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Evaluating Vitamin Premixes for Swine

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Feed represents a major portion of total costs of swine production in Missouri. Particularly in years of short feed supplies and high prices, producers become interested in on-farm ration formulation and mixing.

Producers willing to spend sufficient time in learning the nutrient requirements for various weights and classes of hogs and applying information available on nutrient levels in feeds can formulate and mix swine rations that will result in performance comparable with those commercially available.

On-farm mixing is not for all producers. It does demand accuracy, attention to detail, additional equipment, in some cases, and a good job of mixing.

Supplying vitamins has been a problem in some areas of Missouri for those interested in on-farm ration formulation. Several sources of vitamins are available for producers. These vary rather widely in price, number of vitamins contained, concentration of vitamins in the mix, and other nutrients or additives present.

Sources of Vitamins for Swine

There are many variations, but vitamin supplementation in broad terms is available to Missouri producers in three forms. These might be called: complete supplements, mineral-vitamin premixes, and vitamin premixes.

Complete supplements. These commonly include all nutrients required other than the energy source or grain. They can include protein, major minerals, trace minerals, vitamins, and antibiotics or other drug ingredients.

In most cases, these supplements do a good job of meeting vitamin requirements if purchased from reliable companies and fed according to recommendations. Disadvantages may be in less flexibility in purchasing ingredients of protein, calcium, phosphorus, and antibiotics.

In general, prices will be higher in this form than where the producer purchases and mixes these ingredients separately. However, many times, there is some service included in addition to feedstuffs.

Protein, calcium, and phosphorus levels in the complete ration should be checked using company recommendations and average figures on these nutrients and in the grain you are feeding. In most cases it is not possible to evaluate vitamin and trace mineral levels since they usually are not listed by amounts on the company's feed tag. The producer assumes that amounts of these nutrients are adequate. His evaluation of a particular company's feed then is based pri-

marily on price and past experience with his pigs' performance using their supplement.

Particular attention needs to be paid to kinds and amounts of antibiotics present in evaluating commercial supplements. Many times this is the major difference in cost between the products of two companies. Feed tags must list actual amounts of antibiotics in the supplement. (**Caution:** Be sure to evaluate antibiotics and other drug ingredients on amounts per ton of complete mixed feed, taking into consideration additive concentration in the supplement and the company's recommendations on amounts to add per ton of complete feed.)

Mineral-vitamin premixes. Commercial mineral-vitamin premixes have some of the same limitations as complete supplements for producers set up to do their own ration mixing. The major minerals of calcium, phosphorus, and salt are nearly always included as well as oftentimes trace minerals. Mineral-vitamin premixes do permit the swine producer to purchase his protein needs separately. They may or may not be medicated. They may or may not include on the tag actual amounts of vitamins present.

Where actual ingredient amounts are not listed the producer again must depend on the reliability of the company, his past experience with this product, and the current cost compared to other sources. Where vitamins are listed and concentrations given, an evaluation of amounts present can be checked against the requirements of the pig to see if requirements are met.

Where producers are willing to do ration calculations and have equipment for on-farm mixing, this source of supplementation in general will be a slightly more expensive way to provide vitamins and considerably more expensive to provide calcium and phosphorus compared to actual ingredient costs bought and mixed. Again, some of the detail of formulating and mixing these ingredients has been done for the producer and this may have some value.

Vitamin premixes. Several companies market vitamin premixes in Missouri. The most common variations in these are in concentrations, amounts recommended to mix per ton of feed, levels of antibiotics or medications present, and price. The cost that vitamins add to a ton of swine feed can vary significantly depending on these variations. In a series of least-cost computer ration formulation meetings conducted by University of Missouri-Columbia personnel, the addition of vitamins from commercial companies varied from \$2 to over \$10 per ton of complete mixed feed.

TABLE 1
VITAMIN REQUIREMENT OF SWINE
(Percent or amount per pound of diet)

Class	(lbs.)	Growing and Finishing Swine					Breeding Swine	
		10-25	25-45	45-75	75-135	135-220	Bred Gilts and Sows	Lactation Gilts and Sows
Vitamin A	I.U.	1,000	795	591	591	591	1,818	909
Vitamin D	I.U.	100	91	91	68	57	140	90
Vitamin E	I.U.	5.0	5.0	5.0	5.0	5.0	4.5	4.5
Vitamin K	mg.	.9	.9	.9	.9	.9	.9	.9
Thiamine	mg.	.6	.5	.5	.5	.5	.45	.45
Riboflavin	mg.	1.4	1.4	1.2	1.0	1.0	1.3	1.3
Niacin	mg.	10.0	8.2	6.4	5.5	4.5	4.5	4.5
Pantothenic Acid	mg.	6.0	5.0	5.0	5.0	5.0	5.4	5.4
Vitamin B ₆	mg.	.7	.7	.5	.5	.5	.5	.5
Choline	mg.	500	409	318	250	182	568	568
Vitamin B ²	mcg.	10.0	7.0	5.0	5.0	5.0	6.8	6.8

How To Evaluate Vitamin Premixes

The basic goal of producers should be to meet the vitamin requirements of different weights and classes of swine. This is essential for top production. The second goal, of course, would be to meet these needs as economically as possible. Table 1 lists the vitamin requirements of swine. This table, taken from 1973 National Research Council Recommendations, should be used as a basis for formulating rations. For a more complete discussion of vitamin requirements see UMC Guide 2321, "Vitamin Requirements of Swine."

Because of the variability of vitamins in natural swine feedstuffs and the relatively low cost of commercial vitamins, it is recommended that producers provide the following vitamins completely from the vitamin premix and disregard amounts in the feed. These are vitamin A, D, E, K, riboflavin, niacin, pantothenic acid, and B₁₂. Thiamin, vitamin B₆, and choline requirements should be met in adequate amounts in normal swine feeds.

With these requirements in mind the first step in deciding which vitamin supplement to buy would be to select a reliable company. Second, carefully study the feed tag. Third, determine ingredients present other than vitamins and determine their value to you. Fourth, check vitamin levels using the vitamin supplement check sheet in Table 3 to determine if requirements are met. Fifth, compare price.

TABLE 2
SWINE GROWER VITAMIN PREMIX
Vitamin Guarantees per Pound

Vitamin A, I.U.	600,000
Vitamin D, I.U.	170,000
Vitamin B ₁₂ , mg.	2.6
Vitamin E, I.U.	1,200
Menadione Sodium Bisulfite, mcg.	750
Riboflavin, mg.	670
Niacin, mg.	4,000
d-Pantothenic acid, mg.	1,350
Choline Chloride, mg.	13,500
Thiamine, mcg.	199
Pyridoxine, mcg.	75
Ascorbic Acid, mg.	1.33
Inositol, mcg.	75
Biotin, mcg.	19
Folic Acid, mcg.	75
Para. Amino Benzoic Acid, mcg.	525
Vitamin K, mg.	250
Grower Ration	8 pounds per ton

TABLE 3
CALCULATING VITAMIN REQUIREMENT

Column 1	2	3	4	5	6	7	8
Vitamin	Units per lb. Premix	Lbs. Premix per Ton	Total Units per Ton		Units Required/Ton Ration Pig Weight		
Vitamin A (I.U.)	600,000	8	4,800,000	25-50 1,600,000	50-75 1,180,000	75-225 1,180,000	Breeding Swine 3,636,000
Vitamin D (I.U.)	170,000	8	1,360,000	180,000	180,000	114,000	280,000
Vitamin E (I.U.)	1,300	8	10,400	10,000	10,000	10,000	9,000
Vitamin K (mg)	250	8	2,000	1,800	1,800	1,800	1,800
Riboflavin (mg)	670	8	5,360	2,800	2,400	2,000	2,600
Niacin (mg)	4,000	8	32,000	16,400	12,600	9,100	9,000
Pantothenic (mg)	1,350	8	10,800	10,000	10,000	10,000	10,800
B ₁₂ (mg)	2.6	8	20.8	14.0	10.0	10.0	13.6

Example—Checking Vitamin Premixes

Most vitamin premixes contain a list of vitamins present and units of each vitamin per pound of premix. They then recommend how many pounds of premix to mix in a ton of complete feed. A simple way to see if your premix meets the vitamin requirements of the pig is to check vitamin levels on a ton of complete feed basis. Follow the example in Tables 2 and 3.

If you are offered the grower premix in Table 2, will it meet the needs of 60-pound pigs? Remember, we plan to check for only eight vitamins. Looking down the list find on the premix tag that there are 600,000 units of vitamin A per pound of premix. This is entered under column 2, "Units per pound of premix," in Table 3. Multiplying units per pound by pounds premix per ton gives the total units per ton for vitamin A of 4,800,000 I.U. This figure is in column 4, Table 3. The requirement for 60-pound pigs is 1,180,000 units (column 6, Table 3). Vitamin A is more than adequate.

This same procedure is followed for vitamins D, E and K, riboflavin, niacin, pantothenic acid, and B₁₂. Using this company's recommendation all eight of these vitamins are supplied in adequate amounts in the premix for growing pigs.

Once you are satisfied that vitamin levels are adequate, then consider the other nutrients in the premix which have been mentioned. You need to have some idea of their value on a ton of feed basis. Many Missouri producers can purchase ingredients to meet calcium, phosphorus and salt requirements for \$3.50 or less per ton of complete mixed feed. The value of antibiotics will vary greatly. Keep in mind an upper figure of around \$10.00 per ton of complete feed for antibiotics.

Some producers are buying a mixed antibiotic at a level of approximately 250 grams per ton of feed in this price range. If your premix contains only minimum levels of antibiotics, its value would be considerably less than this. The value of protein in premixes can be estimated by comparing with current prices for soybean oil meal and other supplements on a cost per pound of protein present.

See back page for worksheet

Check Your Vitamin Premix

Use this worksheet and follow the procedure used in the example in this Guide to evaluate your source of vitamins.

Worksheet

CALCULATING VITAMIN REQUIREMENT

Using Your Premix

Column 1	2	3	4	5	6	7	8
Vitamin	Units per lb. Premix	Lbs. Premix per Ton	Total Units per Ton		Units Required/Ton Ration Pig Weight		
				25-50	50-75	75-225	Breeding Swine
Vitamin A (I.U.)			1,600,000	1,600,000	1,180,000	1,180,000	3,636,000
Vitamin D (I.U.)			180,000	180,000	180,000	114,000	280,000
Vitamin E (I.U.)			10,000	10,000	10,000	10,000	9,000
Vitamin K (mg)			1,800	1,800	1,800	1,800	1,800
Riboflavin (mg)			2,800	2,800	2,400	2,000	2,600
Niacin (mg)			16,400	16,400	12,600	9,100	9,000
Pantothenic (mg)			10,000	10,000	10,000	10,000	10,800
B ₁₂ (mg)				14.0	10.0	10.0	13.6

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