



pork industry handbook

COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

Swine Rations

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A dependable and economical source of feed is the backbone of a profitable swine operation. Since approximately 55-70% of the total cost of pork production is feed, the swine producer should be keenly aware of all aspects of swine nutrition and commodity buying.

The pig is an efficient converter of feed to meat. With today's nutritional knowledge, modern meat type hogs can be produced with a feed efficiency of 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 rations designed for specific purposes.

Composition of Feedstuffs

Values for crude fiber, metabolizable energy, crude protein, calcium, phosphorus and three essential amino acids are given in Table 1 for the feedstuffs used in the rations suggested in this publication. Swine producers are cautioned, however, to recognize that feedstuffs vary considerably in all nutrients. Data presented in Table 1 are average figures for a particular 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 rations in Tables 2 through 10.

All rations in this fact sheet are formulated with 44% soybean meal. If 49% soybean meal is used, adjustments should be made. A simple method is to replace 10 lb. of 44% soybean meal with 9 lb. of 49% soybean meal and 1 lb. of grain. For example, if a ration contains 400 lb. of 44% soybean meal and 1,545 lb. of corn, a similar formulation would result with 360 lb. of 49% soybean meal and 1,585 lb. of corn.

Dicalcium phosphate was used in all the rations in this fact sheet. Defluorinated phosphate or steamed bone meal, 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.

Sow Gestation Rations

The rations shown in Tables 2 and 3 are designed for bred sows. For the rations in Table 2, yellow corn is the primary grain source; for those in Table 3, grain sorghum, barley or wheat is the primary energy source.

It is suggested that these rations be fed at a level of 4-5 lb. per head per day. The exact level to feed during gestation depends on weight, age, and condition of the animal and climatic conditions or environmental temperature. Sows should gain about 30-60 lb. and gilts should gain approximately 70-100 lb. during gestation. It may be necessary to feed slightly more of the barley rations (rations 4 and 5 in Table 3) because of their lower energy content. For bred sows and gilts on a good quality legume pasture, such as alfalfa or ladino, 2-3 lb. per head per day of one of the gestation rations presented in Tables 2 or 3 may suffice.

It is recognized that some swine producers may prefer to feed the same ration during gestation that they feed in lactation. In this case, it is suggested that lactation rations presented in Tables 4 and 5 be used for both gestation and lactation. Likewise, if a swine producer prefers to feed rations with higher protein and amino acid content during gestation, the suggested lactation rations may be used instead.

Sow Lactation Rations

The rations shown in Tables 4 and 5 are formulated for lactating sows. For the rations in Table 4, yellow corn is the primary grain source; for those in Table 5, grain sorghum, barley or wheat is the primary energy source.

During lactation, rations may be limit fed during the first few days following farrowing. Increase the daily feed gradually up to full feed or slightly less by 7-10 days after farrowing. If you feed one of the suggested rations that does not contain much bulk, such as rations 1, 5 and 6 in Table 5, constipation may be a problem around farrowing time. If constipation is a problem, substitute approximately 20% wheat bran or 10% dehydrated alfalfa meal or beet pulp for grain in the ration starting 3-4 days before farrowing and continuing up to 1 week following farrowing. Some producers may want to treat this problem by adding 15-20 lb. of potassium chloride or magnesium sulfate (Epsom salts) per ton of ration.

Baby Pig Rations

The baby pig rations in Table 6 may be used as either creep or starter rations. Rations 1, 2 and 3 are formulated for pigs weighing 10-25 lb., and rations 4 through 7 are formulated for pigs weighing 25-40 lb.

Ration 4 is what is commonly called a simplified starter ration since it is built around a corn-soybean meal base. Pigs may not perform quite as well on this ration as compared with performance on the more complex ones also shown in Table 6. However, the simplified ration may be more economically feasible since it is usually cheaper to mix. When post-weaning scours are a problem, the substitution of 200-400 lb. of ground oats for corn or grain sorghum in rations 4 through 7, Table 6, for the first 2 or 3 weeks after weaning may help.

Growing Rations

The rations shown in Tables 7 and 8 are designed for pigs weighing 40-125 lb. Yellow corn is the primary energy source for the rations in Table 7 whereas barley or grain sorghum is the primary energy source for those shown in Table 8.

The barley used in the rations in Table 8 was considered to be at least a 48-lb. standard test weight and to contain 11.7% crude protein. For each 1% crude protein below 11.7%, an additional 50 lb. of soybean meal should be substituted for 50 lb. of barley. If the protein of barley exceeds 12%, extra value cannot be given because of a possible amino acid deficiency or imbalance due to the higher proportion of grain protein in the diet.

Pigs usually do not gain as efficiently on barley rations as on corn or grain sorghum rations because of the lower energy and higher fiber content of barley. Pigs fed lightweight barley (less than 48 lb./bu.) will gain even more slowly and less efficiently. Lightweight barley contains more fiber which tends to reduce consumption and thus reduces rate of gain.

Grain sorghum has an average nutrient content similar to corn. Such values were used in the grain sorghum

rations in Table 8. However, a wide range in nutrient content exists among different samples of grain sorghum. In fact, grain sorghum may vary from 7 to 11.5% crude protein. If grain sorghum containing less than 9% crude protein is used, adjustments in grain-soybean meal ratio should be made. If the grain sorghum contains more than 9% crude protein, the grain-soybean meal ratio should not be altered, as often the lysine content of the grain sorghum does not increase linearly with increase in protein content. Usually pigs gain similarly but less efficiently on grain sorghum than on corn. Research indicates that grain sorghum has approximately 95% of the energy value of corn.

Finishing Rations

The rations shown in Tables 9 and 10 are designed for pigs weighing 125 lb. to market weight. For the rations shown in Table 9, yellow corn is the primary grain source; for those in Table 10, barley or grain sorghum is the primary energy source. The comments made about barley and grain sorghum in growing rations also apply to the finishing rations.

At times it may be desirable to feed finishing rations that contain 1% less protein than the rations listed. Such circumstances include: (1) economics, such as when the price of protein supplement is high compared to grain; (2) when barrows are fed separately from gilts (barrows require less protein than gilts); or (3) if the hogs are below average in muscling. This adjustment can be made by adding 50 lb. less soybean meal per ton and 50 lb. more corn or grain sorghum. For example, ration 1 in Table 9 would contain approximately 1% less protein if it contained 1,710 lb. of corn and 235 lb. of soybean meal.

Vitamin and Trace Mineral Premix

The levels of vitamins and trace minerals in the rations are based on the composition of the premix given in Table 11. Be sure to check the composition of the premix you use and the manufacturers' recommendations, and adjust the amount in your rations accordingly. Most vitamin-trace mineral premixes are manufactured to add to swine rations at the rate of 2-10 lb./ton of complete feed.

Do not purchase more than a 3-4 month supply of a vitamin trace mineral premix at one time. Vitamins may lose their potency, especially in the presence of trace minerals. Be sure and store all premixes in a cool, dry place.

Antibiotics and Other Feed Additives

Antibiotics and other feed additives have not been included in the rations since the choice of additive varies among farms. The greatest benefits from antibiotics or other feed additives are usually in the baby pig and growing rations. Often, there is also a response when they are used in finishing rations. In general, antibiotics are not needed in gestation rations except perhaps at breeding time and just before and after farrowing. When using feed additives, be sure to follow guidelines for additions and any withdrawal regulations listed on the label. For a more complete discussion on feed additives see PIH-24.

Table 1. Average nutrient content of common feedstuffs*

Ingredient	Crude fiber	Metabolizable energy	Calcium	Phosphorus	Crude protein	Lysine	Tryptophan	Methionine	Cystine
	%	kcal./lb.			percent				
Alfalfa meal, dehydrated, 17%	25.0	543	01.30	00.23	17.0	0.80	.36	.29	.29
Barley	07.0	1,275	00.06	00.36	11.7	0.36	.16	.18	.19
Corn, yellow	02.5	1,500	00.01	00.25	08.8	0.26	.09	.19	.20
Cottonseed meal (solvent)	13.0	1,150	00.15	00.95	41.0	1.55	.48	.49	.65
Fat, animal	----	3,550	----	----	----	----	----	----	----
Grain sorghum	02.7	1,425	00.02	00.27	09.0	0.22	.09	.17	.14
Meat and bone meal, 50%	02.8	1,100	08.10	04.10	50.0	2.50	.29	.65	.62
Meat and bone meal, 45%	02.1	1,100	10.50	05.30	45.0	2.20	.17	.53	.20
Milk, dried skim	----	1,140	01.25	01.00	33.3	2.50	.45	.90	.40
Oats	12.0	1,200	00.08	00.33	12.0	0.34	.13	.18	.15
Oat groats	03.0	1,500	00.07	00.40	16.0	0.45	.18	.20	.26
Soybean meal, 44%	06.5	1,475	00.25	00.60	44.0	2.88	.55	.56	.66
Soybean meal, 48.5%	03.0	1,520	00.20	00.65	48.5	3.14	.63	.73	.82
Sugar	----	1,383	----	----	----	----	----	----	----
Tankage, 60%	02.0	980	04.60	02.60	60.0	3.89	.58	.75	.52
Wheat, hard winter†	02.4	1,500	00.05	00.35	12.2	0.38	.15	.20	.16
Wheat bran	11.0	890	00.08	01.15	15.0	0.56	.29	.09	.29
Wheat midds	07.5	1,300	00.05	00.80	16.0	0.64	.18	.16	.18
Whey, dried	----	1,445	00.90	00.70	12.0	0.80	.13	.16	.24
Calcium carbonate (limestone)	----	----	38.00	----	----	----	----	----	----
Dicalcium phosphate	----	----	22.00	18.50	----	----	----	----	----
Defluorinated phosphate	----	----	32.00	18.00	----	----	----	----	----
Steamed bone meal	----	----	24.00	12.00	----	----	----	----	----

*Dry matter was assumed to be that normally found in air dry feeds.

†Other varieties such as soft white winter wheat may be considerably lower in crude protein content than hard winter wheat grown in the Great Plains states.

Table 2. Suggested sow gestation rations with corn as the grain source.

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Corn, yellow	1,715	1,340	1,390	1,385	1,745	1,770	1,565
Oats	----	400	----	----	----	----	----
Wheat midds	----	----	400	----	----	----	----
Wheat bran	----	----	----	400	----	----	----
Soybean meal, 44%	205	180	135	140	105	65	160
Meat and bone scraps, 50%	----	----	----	----	100	----	----
Tankage, 60%	----	----	----	----	----	100	----
Dehydrated alfalfa meal, 17%	----	----	----	----	----	----	200
Calcium carbonate	25	25	25	30	15	20	15
Dicalcium phosphate	35	35	30	25	15	25	40
Salt	10	10	10	10	10	10	10
Vitamin trace mineral mix*	5	5	5	5	5	5	5
Choline chloride†	5	5	5	5	5	5	5
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	12.00	12.30	12.30	12.20	12.50	12.20	12.10
Lysine, %	.51	.50	.50	.50	.50	.51	.51
Tryptophan, %	.13	.14	.14	.16	.13	.13	.15
Methionine + Cystine, %	.45	.44	.42	.43	.47	.44	.47
Calcium, %	.89	.90	.85	.90	.87	.90	.88
Phosphorus, %	.60	.61	.65	.67	.60	.60	.64
Metabolizable energy, kcal./lb.	1,437	1,378	1,402	1,320	1,441	1,425	1,346

*See Table 11.

†Choline chloride premix containing 25% choline.

Table 3. Suggested sow gestation rations with grain sorghum, barley or wheat as the grain source.

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Grain sorghum	1,705	1,720	1,550	-----	-----	-----	-----
Barley	-----	-----	-----	1,800	1,825	-----	-----
Wheat	-----	-----	-----	-----	-----	1,810	1,650
Soybean meal, 44%	215	130	175	125	60	115	80
Meat and bone scraps, 50%	-----	100	-----	-----	60	-----	-----
Dehydrated alfalfa meal, 17%	-----	-----	200	-----	-----	-----	200
Calcium carbonate	25	15	15	25	20	25	20
Dicalcium phosphate	35	15	40	30	15	30	30
Salt	10	10	10	10	10	10	10
Vitamin trace mineral mix*	5	5	5	5	5	5	5
Choline chloride†	5	5	5	5	5	5	5
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	12.40	13.10	12.50	13.30	13.50	13.40	13.50
Lysine, %	.50	.50	.50	.50	.50	.50	.50
Tryptophan, %	.14	.13	.16	.17	.18	.17	.18
Methionine + Cystine, %	.39	.40	.41	.40	.42	.39	.40
Calcium, %	.90	.89	.88	.87	.85	.87	.89
Phosphorus, %	.61	.62	.65	.65	.61	.63	.61
Metabolizable energy, kcal./lb.	1,374	1,377	1,287	1,240	1,240	1,443	1,351

*See Table 11.

†Choline chloride premix containing 25% choline.

Table 4. Suggested sow lactation rations with corn as the grain source.

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Corn, yellow	1,570	1,205	1,245	1,235	1,595	1,635	1,435
Oats	-----	400	-----	-----	-----	-----	-----
Wheat midds	-----	-----	400	-----	-----	-----	-----
Wheat bran	-----	-----	-----	400	-----	-----	-----
Soybean meal, 44%	360	325	285	300	260	210	300
Meat and bone scraps, 50%	-----	-----	-----	-----	100	-----	-----
Tankage, 60%	-----	-----	-----	-----	-----	100	-----
Dehydrated, alfalfa meal, 17%	-----	-----	-----	-----	-----	-----	200
Calcium carbonate	25	25	30	30	15	15	15
Dicalcium phosphate	30	30	25	20	15	25	35
Salt	10	10	10	10	10	10	10
Vitamin trace mineral mix*	5	5	5	5	5	5	5
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	14.80	14.80	14.90	15.00	15.20	14.80	14.60
Lysine, %	.70	.70	.70	.70	.70	.70	.70
Tryptophan, %	.17	.17	.18	.20	.15	.16	.18
Methionine + Cystine, %	.52	.50	.49	.50	.53	.50	.52
Calcium, %	.86	.88	.90	.86	.89	.84	.85
Phosphorus, %	.59	.60	.64	.65	.63	.63	.61
Metabolizable energy, kcal./lb.	1,443	1,384	1,404	1,325	1,443	1,430	1,351

*See Table 11.

Table 5. Suggested sow lactation rations with grain sorghum, barley or wheat as the grain source.

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Grain sorghum	1,560	1,585	1,415	-----	-----	-----	-----
Barley	-----	-----	-----	1,655	1,675	-----	-----
Wheat	-----	-----	-----	-----	-----	1,670	1,510
Soybean meal, 44%	370	275	320	280	185	265	230
Meat and bone scrap, 50%	-----	100	-----	-----	105	-----	-----
Dehydrated alfalfa meal, 17%	-----	-----	200	-----	-----	-----	200
Calcium carbonate	25	15	15	25	15	25	20
Dicalcium phosphate	30	10	35	25	5	25	25
Salt	10	10	10	10	10	10	10
Vitamin trace mineral mix*	5	5	5	5	5	5	5
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	15.20	15.70	15.10	15.80	16.50	16.00	16.00
Lysine, %	.70	.70	.70	.70	.70	.70	.70
Tryptophan, %	.18	.17	.19	.21	.19	.19	.21
Methionine + Cystine, %	.48	.48	.48	.48	.48	.46	.47
Calcium, %	.88	.85	.85	.84	.85	.83	.86
Phosphorus, %	.60	.59	.63	.61	.62	.60	.59
Metabolizable energy, kcal./lb.	1,352	1,387	1,298	1,261	1,262	1,447	1,356

*See Table 11.

Table 6. Suggested baby pig rations.

Ingredient	Ration number for						
	Pigs 10-25 lb.			Pigs 25-40 lb.			
	1	2	3	4	5	6	7
	pounds						
Corn, yellow	1,130	1,015	810	1,400	1,250	1,060	620
Grain sorghum	-----	-----	-----	-----	-----	-----	620
Oat groats	-----	-----	200	-----	-----	200	-----
Soybean meal, 44%	455	525	575	535	490	480	500
Dried whey	-----	400	200	-----	200	200	200
Dried skim milk	200	-----	-----	-----	-----	-----	-----
Sugar	100	-----	100	-----	-----	-----	-----
Animal fat	50	-----	50	-----	-----	-----	-----
Calcium carbonate	15	15	15	15	15	15	15
Dicalcium phosphate	35	30	35	35	30	30	30
Salt	10	10	10	10	10	10	10
Vitamin-trace mineral mix*	5	5	5	5	5	5	5
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	18.30	18.40	19.00	17.90	17.50	18.00	17.70
Lysine, %	1.05	1.05	1.05	.95	.95	.95	.95
Tryptophan, %	.21	.22	.23	.21	.20	.21	.21
Methionine + Cystine, %	.62	.60	.60	.60	.58	.59	.57
Calcium, %	.85	.87	.84	.75	.77	.78	.77
Phosphorus, %	.70	.71	.70	.65	.66	.66	.66
Metabolizable energy, kcal./lb.	1,456	1,437	1,498	1,445	1,443	1,443	1,421

*See Table 11.

Table 7. Suggested growing rations (40-125 lb.), with corn as the grain source.

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Corn, yellow	1,565	795	1,370	1,230	1,570	1,595	1,615
Wheat, hard winter	-----	800	-----	-----	-----	-----	-----
Oats	-----	-----	200	-----	-----	-----	-----
Wheat midds	-----	-----	-----	400	-----	-----	-----
Soybean meal, 44%	380	350	375	320	330	300	325
Meat and bone meal, 50%	-----	-----	-----	-----	65	-----	-----
Tankage	-----	-----	-----	-----	-----	60	-----
Lysine, 78% L-lysine	-----	-----	-----	-----	-----	-----	2
Calcium carbonate	15	20	12	20	10	12	17
Dicalcium phosphate	27	22	30	17	12	20	28
Salt	10	10	10	10	10	10	10
Vitamin-trace mineral mix*	3	3	3	3	3	3	3
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	15.20	16.10	15.50	15.60	15.80	15.40	14.30
Lysine, %	.75	.75	.75	.75	.75	.76	.76
Tryptophan, %	.17	.20	.17	.19	.17	.17	.16
Methionine + Cystine, %	.53	.51	.53	.51	.55	.53	.52
Calcium, %	.64	.68	.63	.64	.63	.64	.68
Phosphorus, %	.56	.55	.59	.57	.54	.55	.56
Metabolizable energy, kcal./lb.	1,454	1,454	1,425	1,418	1,457	1,446	1,451

*See Table 11.

Table 8. Suggested growing rations (40-125 lb.) with barley or grain sorghum as the grain source.

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Barley	1,640	1,650	1,520	840	-----	-----	-----
Grain sorghum	-----	-----	-----	-----	1,545	800	1,555
Wheat, hard winter	-----	-----	-----	800	-----	790	-----
Soybean meal, 44%	310	235	330	310	400	355	345
Meat and bone meal, 45%	-----	100	-----	-----	-----	-----	-----
Meat and bone meal, 50%	-----	-----	-----	-----	-----	-----	60
Animal fat	-----	-----	100	-----	-----	-----	-----
Calcium carbonate	20	2	17	20	17	17	12
Dicalcium phosphate	17	-----	20	17	25	25	15
Salt	10	10	10	10	10	10	10
Vitamin-trace mineral mix*	3	3	3	3	3	3	3
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	16.40	17.10	16.10	16.60	15.70	16.20	16.10
Lysine, %	.75	.75	.75	.75	.75	.75	.75
Tryptophan, %	.22	.20	.21	.22	.20	.20	.17
Methionine + Cystine, %	.49	.49	.48	.49	.50	.48	.49
Calcium, %	.66	.64	.63	.66	.67	.66	.69
Phosphorus, %	.55	.63	.55	.54	.56	.59	.57
Metabolizable energy, kcal./lb.	1,274	1,280	1,388	1,365	1,396	1,424	1,395

*See Table 11.

Table 9. Suggested finishing rations (125 lb. to market) with corn as the grain source.

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Corn, yellow	1,660	900	1,465	1,325	1,680	1,700	1,725
Wheat, hard winter	-----	800	-----	-----	-----	-----	-----
Oats	-----	-----	200	-----	-----	-----	-----
Wheat midds	-----	-----	-----	400	-----	-----	-----
Soybean meal, 44%	285	250	280	225	225	195	220
Meat and bone meal, 50%	-----	-----	-----	-----	60	-----	-----
Tankage	-----	-----	-----	-----	-----	60	-----
Lysine, 78% L-lysine	-----	-----	-----	-----	-----	-----	2
Calcium carbonate	17	17	15	20	10	15	15
Dicalcium phosphate	25	20	27	17	12	17	25
Salt	10	10	10	10	10	10	10
Vitamin-trace mineral mix*	3	3	3	3	3	3	3
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	13.60	14.30	13.80	14.00	13.80	13.60	12.40
Lysine, %	.62	.62	.62	.62	.62	.62	.62
Tryptophan, %	.15	.17	.16	.16	.15	.15	.14
Methionine + Cystine, %	.49	.47	.49	.47	.51	.49	.47
Calcium, %	.65	.60	.64	.63	.60	.64	.60
Phosphorus, %	.53	.51	.53	.55	.51	.51	.52
Metabolizable energy, kcal./lb.	1,455	1,459	1,425	1,420	1,459	1,450	1,456

*See Table 11.

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

Ingredient	Ration number						
	1	2	3	4	5	6	7
	pounds						
Barley	1,735	1,745	1,620	900	-----	-----	-----
Grain sorghum	-----	-----	-----	-----	1,640	895	1,655
Wheat, hard winter	-----	-----	-----	845	-----	800	-----
Soybean meal, 44%	215	140	230	205	305	255	250
Meat and bone meal, 45%	-----	100	-----	-----	-----	-----	-----
Meat and bone meal, 50%	-----	-----	-----	-----	-----	-----	60
Animal fat	-----	-----	100	-----	-----	-----	-----
Calcium carbonate	20	2	20	20	20	17	10
Dicalcium phosphate	17	-----	17	17	22	20	12
Salt	10	10	10	10	10	10	10
Vitamin-trace mineral mix*	3	3	3	3	3	3	3
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Protein, %	14.90	15.50	14.50	14.90	14.10	14.50	14.40
Lysine, %	.62	.62	.62	.62	.62	.62	.62
Tryptophan, %	.20	.19	.19	.19	.15	.17	.15
Methionine + Cystine, %	.46	.45	.44	.45	.44	.44	.45
Calcium, %	.65	.63	.65	.64	.68	.60	.61
Phosphorus, %	.53	.61	.52	.53	.51	.52	.53
Metabolizable energy, kcal./lb.	1,243	1,270	1,381	1,359	1,393	1,426	1,396

*See Table 11.

Table 11. Suggested vitamin-trace mineral mix.*

Ingredient†	Amount per pound premix
Vitamin A	800,000 I.U.
Vitamin D	80,000 I.U.
Vitamin E	3,400 I.U.
Vitamin K (Menadione)	660 mg.
Riboflavin	800 mg.
Pantothenic acid	4,000 mg.
Niacin	5,400 mg.
Choline chloride	20,000 mg.
Vitamin B ₁₂	4 mg.
Copper	.4%
Iodine	.008%
Iron	3.0%
Manganese	.8%
Zinc	4.0%

*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 3 or 4 months. Vitamins may lose their potency in the presence of trace minerals if stored for a prolonged period.

†Selenium should be added to the above premix in areas where deficiencies are thought to occur. This is generally east of the Mississippi River. A suggested amount for the above premix is .004%.