet at each stage of production.

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

Nutrients <sup>2</sup>	CF	ME	Ca	P	CP	Lys	Try	Thr	Met+Cys
Ingredient	%	kcal./lb.	Percent						
Alfalfa hay, suncured	29.0	800	1.20	0.20	14.0	0.55	0.25	0.50	.35
Alfalfa meal, dehydrated, 17%	24.0	775	1.40	0.23	17.0	0.80	0.34	0.70	.56
Barley	6.0	1380	0.05	0.34	11.5	0.40	0.15	0.36	.37
Blood meal, flash dried	1.0	1200	0.40	0.30	86.0	7.00	1.00	3.60	2.00
Canola meal	11.4	1200	0.68	1.17	38.0	2.30	0.44	1.68	1.66
Corn, yellow	2.5	1550	0.02	0.25	8.5	0.24	0.09	0.32	.40
Fat <sup>3</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	.37
Oat groats	2.5	1550	0.07	0.40	15.8	0.50	0.18	0.44	.41
Sorghum, grain	2.2	1480	0.02	0.27	8.9	0.22	0.09	0.27	.29
Soybeans, full-fat (cooked) <sup>4</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
Sugar	-	1383	-	-	-	-	-	-	-
Sunflower meal (solvent, dehulled)	11.7	1195	0.42	0.94	45.0	1.68	0.60	1.63	1.55
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	.50
Wheat, soft winter	2.3	1500	0.05	0.35	11.4	0.30	0.12	0.32	.35
Wheat, hard red spring	2.4	1515	0.04	0.39	13.5	0.34	0.18	0.37	.45
Wheat, durum	2.5	1505	0.10	0.40	12.7	0.39	0.16	0.43	.45
Wheat bran	11.0	980	0.13	1.15	15.0	0.56	0.25	0.41	.43
Wheat middlings	7.5	1340	0.13	0.80	16.0	0.68	0.19	0.54	.41
Whey, dried	-	1405	0.85	0.70	13.0	0.90	0.17	0.80	.49

<sup>1</sup>All values are on a 90% dry matter basis.

<sup>2</sup>Nutrient abbreviations are for crude fiber, metabolizable energy, calcium, phosphorus, crude protein, lysine, tryptophan, threonine, methionine and cystine, respectively.

<sup>3</sup>Different sources may contain different ME values.

<sup>4</sup>Soybeans should be cooked or roasted to a temperature of 240-260°F to destroy the trypsin inhibitor. The values above are for heat treated soybeans.

Tables 13 and 14 have diets using the supplements from Table 12. The diets in Table 13 are for growing pigs (40 to 125 lb.). The calcium levels are slightly higher than needed for growing pigs; however, it is necessary to have the higher calcium level when the same supplement (using a smaller amount) is used to meet the calcium needs of finishing pigs in Table 14. The finishing diets in Table 14 are designed for pigs weighing 125 lb. to market weight.

Suggested supplements for sows are shown in Table 15. Table 16 contains sow diets using the supplements from Table 15.

### Base Mixes

Another popular method of preparing swine diets is to purchase or prepare on the farm a base mix (complete swine premix). The base mix is then blended with ground grain and soybean meal to make a complete diet. Suggested base mixes are shown in Table 17. Base mixes 1 and 2 are for growing and finishing swine while base mixes 3 and 4 are for sow diets during gestation and lactation. Base mixes 1 and 3 are formulated to be added at the rate of 60 and 80 lb. respectively; whereas, base mixes 2 and 4 are designed for adding at the rate of 100 lb. per ton of complete feed.

Formulas in Tables 18 and 19 are diets using base mixes from Table 17. Those in Tables 18 and 19 show suggested growing, finishing, and sow diets using corn as the grain source while in Table 19 sorghum grain is the primary grain source.

These suggested diets do not contain much fiber, therefore, if constipation is a problem, follow the recommendations given in the section titled "Sow Diets."

### Vitamin and Trace Mineral Premix

The levels of vitamins and trace minerals in the diets, supplements, and base mixes are based on the composition of the premix in Table 20. Be sure to check the composition of the premix use and the manufacturers' recommendations and adjust the amount in the suggested diets accordingly. Most vitamin-trace mineral premixes are manufactured to add to swine diets at the rate of 2 to 10 lb. per ton of complete feed.

Do not keep more than a three month supply of the vitamin-trace mineral premix. Vitamins may lose their potency, especially in the presence of trace minerals. Be sure to store all premixes in a cool, dry place.

### Antibiotics and Other Feed Additives

Antibiotics and other feed additives have not been included in the diets since the choice of additive varies between farms. The greatest benefits from antibiotics or other feed additives are for the baby pigs and growing pigs. The advantages are less for finishing pigs. In general, antibiotics are not needed in sow diets except perhaps at breeding time and just before and after farrowing. When using feed additives, be sure to follow label guidelines for levels to feed and abide by any withdrawal times on the label. For a more complete discussion on feed additives see PIH-31.

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>1</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 <sup>2</sup>	30-36	14-18	95-100
Monosodium phosphate <sup>2</sup>	0	22	
Sodium tripolyphosphate <sup>3</sup>	0	25	95-102
Steamed bone meal	24-28	12	90-100

<sup>1</sup>The value expressed is the relative availability of phosphorus, using dicalcium phosphate as the standard (100).

<sup>2</sup>This product contains approximately 16% sodium.

<sup>3</sup>This product contains approximately 31% sodium.

Table 3. Suggested sows diets with corn as a major grain source.

Ingredient	Diet number							
	1	2	3	4	5	6	7	8
	pounds							
Corn, yellow	1627	1651	1253	1302	1286	1660	1677	1479
Oats	---	---	400	---	---	---	---	---
Wheat middlings	---	---	---	400	---	---	---	---
Wheat bran	---	---	---	---	400	---	---	---
Soybean meal, 44%	295	---	270	225	245	195	160	250
Soybean meal, 48%	---	270	---	---	---	---	---	---
Meat and bone meal, 50%	---	---	---	---	---	100	---	---
Tankage, 60%	---	---	---	---	---	---	100	---
Dehydrated alfalfa meal, 17%	---	---	---	---	---	---	---	200
Calcium carbonate	19	20	19	25	29	7	13	11
Dicalcium phosphate	44	44	43	33	25	23	35	45
Salt	10	10	10	10	10	10	10	10
Vitamin-trace mineral mix*	5	5	5	5	5	5	5	5
Total	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated Analysis</b>								
Protein, %	13.40	13.50	13.60	13.70	13.90	13.90	13.70	13.50
Lysine, %	.62	.62	.62	.62	.62	.62	.62	.62
Tryptophan, %	.17	.16	.17	.17	.19	.15	.15	.18
Threonine, %	.51	.52	.51	.51	.50	.51	.53	.52
Methionine + cystine, %	.54	.52	.48	.48	.49	.50	.49	.50
Calcium, %	.91	.91	.90	.91	.90	.90	.90	.90
Phosphorus, %	.70	.70	.70	.70	.70	.70	.71	.70
Metabolizable energy, kcal/lb.	1476	1486	1416	1441	1371	1480	1465	1406

\*See Table 20. It is also recommended that during the gestation period, additional choline (550 grams per ton) be added to the diets. This can be provided by adding 2.5 lb. of choline chloride premix containing 50% choline or 2.0 lb. of a chloride premix containing 60% choline.

Table 4. Suggested sow diets with sorghum grain, barley or wheat as the grain source.

Ingredient	Diet number							
	1	2	3	4	5	6	7	8
	pounds							
Sorghum grain	1617	1642	1651	1469	---	---	---	---
Barley	---	---	---	---	1735	1759	---	---
Wheat, hard winter	---	---	---	---	---	---	1724	1565
Soybean meal, 44%	306	---	205	260	190	128	200	165
Soybean meal, 48%	---	280	---	---	---	---	---	---
Meat and bone meal, 50%	---	---	100	---	---	60	---	---
Dehydrated alfalfa meal, 17%	---	---	---	200	---	---	---	200
Calcium carbonate	20	20	9	13	22	16	20	12
Dicalcium carbonate	42	43	20	43	38	22	41	43
Salt	10	10	10	10	10	10	10	10
Vitamin-trace mineral mix*	5	5	5	5	5	5	5	5
Total	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated analyses</b>								
Protein, %	13.90	14.00	14.40	13.90	14.20	14.40	14.90	14.90
Lysine, %	.62	.62	.62	.62	.62	.62	.62	.62
Tryptophan, %	.17	.16	.15	.18	.19	.18	.21	.22
Threonine, %	.48	.49	.48	.49	.47	.44	.49	.50
Methionine + cystine, %	.42	.44	.42	.42	.43	.47	.55	.54
Calcium, %	.90	.90	.91	.91	.91	.90	.90	.90
Phosphorus, %	.70	.71	.70	.70	.70	.70	.70	.71
Metabolizable energy, kcal/lb.	1419	1429	1423	1354	1335	1338	1417	1352

\*See Table 20. It is also recommended that during gestation period, additional choline (550 grams per ton) be added to the diets. This can be provided by adding 2.5 lb of choline chloride premix containing 50% choline or 2.0 lb of a chloride premix containing 60% choline.

Table 5. Suggested baby pig diets.

Ingredient	Diet number											
	Pigs 10-25 lb.						Pigs 25-40 lb.					
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Corn, yellow	990	1060	955	754	776	1211	1396	1255	1344	625	1159	1279
Sorghum grain	----	----	----	----	----	----	----	----	----	625	----	----
Ground oats	----	----	----	----	----	----	----	----	----	----	200	----
Oat groats	----	----	----	200	200	----	----	----	----	----	----	----
Soybean meal, 44%	421	530	590	635	570	390	543	490	545	495	530	410
Fish meal, menhaden	100	----	----	----	----	100	----	----	----	----	----	----
Dried whey	400	----	400	200	400	200	----	200	----	200	----	200
Dried skim milk	----	200	----	----	----	----	----	----	----	----	----	----
Sugar <sup>1</sup>	----	100	----	100	----	----	----	----	----	----	----	----
Fat	50	50	----	50	----	50	----	----	50	----	50	50
Lysine, 78% L-Lysine	----	----	----	----	----	3	----	----	----	----	----	3
Calcium carbonate	7	15	15	16	15	10	15	13	15	13	15	13
Dicalcium phosphate	20	33	28	33	27	24	34	30	34	30	34	33
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Vitamin-trace mineral mix <sup>2</sup>	5	5	5	5	5	5	5	5	5	5	5	5
Total	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated Analyses</b>												
Protein, %	19.10	19.50	19.60	20.10	20.00	18.30	17.90	17.40	17.70	17.60	17.80	15.80
Lysine, %	1.15	1.15	1.15	1.15	1.15	1.15	.95	.95	.95	.95	.95	.95
Tryptophan, %	.24	.26	.26	.27	.27	.21	.23	.23	.23	.23	.23	.20
Threonine, %	.80	.78	.81	.78	.81	.76	.68	.70	.68	.69	.67	.63
Methionine + cystine, %	.66	.64	.64	.62	.63	.64	.60	.59	.59	.56	.58	.55
Calcium, %	.85	.86	.86	.86	.85	.85	.75	.75	.75	.75	.76	.77
Phosphorus, %	.71	.70	.70	.70	.70	.70	.65	.65	.65	.66	.65	.66
Metabolizable energy, kcal./lb.	1516	1529	1451	1502	1453	1500	1478	1470	1525	1449	1495	1520

<sup>1</sup>Dextrose or hydrolyzed corn starch product.

<sup>2</sup>See Table 20.

Table 6. Suggested diets for growing swine (40 to 125 lb.) using corn as the major grain source.

Ingredient	Diet number									
	1	2	3	4	5	6	7	8	9	10
	pounds									
Corn, yellow	1555	1587	1384	1403	1441	1368	1228	1581	1597	1614
Oats	----	----	----	----	----	200	----	----	----	----
Wheat middlings	----	----	----	----	----	----	400	----	----	----
Soybean meal, 44%	395	----	----	443	----	383	327	315	285	332
Soybean meal, 48%	----	361	----	----	404	----	----	----	----	----
Soybean, full-fat (cooked)	----	----	563	----	----	----	----	----	----	----
Meat and bone meal, 50%	----	----	----	----	----	----	----	80	----	----
Tankage, 60%	----	----	----	----	----	----	----	----	80	----
Fat	----	----	----	100	100	----	----	----	----	----
Lysine, 78% L-Lysine	----	----	----	----	----	----	----	----	----	2
Calcium carbonate	15	17	17	15	16	15	21	7	11	15
Dicalcium phosphate	25	25	26	29	29	24	14	7	17	27
Salt	7	7	7	7	7	7	7	7	7	7
Vitamin-trace mineral mix*	3	3	3	3	3	3	3	3	3	3
Total	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated analysis</b>										
Protein, %	15.30	15.40	16.20	15.70	15.80	15.40	15.60	15.60	15.50	14.20
Lysine, %	.75	.75	.80	.80	.80	.75	.75	.75	.75	.75
Tryptophan, %	.20	.19	.21	.20	.19	.20	.20	.18	.19	.18
Threonine, %	.58	.60	.62	.60	.61	.58	.58	.58	.60	.54
Methionine + cystine, %	.54	.57	.56	.54	.57	.54	.52	.55	.54	.52
Calcium, %	.65	.65	.69	.68	.68	.65	.65	.65	.65	.65
Phosphorus, %	.55	.55	.58	.58	.58	.55	.55	.55	.55	.55
Metabolizable energy, kcal./lb.	1494	1506	1534	1589	1606	1464	1461	1497	1485	1493

\*See Table 20.

Table 7. Suggested diets for growing swine (40 to 125 lb.) using sorghum grain and barley as the major grain source.

Ingredient	Diet number									
	1	2	3	4	5	6	7	8	9	10
	pounds									
Sorghum grain	1549	1577	1371	1393	1431	----	----	----	----	----
Barley	----	----	----	----	----	1660	1685	1508	1500	1529
Soybean meal, 44%	400	----	----	454	----	293	----	----	350	----
Soybean meal, 48%	----	372	----	----	415	----	266	----	----	319
Soybeans, full-fat (cooked)	----	----	577	----	----	----	----	443	----	----
Fat	----	----	----	100	100	----	----	----	100	100
Calcium carbonate	17	18	17	17	17	18	20	18	17	19
Dicalcium phosphate	24	23	25	26	27	19	19	21	23	23
Salt	7	7	7	7	7	7	7	7	7	7
Vitamin-trace mineral mix	3	3	3	3	3	3	3	3	3	3
Total	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated analysis</b>										
Protein, %	15.70	16.00	16.70	16.20	16.40	16.00	16.10	16.80	16.30	16.50
Lysine, %	.75	.75	.80	.80	.80	.75	.75	.80	.80	.80
Tryptophan, %	.20	.19	.21	.21	.21	.22	.22	.23	.22	.22
Threonine, %	.55	.57	.59	.57	.59	.55	.56	.59	.57	.58
Methionine + cystine	.46	.49	.49	.47	.50	.48	.50	.50	.48	.51
Calcium, %	.66	.65	.68	.68	.68	.65	.66	.68	.68	.68
Phosphorus %	.55	.55	.58	.58	.58	.55	.55	.58	.58	.58
Metabolizable energy, kcal./lb.	1438	1452	1488	1541	1558	1360	1366	1404	1470	1479

\*See Table 20.

Table 8. Suggested diets for growing swine (40 to 125 lb.) using various grains blended with wheat as the major grain source.

Ingredient	Diet number									
	1	2	3	4	5	6	7	8	9	
	pounds									
Wheat, hard winter	804	717	727	829	747	750	800	714	724	
Corn, yellow	804	717	728	----	----	----	----	----	----	
Barley	----	----	----	829	747	748	----	----	----	
Sorghum grain	----	----	----	----	----	----	800	715	723	
Soybean meal, 44%	342	----	394	293	----	350	350	----	400	
Soybean, full-fat (cooked)	----	514	----	----	455	----	----	520	----	
Fat	----	----	100	----	----	100	----	----	100	
Calcium carbonate	16	16	16	18	18	17	17	17	15	
Dicalcium phosphate	24	26	25	21	23	25	23	24	28	
Salt	7	7	7	7	7	7	7	7	7	
Vitamin-trace mineral mix*	3	3	3	3	3	3	3	3	3	
Total	2000	2000	2000	2000	2000	2000	2000	2000	2000	
<b>Calculated analysis</b>										
Protein, %	15.90	16.90	16.20	16.30	17.20	16.60	16.10	17.10	16.40	
Lysine, %	.75	.80	.80	.75	.80	.80	.75	.80	.80	
Tryptophan, %	.21	.23	.22	.22	.24	.23	.21	.23	.22	
Threonine, %	.57	.61	.59	.55	.60	.57	.55	.60	.57	
Methionine + cystine, %	.56	.58	.56	.53	.51	.50	.52	.54	.52	
Calcium, %	.65	.68	.66	.66	.69	.69	.66	.68	.68	
Phosphorus, %	.55	.59	.55	.55	.58	.58	.55	.58	.59	
Metabolizable energy, kcal./lb.	1465	1505	1567	1397	1437	1501	1437	1482	1540	

\* See Table 20.

Table 9. Suggested finishing diets (125 lb. to market) with corn as the major grain source<sup>1</sup>

Ingredient	Diet number									
	1	2	3	4	5	6	7	8	9	10
	pounds									
Corn, yellow	1662	1683	1576	1605	1473	1329	1678	1689	1780	1627
Oats	----	----	----	----	200	----	----	----	----	----
Wheat middlings	----	----	----	----	----	400	----	----	----	----
Soybean meal, 44%	290	----	314	----	280	225	234	261	90	160
Soybean meal, 48%	----	268	----	284	----	----	----	----	----	----
Meat and bone meal, 50%	----	----	----	----	----	----	60	----	----	----
Blood meal, flash dried	----	----	----	----	----	----	----	----	80	----
Canola meal	----	----	----	----	----	----	----	----	----	170
Fat	----	----	60	60	----	----	----	----	----	----
Lysine, 78% L-lysine	----	----	----	----	----	----	----	1	----	----
Calcium carbonate	16	17	15	16	16	19	9	16	15	17
Dicalcium phosphate	22	22	25	25	21	17	9	23	25	16
Salt	7	7	7	7	7	7	7	7	7	7
Vitamin-trace mineral mix <sup>2</sup>	3	3	3	3	3	3	3	3	3	3
Total	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated Analysis</b>										
Protein, %	13.40	13.60	13.60	13.60	13.60	13.80	13.80	12.90	13.00	13.60
Lysine, %	.62	.62	.64	.64	.62	.62	.62	.62	.62	.62
Tryptophan, %	.17	.16	.17	.16	.17	.17	.16	.16	.15	.16
Threonine, %	.51	.52	.52	.53	.51	.51	.52	.49	.50	.54
Methionine + cystine, %	.50	.53	.50	.52	.50	.48	.51	.49	.49	.56
Calcium, %	.61	.61	.62	.62	.60	.62	.60	.61	.61	.60
Phosphorus, %	.50	.50	.52	.52	.50	.55	.50	.50	.50	.50
Metabolizable energy, kcal./lb.	1499	1510	1558	1569	1469	1462	1502	1499	1490	1480

<sup>1</sup>Diets for market slaughter hogs. See diets in Tables 3 and 4 for replacement gilts.

<sup>2</sup>See Table 20.

Table 10. Suggested finishing diets (125 lb. to market) with barley or sorghum grain as the major grain source.

Ingredient	Diet number											
	1	2	3	4	5	6	7	8	9	10	11	12
	pounds											
Barley	1770	1784	1628	1923	1834	1748	----	----	----	----	----	----
Sorghum grain	----	----	----	----	----	----	1649	1675	1668	1814	1712	1617
Soybean meal, 44%	185	----	225	25	80	110	304	----	245	130	200	180
Soybean meal, 48%	----	171	----	----	----	----	----	277	----	----	----	----
Meat and bone meal, 50%	----	----	----	----	----	----	----	----	60	----	----	----
Blood meal, flash dried	----	----	----	----	40	----	----	----	----	----	40	----
Canola meal	----	----	----	----	----	100	----	----	----	----	----	160
Fat	----	----	100	----	----	----	----	----	----	----	----	----
Lysine, 78% L-lysine	----	----	----	5	----	----	----	----	----	6	----	----
Calcium carbonate	19	19	18	19	19	20	17	18	10	17	16	18
Dicalcium phosphate	16	16	19	18	17	12	20	20	7	23	22	15
Salt	7	7	7	7	7	7	7	7	7	7	7	7
Vitamin-trace mineral mix <sup>2</sup>	3	3	3	3	3	3	3	3	3	3	3	3
Total	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated analyses</b>												
Protein, %	14.30	14.40	14.30	11.60	14.00	14.30	14.00	14.10	14.30	10.90	13.70	14.20
Lysine, %	.62	.62	.65	.62	.62	.62	.62	.62	.62	.62	.62	.62
Tryptophan, %	.19	.19	.19	.15	.18	.18	.17	.16	.16	.12	.16	.16
Threonine, %	.48	.48	.48	.37	.48	.49	.48	.49	.48	.36	.47	.50
Methionine + cystine, %	.44	.48	.43	.37	.43	.47	.42	.44	.42	.34	.41	.47
Calcium, %	.61	.60	.63	.61	.61	.61	.61	.61	.60	.61	.60	.60
Phosphorus, %	.50	.51	.53	.50	.50	.50	.50	.15	.50	.50	.50	.50
Metabolizable energy, kcal./lb.	1356	1362	1466	1340	1350	1344	1442	1452	1444	1437	1435	1420

<sup>1</sup>Diets for market slaughter hogs. See diets in Tables 3 and 4 for replacement gilts.

<sup>2</sup>See Table 20.

**Table 11. Suggested diets for finishing swine (125 lb. to market) using wheat or various grains blended with wheat as the major grain source.**

Ingredient	Diet number									
	1	2	3	4	5	6	7	8	9	10
	pounds									
Wheat, hard winter	1754	1773	----	----	800	851	883	----	1667	----
Wheat, soft winter	----	----	1703	1724	----	----	----	842	----	1618
Corn, yellow	----	----	----	----	902	----	----	842	----	----
Barley	----	----	----	----	----	----	882	----	----	----
Sorghum grain	----	----	----	----	----	852	----	----	----	----
Soybean meal, 44%	200	----	252	----	251	250	190	270	225	276
Soybean meal, 48%	----	180	----	232	----	----	----	----	----	----
Fat	----	----	----	----	----	----	----	----	60	60
Calcium carbonate	17	18	17	21	16	17	18	18	16	19
Dicalcium phosphate	19	19	18	13	21	20	17	18	22	17
Salt	7	7	7	7	7	7	7	7	7	7
Vitamin-trace mineral mix <sup>2</sup>	3	3	3	3	3	3	3	3	3	3
Total	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<b>Calculated analysis</b>										
Protein, %	15.10	15.10	15.30	15.40	14.20	14.50	14.60	14.30	15.10	15.30
Lysine, %	.62	.62	.62	.62	.62	.62	.62	.62	.64	.64
Tryptophan, %	.21	.21	.18	.18	.19	.19	.20	.17	.21	.18
Threonine, %	.49	.50	.49	.50	.51	.48	.48	.50	.50	.49
Methionine + cystine, %	.56	.57	.45	.47	.53	.48	.50	.48	.55	.45
Calcium, %	.61	.61	.60	.61	.60	.61	.60	.61	.62	.62
Phosphorus, %	.50	.50	.50	.50	.50	.50	.50	.50	.52	.52
Metabolizable energy, kcal./lb.	1439	1445	1461	1471	1472	1440	1398	1481	1501	1522

<sup>1</sup>Diets for market slaughter hogs. See diets in Table 3 and 4 for replacement gilts.

<sup>2</sup>See Table 20.

**Table 12. Recommended protein supplements for market hogs.**

Ingredient	Supplement						
	1	2	3	4	5	6	7
	pounds						
Soybean meal, 48%	----	----	1690	----	1325	1510	----
Soybean meal, 44%	1720	1625	----	1320	----	----	1670
Dehydrated alfalfa meal, 17%	----	100	----	----	100	----	----
Meat and bone meal, 50% <sup>1</sup>	----	----	----	550	400	----	----
Fish meal, menhaden, 60%	----	----	----	----	----	200	----
Calcium carbonate	90	85	100	35	50	95	100
Dicalcium phosphate	130	130	150	35	65	135	160
Vitamin-trace mineral mix <sup>2</sup>	25	25	25	25	25	25	25
Salt	35	35	35	35	35	35	35
Lysine, 78% L-lysine	----	----	----	----	----	----	10
Total	2000	2000	2000	2000	2000	2000	2000
<b>Calculated analysis</b>							
Protein, %	37.84	36.60	40.56	42.79	42.65	42.34	36.74
Lysine, %	2.49	2.40	2.64	2.68	2.67	2.83	2.81
Tryptophan, %	.54	.53	.54	.49	.50	.55	.53
Threonine, %	1.46	1.42	1.61	1.56	1.61	1.68	1.42
Methionine + cystine, %	1.01	0.99	1.19	1.09	1.19	1.30	0.99
Calcium, %	3.40	3.36	3.72	3.83	3.75	3.96	3.91
Phosphorus, %	1.72	1.70	1.94	1.98	1.96	2.03	1.98
Metabolizable energy, kcal./lb.	1256	1225	1297	1248	1263	1309	1219

<sup>1</sup>The meat and bone meal was considered to have 9.40% calcium and 4.50% phosphorus. If meat and bone meal with a higher concentration of calcium and phosphorus is used, the amount of dicalcium phosphate should be reduced accordingly.

<sup>2</sup>See Table 20.



Table 13. Growing diets (40 to 125 lb.) using recommended protein supplements in Table 12.

Ingredient	Diet number						
	1	2	3	4	5	6	7
				<b>pounds</b>			
Yellow corn	1550	1530	1575	1580	1580	1610	1600
Supplement 1	450	----	----	----	----	----	----
Supplement 2	----	470	----	----	----	----	----
Supplement 3	----	----	425	----	----	----	----
Supplement 4	----	----	----	420	----	----	----
Supplement 5	----	----	----	----	420	----	----
Supplement 6	----	----	----	----	----	390	----
Supplement 7	----	----	----	----	----	----	400
<b>Total</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>
<b>Calculated analysis</b>							
Protein, %	15.10	15.10	15.30	15.70	15.70	15.10	14.20
Lysine, %	.75	.75	.75	.75	.75	.75	.75
Tryptophan, %	.19	.19	.19	.17	.18	.18	.18
Threonine, %	.58	.58	.59	.58	.59	.59	.54
Methionine + cystine, %	.54	.54	.57	.54	.57	.58	.52
Calcium, %	.78	.80	.81	.82	.80	.79	.80
Phosphorus, %	.58	.59	.61	.61	.61	.60	.60
Metabolizable energy, kcal./lb.	1484	1474	1496	1487	1490	1503	1484

Table 14. Finishing diets (125 lb. to market) using recommended protein supplements in Table 12.

Ingredient	Diet number						
	1	2	3	4	5	6	7
				<b>pounds</b>			
Yellow corn	1650	1645	1685	1685	1690	1700	1700
Supplement 1	350	----	----	----	----	----	----
Supplement 2	----	355	----	----	----	----	----
Supplement 3	----	----	315	----	----	----	----
Supplement 4	----	----	----	315	----	----	----
Supplement 5	----	----	----	----	310	----	----
Supplement 6	----	----	----	----	----	300	----
Supplement 7	----	----	----	----	----	----	300
<b>Total</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>
<b>Calculated analysis</b>							
Protein, %	13.60	13.50	13.60	13.90	13.80	13.60	12.70
Lysine, %	.63	.62	.62	.62	.62	.63	.63
Tryptophan, %	.17	.17	.16	.15	.15	.16	.16
Threonine, %	.52	.52	.52	.52	.52	.52	.49
Methionine + cystine, %	.51	.50	.52	.51	.52	.54	.49
Calcium, %	.61	.61	.60	.62	.60	.61	.60
Phosphorus, %	.51	.51	.52	.52	.52	.52	.51
Metabolizable energy, kcal./lb.	1499	1492	1510	1502	1506	1514	1500

**Table 15. Recommended protein supplements for sows.**

Ingredient	Supplement							
	1	2	3	4	5	6	7	
				<b>pounds</b>				
Soybean meal, 48%	----	----	1560	----	1190	1370	----	
Soybean meal, 44%	1590	1500	----	1225	----	----	1525	
Dehydrated alfalfa meal, 17%	----	100	----	----	100	----	----	
Meat and bone meal, 50% <sup>1</sup>	----	----	----	500	400	----	----	
Fish meal, menhaden, 60%	----	----	----	----	----	200	----	
Calcium carbonate	100	90	110	55	70	110	115	
Dicalcium phosphate	240	240	260	150	170	250	280	
Vitamin-trace mineral mix <sup>2</sup>	35	35	35	35	35	35	35	
Salt	35	35	35	35	35	35	35	
Lysine, 78% L-lysine	----	----	----	----	----	----	10	
<b>Total</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	
<b>Calculated analysis</b>								
Protein, %	34.98	33.85	37.44	39.45	39.41	38.98	33.55	
Lysine, %	2.30	2.22	2.43	2.48	2.46	2.61	2.60	
Tryptophan, %	.50	.49	.50	.46	.45	.50	.48	
Threonine, %	1.35	1.31	1.48	1.44	1.49	1.55	1.30	
Methionine + cystine, %	0.94	0.91	1.10	1.01	1.09	1.20	0.90	
Calcium, %	4.78	4.65	5.11	5.23	5.27	5.50	5.49	
Phosphorus, %	2.70	2.68	2.91	2.90	2.89	3.05	3.05	
Metabolizable energy, kcal/lb	1160	1134	1197	1153	1159	1201	1113	

<sup>1</sup>The meat and bone meal was considered to have 9.40% calcium and 4.50% phosphorus. If meat and bone meal with a higher concentration of calcium and phosphorus is used, the amount of dicalcium phosphate should be reduced accordingly.

<sup>2</sup>See Table 20. :

**Table 16. Sow diets using recommended protein supplements in Table 15.**

Ingredient	Diet number							
	1	2	3	4	5	6	7	
				<b>pounds</b>				
Yellow corn	1635	1620	1655	1660	1660	1680	1680	
Supplement 1	365	----	----	----	----	----	----	
Supplement 2	----	380	----	----	----	----	----	
Supplement 3	----	----	345	----	----	----	----	
Supplement 4	----	----	----	340	----	----	----	
Supplement 5	----	----	----	----	340	----	----	
Supplement 6	----	----	----	----	----	320	----	
Supplement 7	----	----	----	----	----	----	320	
<b>Total</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	
<b>Calculated analysis</b>								
Protein, %	13.30	13.30	13.50	13.80	13.80	13.40	12.50	
Lysine, %	.62	.62	.62	.62	.62	.62	.62	
Tryptophan, %	.16	.17	.16	.15	.15	.16	.15	
Threonine, %	.51	.51	.52	.51	.52	.52	.48	
Methionine + cystine, %	.50	.50	.52	.50	.52	.53	.48	
Calcium, %	.89	.90	.90	.91	.91	.90	.90	
Phosphorus, %	.70	.71	.71	.70	.70	.70	.70	
Metabolizable energy, kcal./lb.	1479	1471	1489	1484	1484	1494	1480	

Table 17. Recommended base mixes (complete pre-mixes).

Ingredient	Base mix <sup>1</sup>			
	Growing-finishing		Sow	
	1	2	3	4
	pounds			
Calcium carbonate	540	320	500	395
Dicalcium phosphate	870	510	1100	875
Salt	240	140	----	200
Vitamin-trace mineral mix <sup>2</sup>	100	60	125	100
Soybean meal, 44%	250	970	275	430
Total	2000	2000	2000	2000
<b>Calculated Analysis</b>				
Protein, %	5.50	21.34	6.05	9.46
Lysine, %	.36	1.41	.40	.62
Tryptophan, %	.08	.31	.09	.14
Threonine, %	.21	.82	.23	.37
Methionine + cystine, %	.15	.57	.16	.25
Calcium, %	19.87	11.84	21.64	17.19
Phosphorus, %	8.12	5.01	10.26	8.22
Metabolizable energy, kcal./lb.	183	708	201	314

<sup>1</sup>Base mixes 1 and 3 are designed to be used at the rate of 60 and 80 lb. per ton, respectively. Base mixes 2 and 4 at the rate of 100 lb. per ton of complete feed.

<sup>2</sup>See Table 20.

Table 18. Complete corn diets using base mixes.

Ingredient	Growing (40-125 lb.)		Finishing (125 lb. to market)		Sow	
	Diet number					
	1	2	3	4	5	6
Corn, yellow	1560	1560	1655	1660	1630	1630
Soybean meal, 44%	380	340	285	240	280	270
Salt	----	----	----	----	10	----
Base Mix 1*	60	----	60	----	----	----
Base Mix 2*	----	100	----	100	----	----
Base Mix 3*	----	----	----	----	80	----
Base Mix 4*	----	----	----	----	----	100
Total	2000	2000	2000	2000	2000	2000
<b>Calculated analysis</b>						
Protein, %	15.20	15.20	13.50	13.40	13.30	13.30
Lysine, %	.75	.75	.62	.62	.62	.62
Tryptophan, %	.19	.19	.17	.17	.17	.17
Threonine, %	.58	.58	.51	.51	.51	.51
Methionine + cystine, %	.54	.54	.50	.50	.50	.50
Calcium, %	.67	.66	.66	.64	.92	.92
Phosphorus, %	.55	.55	.54	.53	.70	.70
Metabolizable energy, kcal./lb.	1492	1492	1496	1497	1475	1476

\*See Table 17.

Table 19. Complete sorghum grain diets using base mixes.

Ingredient	Growing (40-125 lb.)		Finishing (125 lb. to market)		Sow	
			Diet number			
	1	2	3	4	5	6
	pounds					
Sorghum grain	1545	1550	1640	1645	1615	1620
Soybean meal, 44%	395	350	300	255	295	280
Salt	---	---	---	---	10	---
Base Mix 1*	60	---	60	---	---	---
Base Mix 2*	---	100	---	100	---	---
Base Mix 3*	---	---	---	---	80	---
Base Mix 4*	---	---	---	---	---	100
Total	2000	2000	2000	2000	2000	2000
<b>Calculated analysis</b>						
Protein, %	15.70	15.70	14.20	14.00	13.90	13.80
Lysine, %	.75	.75	.62	.62	.62	.62
Tryptophan, %	.20	.20	.15	.17	.17	.17
Threonine, %	.55	.55	.53	.48	.48	.48
Methionine + cystine, %	.46	.46	.43	.42	.41	.41
Calcium, %	.67	.66	.66	.65	.93	.92
Phosphorus, %	.57	.56	.55	.55	.72	.71
Metabolizable energy, kcal/.lb.	1437	1437	1396	1438	1418	1418

\*See Table 17.

Table 20. Suggested vitamin-trace mineral mix.<sup>1</sup>

Nutrient	Amount per <sup>2</sup> pound of premix	Suggested source
Vitamin A	900,000 IU	Vitamin A palmitate-gelatin coated
Vitamin D	100,000 IU	Vitamin D3 - stabilized
Vitamin E	5,000 IU	dl- tocopheryl acetate
Vitamin K (Menadione Equivalent)	660 mgs	Menadione sodium bisulfite
Riboflavin	1,200 mgs	Riboflavin
Pantothenic acid	4,500 mgs	Calcium pantothenate
Niacin	7,000 mgs	Nicotinamide
Choline chloride	20,000 mgs	Choline chloride (60%)
Vitamins 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>4</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 three months. Vitamins may lose their potency in the presence of trace minerals if stored for a prolonged period.

<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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