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# EC64-210 Swine Ration Suggestions

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UNIVERSITY OF NEBRASKA

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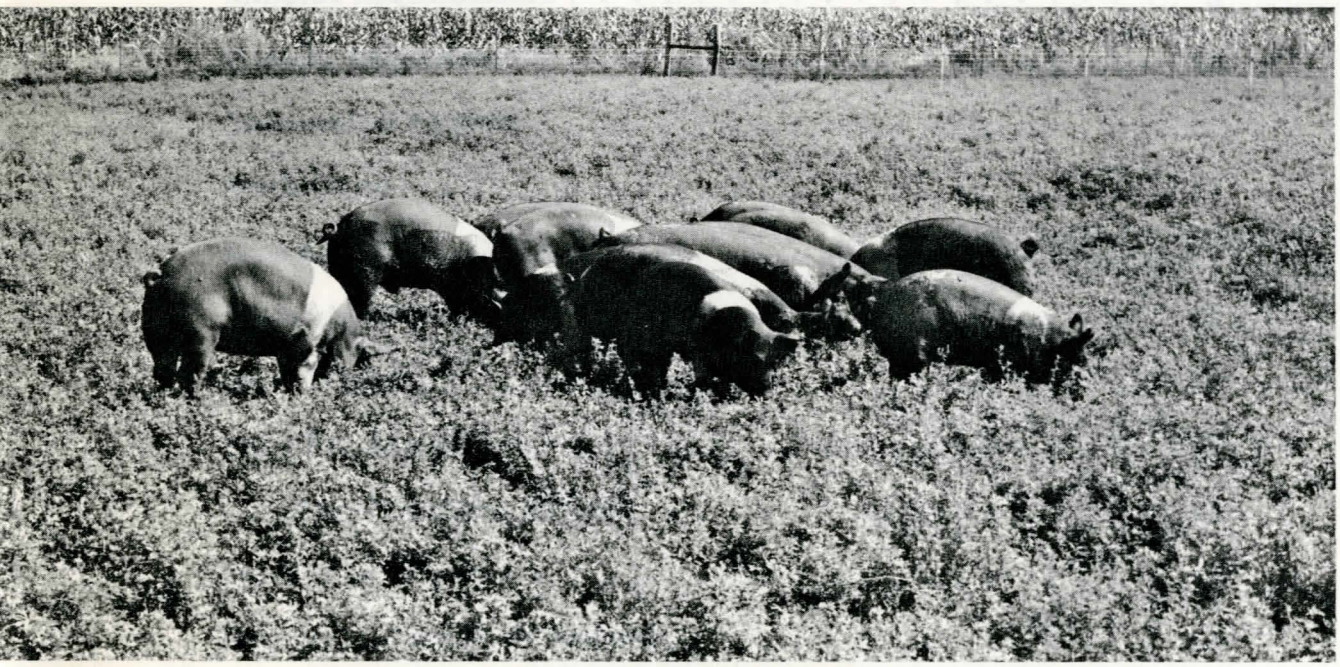

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# UNIVERSITY of NEBRASKA

# Swine Ration Suggestions

By

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SWINE RATION SUGGESTIONS UNIVERSITY OF NEBRASKA

Feed represents 65 to 70 percent of the total costs of producing pork. Thus, the producer must be keenly aware of all segments of swine feeding.

The purpose of this circular is to give accurate information on swine feeding. Since rations and methods of feeding are changing rapidly, this circular will be revised annually to provide the latest recommendations. In addition, it will be the object of this publication to give answers to some of the more frequently asked questions.

## Protein

· What Are The Major Sources of Protein for Swine?

A. Plant - Soybean meal
Linseed meal
Safflower meal
Cottonseed meal
Peanut meal

B. Animal - Dried skimmilk
Meat and bone scraps
Tankage
Fish meal
Dried buttermilk
Blood meal

Protein must be thoroughly mixed with grain.

## What Is The Recommended Level of Protein in The Ration For All Classes of Swine?

To simplify the number of rations required for swine, the University of Nebraska recommends three rations containing 16, 14, and 12 percent protein for all pigs except for the pre-starter and starter rations. The feeding program is as follows:

| Ration | Source | Age or Size of Pig | Level of Protein % |
|---|---|---|---|
| Pre-starter | Commercial | Early weaned or orphan pigs | 22 |
| Starter | Commercial | 2 wks. of age - 30 lbs. body weight | 18-20 |
| Grower | Commercial or home mixed | 30-50 lbs. body weight | 16 |
| Growing-Finishing | Commercial or home mixed | 50-125 lbs. body weight | 14 |
| Growing-Finishing | Commercial or home mixed | 125 lbs. - market weight | 12 |
| Gilts Retained for Breeding | Commercial or home mixed | 200 lbs. - breeding | 14 |
| (Hand-feed about 1 1/2 to 2 1/2 percent of body weight, - 3 to 6 pounds) | | | |
| (Flush gilts by full feeding ration two weeks prior to breeding) | | | |
| Gestation - First 2/3: | | | 14 |
| Hand-feed ration to maintain body weight (3 to 5 pounds per day for gilts up to 350 pounds) (3 to 6 pounds per day for sows 300 to 600 pounds) | | | |
| Gestation - Last 1/3: | | | 16 |
| Hand-feed about 6 pounds of ration | | | |
| Farrowing: | | | |
| Reduce feed intake slightly 4 to 5 days before and after farrowing (keep sows just a little hungry) | | | 16 |
| Lactation: | | | |
| Self-feed during lactation or hand-feed to appetite | | | 16 |

· How Much Protein Supplement Is Needed With Corn and Milo to Formulate Rations With Recommended Levels of Protein?

The following table lists the amount of corn and protein supplement per ton of feed with varying levels of protein in the supplement.

| Percent Protein in Supplement | | Percent Protein in Ration 16% | 14% | 12% |
|---|---|---|---|---|
| 26 | Corn or Milo* | 1163 lb. | 1375 lb. | 1628 lb. |
| | Supplement | 837 | 625 | 372 |
| | Lb. of grain/lb. supp. | 1.4 | 2.2 | 4.4 |
| 28 | Corn or Milo* | 1250 | 1458 | 1666 |
| | Supplement | 750 | 542 | 334 |
| | Lb. of grain/lb. supp. | 1.7 | 2.7 | 5.0 |
| 30 | Corn or Milo* | 1321 | 1509 | 1698 |
| | Supplement | 679 | 491 | 302 |
| | Lb. of grain/lb. supp. | 2.0 | 3.1 | 4.6 |
| 32 | Corn or Milo* | 1379 | 1552 | 1724 |
| | Supplement | 621 | 448 | 276 |
| | Lb. of grain/lb. supp. | 2.1 | 3.5 | 6.2 |
| 34 | Corn or Milo* | 1429 | 1587 | 1746 |
| | Supplement | 571 | 413 | 254 |
| | Lb. of grain/lb. supp. | 2.5 | 3.8 | 6.9 |
| 36 | Corn or Milo* | 1471 | 1618 | 1765 |
| | Supplement | 529 | 382 | 235 |
| | Lb. of grain/lb. supp. | 2.8 | 4.2 | 7.5 |
| 38 | Corn or Milo* | 1507 | 1644 | 1781 |
| | Supplement | 493 | 356 | 219 |
| | Lb. of grain/lb. supp. | 3.1 | 4.6 | 8.1 |
| 40 | Corn or Milo* | 1538 | 1667 | 1795 |
| | Supplement | 462 | 333 | 205 |
| | Lb. of grain/lb. supp. | 3.3 | 5.0 | 8.8 |
| 42 | Corn or Milo* | 1566 | 1687 | 1807 |
| | Supplement | 434 | 313 | 193 |
| | Lb. of grain/lb. supp. | 3.6 | 5.4 | 9.4 |
| 44 | Corn or Milo* | 1591 | 1705 | 1818 |
| | Supplement | 409 | 295 | 182 |
| | Lb. of grain/lb. supp. | 3.9 | 5.8 | 10.0 |

* Where protein content of milo is 9% or greater (see page 13 for explanation)

- Can Soybean Meal Be Fed As the Only Source of Supplemental Protein for Growing-Finishing Swine?

Research at universities in the midwest including Nebraska, has shown that soybean meal is an excellent protein supplement for swine. It is equal to any other source of protein or combination of proteins for swine when properly fortified with vitamins and minerals. From an economic standpoint soybean meal by itself contains an adequate balance of amino acids to meet the needs of all classes of swine weighing over 25 pounds.

- If Soybean Meal Alone Contains an Adequate Balance of Amino Acids (the Building Blocks of Body Protein), Why Do Most Commercial Supplements Contain a Variety of Protein Sources?

There are three major reasons: (1) When a feed manufacturer registers his feed, he lists all feedstuffs that he may want to include in it. Then, depending on the price and limits of good nutrition, he substitutes lower priced protein sources for higher priced protein sources; thus, the feed manufacturer is able to pass these economic advantages on to the consumer. (2) Since soybean is highly palatable to swine, the feed manufacturer usually adds less palatable ingredients, such as alfalfa meal or tankage, to help control supplement consumption for producers who feed supplement free choice with grain. (3) Habit! Animal proteins were once considered to be better than plant proteins.

- If the Price of Tankage or Meat and Bone Scraps Is the Same as Soybean Meal on a Protein Basis; Can Tankage and/or Meat and Bone Scraps be Fed as the Only Source of Protein?

Results at the University of Nebraska indicate that high levels of meat and bone scraps in the ration reduce growth rate. As a result, our recommendation is that tankage and/or meat and bone scraps should not exceed over 5 percent of the ration or 25 percent of the protein supplement.

- Is There a Difference in Uniformity of Product Between Protein Sources?

Animal proteins vary considerably more in composition and quality than plant proteins. Tankage and meat and bone scraps are by-products of the meat packing industry. Thus, the composition of these two products depends upon the classes of animals being slaughtered. Methods of processing also influence the quality of animal proteins. Plant proteins, on the other hand, are more uniform because they are made from only one product. Too, methods of processing plant proteins have been standardized and the same kind of product can be produced year in and year out. However, improper processing can, and sometimes does occur in the production of plant proteins. Such instances are exceptions rather than the rule.

## Minerals

• What Minerals and What Level of Each Should Be Included in Rations for Swine?

| Mineral | Pig Weight 10-30 Lbs. | 30-50 Lbs. | 50-125 Lbs. | Market Weight | Breeding Stock |
|---|---|---|---|---|---|
| Calcium % | .70 | .60 | .60 | .50 | .60 |
| Phosphorus % | .70 | .60 | .60 | .50 | .60 |
| Salt % (Chlorine and Sodium) | .50 | .50 | .50 | .50 | .50 |
| Zinc, gm./ton | 90 | 90 | 90 | 90 | 90 |
| Iodine, gm./ton | .20 | .20 | .20 | .20 | .20 |
| Iron, gm. | 90 | 90 | 90 | 90 | 90 |

• What Are the Sources of Minerals for Swine?

| Mineral | Source |
|---|---|
| Calcium | Ground limestone |
| Calcium and phosphorus | Dicalcium phosphate, steamed bone meal |
| Phosphorus | Monosodium and disodium phosphate |
| Sodium and Chlorine | Salt |
| Iodine | Iodized salt, trace mineralized salt, and trace mineral mixes |
| Iron (baby pigs) | Iron injections, clean soil, pills or pastes containing iron |
| Iron (growing and mature pigs) | Iron sulfate, iron carbonate, trace mineral mixes, trace mineralized salt |
| Zinc | Zinc carbonate, zinc sulfate, trace mineral mixes, trace mineralized salt |
| Copper, cobalt, potassium, Magnesium, manganese, sulfur | Usually adequate in natural feedstuffs. |

• How Should the Minerals Be Fed -- as a Part of a Complete Ration, Part of a Protein Supplement or Self-Fed Free Choice?

Many instances have been reported in Nebraska where swine have overeaten or undereaten minerals that have been fed free choice. If we wish to make sure that pigs meet their daily requirement for minerals, but do not exceed these, minerals should be fed in a completely mixed ration.

• What Occurs if High Levels of Minerals Are Fed?

If the level of calcium in the ration exceeds 0.8 percent, there may be a decrease in pig gains and feed conversion. Most commercial protein supplements are balanced in minerals to meet the pig's needs when supplement is combined with grain according to the manufacturer's recommendations. Minerals should not be added haphazardly. If problems develop such as bone abnormalities, rations should be carefully analyzed before changes or additions in the mineral content are made. Warning! Adding minerals without reason may cause more harm than good.

· Why Has the Recommended Level of Phosphorus in Corn-Soy Rations Changed?

The pig can utilize only about one-third of the phosphorus found in plant feedstuffs (corn, milo, soybean meal, etc.). Because of this lowered availability, rations formulated from grain and plant protein require added available phosphorus. A rule of thumb to follow -- use the calcium requirement (see table) for the phosphorus requirement also. This will give the recommended 1:1 ratio between total calcium and total phosphorus. A ration formulated on this basis will require adding a mineral supplement containing phosphorus.

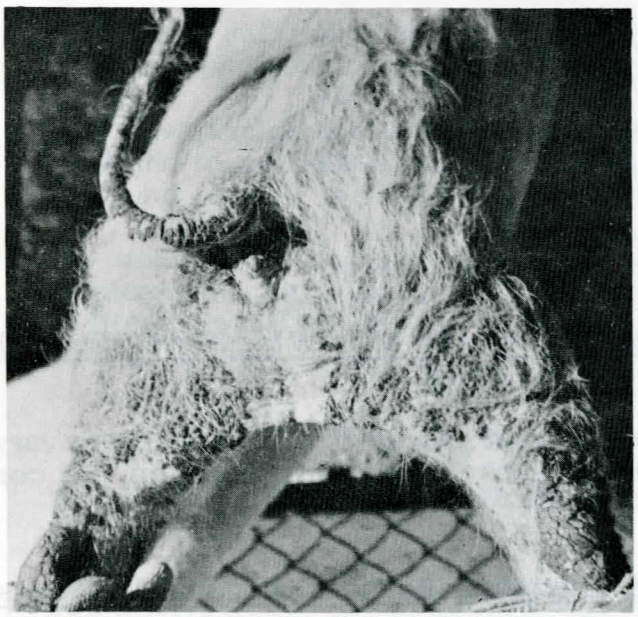
If a complete mineral supplement is used for preparing the ration, the calcium-phosphorus ratio in the supplement should not exceed 1.6:1. Such a ratio should give a 1:1 ratio between calcium and phosphorus in a complete corn-soybean ration.

· Are Mineral Supplements Available Which Will Allow You to Add Phosphorus to the Ration Without Adding Calcium Too?

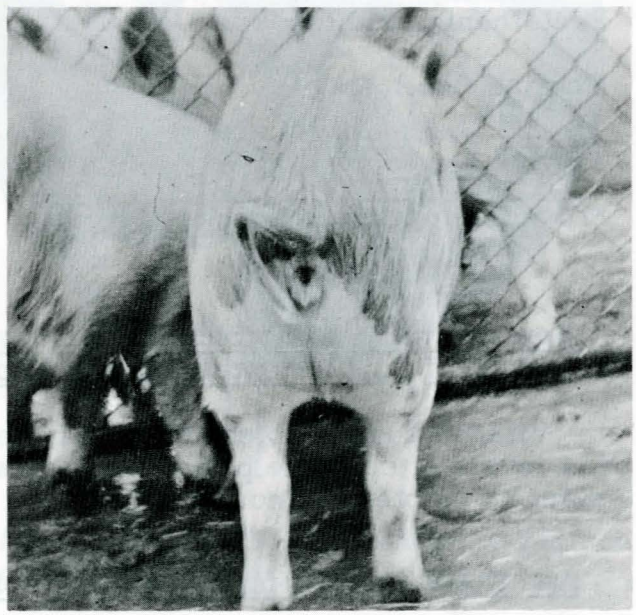
There are several commercial compounds that contain phosphorus but no calcium. Two compounds generally recommended are monosodium phosphate (about 25 percent phosphorus) and disodium phosphate (about 21 percent phosphorus). Other phosphorus compounds are being studied but are not presently being recommended for swine.

· What is Parakeratosis and What Relation Has It to Zinc?

The combination of a high level of calcium (over .8 percent) and an inadequate level of zinc may cause a nutritional disease known as parakeratosis. The condition can be identified by the mangy-like appearance of the animal. The skin becomes dry and scaly, particularly on the hind legs, tail, and under region of body. The condition can be corrected by keeping the level of calcium below 0.8 percent and by adding 90 grams of zinc per ton of complete ration.



This gilt developed parakeratosis on a ration high in calcium and inadequate in zinc.



Same gilt four weeks later with same calcium level but added zinc (90 gm. per ton).

· Should Additional Supplemental Copper be Added to Rations?

Limited studies indicate that copper may have an effect similar to antibiotics. Since copper is toxic when fed in excess, caution should be exercised.

Suggested Levels of Copper

| Compound | Per ton of Complete Feed | Per ton of Supplement |
|---|---|---|
| Cupric carbonate | .5 pounds | 2.5 pounds |
| Cupric oxide | .4 pounds | 2.0 pounds |
| Cupric sulfate | 1.1 pounds | 5.0 pounds |

Vitamins

The recommended level of vitamins in swine rations is

| Vitamin | Pig Weight 10-30 lbs. | 30-50 lbs. | 50 lbs. to Market | Breeding Stock |
|---|---|---|---|---|
| | Amount per ton of complete feed | | | |
| Vitamin A (million IU)* | 4 | 3 | 3 | 5 |
| Vitamin D (million IU)* | .36 | .24 | .24 | .24 |
| Riboflavin (gm.) | 4 | 3 | 3 | 3 |
| Niacin (gm.) | 32 | 24 | 16 | 16 |
| Pantothenic acid (gm.) | 16 | 12 | 12 | 12 |
| Choline (gm.) | 900 | 700 | 700 | 800 |
| Vitamin $B_{12}$ (mg.) | 40 | 20 | 10 | 10 |

*IU = International Units

· How Much Carotene Should Be Considered in Corn and Milo When Determining the Amount of Supplemental Vitamin A to Add in the Ration?

Vitamin A and carotene are easily destroyed by heat and light. This results in varying levels of carotene between samples of corn. Thus, in ration formulation, we consider no carotene in corn or milo.

· Are There Any Differences in Stabilized Vitamin A Between Commercial Feeds?

Generally not. Most commercial companies fortify their feed with a stabilized form of Vitamin A. The stabilized form of Vitamin A can be used by the pig over an extended period of time.

· When Buying Vitamins and Minerals, Should They be Bought in Separate Premixes or Together in the Same Mix?

Some vitamins in the presence of minerals over a prolonged period of time are destroyed. Therefore, we recommend that vitamins and minerals be bought in separate premixes. If the vitamins and minerals are purchased in one premix they should be used within 30 days of purchase.

· What Is the Approximate Cost of Adding Premixes to Corn-Soybean Rations And Where Can They be Obtained?

The cost of vitamin premix without antibiotics will vary from $2.00 to $4.00 per ton of complete feed. All vitamin premixes should be stored in a cool, dry, place. Addresses of companies selling premixes in Nebraska are available at the County Extension office or the Animal Science Department.

Here is a table of commonly used conversion factors:

1 pound = 454 grams
1 ounce = 28.4 grams
1 gram = 1,000 milligrams
1 milligram = 1,000 micrograms, also called gammas
1 microgram per gram = 1 part per million
3 microgram of Vitamin A = 1 unit of Vitamin A

To convert milligrams per gram to milligrams per pound, multiply by 454.

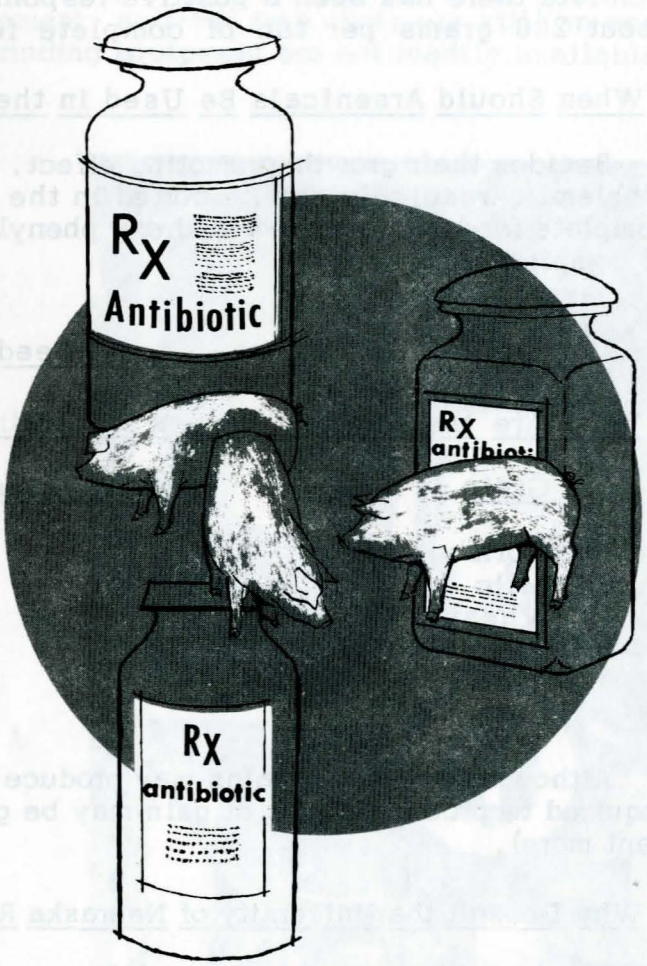
To convert micrograms per gram or per pound to milligrams per gram or per pound, divide by 1,000.

To convert milligrams per pound to micrograms per gram or parts per million, divide by .454 or multiply by 2.2.

## Feed Additives

· What Antibiotics Should Be Fed and What Levels?

The response to specific antibiotics varies considerably due to disease level, kind, level of antibiotics, season of year, and other environmental factors. As a result, rotation of antibiotics and use of mixtures seems to be more effective than antibiotics used singly and/or continually. Rotation may be yearly or with changes in protein levels.




Antibiotics should not be used to replace good management.

· What Are the Recommended Levels of Antibiotics Per Ton of Complete Feed?

| Ration | Gram Per Ton |
|---|---|
| Starter | 50-100 gm. |
| Grower (16%) | 50-20 gm. |
| Growing-Finish (14%) | 20 gm. |
| Growing-Finish (12%) | 20 gm. (optional) |

· How About Feeding Antibiotics to the Breeding Herd?

Several experiments have been conducted where high levels of antibiotics were fed before breeding and after breeding to determine effect on conception rate and litter size. Results have been variable. However, in instances of poor litter size and low conception rate there has been a positive response to antibiotics. The level used has been about 200 grams per ton of complete feed or about 1/2 gram per sow per day.

· When Should Arsenicals Be Used in the Ration?

Besides their growth-promoting effect, arsenicals may also help where scours is a problem. Arsenicals can be added in the form of arsanilic acid, 90 grams per ton of complete feed, or 3-nitro-4-hydroxy phenylarsonic acid (3-nitro) at 22.7 grams per ton of complete feed.

## Feed Grains

· What Are the Feeding Values of Grains Other Than Corn When Fed to Swine?

| Grain | Feeding Value As Compared to Corn |
|---|---|
| Corn | 100 percent |
| Milo | 97 percent |
| Wheat | 100 percent |
| Barley | 90 percent |
| Rye | 85 percent |
| Oats | 80 percent |

Although some feed grains may produce the same gains as corn, the amount of feed required to produce a unit of gain may be greater, as in the case of milo (5 to 10 percent more).

· Why Doesn't the University of Nebraska Recommend Oats in Swine Finishing Rations?

The high fiber content of oats (12 percent) reduces the energy content of rations and consequently results in reduced growth rate and feed efficiency of growing-finishing pigs. Young pigs (up to 100-125 pounds) should be fed high energy rations to produce maximum lean pork efficiently. Therefore, we recommend that if oats is available for swine that it be used for breeding stock where lower energy rations are recommended, particularly during the first two-thirds of pregnancy.

• What Rule Should You Follow When Replacing Corn With Milo in a Corn-Soybean Meal Ration?

Although the protein content may be higher in milo than corn (10 or 11 percent versus 8.8 percent), the protein quality of milo is poorer. A good procedure is to substitute milo for corn pound for pound if the protein content of the milo is greater than 9 percent. If the protein content of milo falls below 9 percent, recalculate your rations on a protein basis. It is usually profitable to have your milo analyzed for protein content.

## Methods of Feeding

The main methods of feeding swine are (1) grain and supplement free choice and (2) complete rations either full-fed or limited-fed.

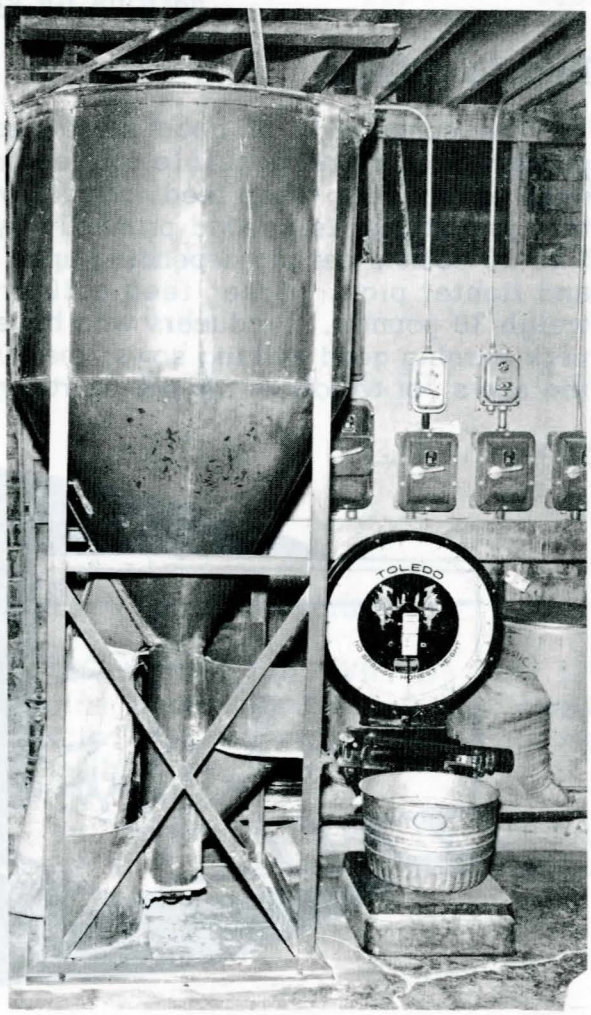
The University of Nebraska prefers the use of complete rations because the producer can be sure of better control of protein, mineral and vitamin intake. Complete feeds reduce mineral and vitamin problems. Over-consumption of protein supplement is eliminated. Each pig gets a balanced ration with every pound of feed. Although complete feeds are preferred, grain and protein supplement, self-fed free choice is still an economical practice particularly if mixing and grinding equipment are not readily available.

• Will It Pay to Mix and Formulate Rations on the Farm?

One method of mixing a complete ration is by mixing ground corn with a commercial protein supplement in proportions suggested by the manufacturer or as suggested on page . The mixing can be done either commercially or with a mixer-grinder. A self-unloading wagon does a poor job of mixing corn and supplement.

A second method of mixing rations is to use the feeding program suggested by the University. This requires the producer to buy all ingredients indicated in the rations on page and to do a thorough job of mixing.

Many factors are involved in the success of home mixing. Some of these include the efficiency of grinding, mixing, size of operation, quality of feed, availability of ration ingredients and labor. There will not be much cost saving in mixing your own rations unless (1) you can buy 44 percent soybean meal for at least $20 a ton less than a good 40 percent supplement and unless (2) you can buy minerals, vitamins, and antibiotics to fortify a ton of complete ration for $4.00 to $6.00. In addition, feed manufacturers today offer a service program for swine producers can be invaluable to a swine enterprise.




Adequate facilities are a must for farm mixing.

- Should One Limit the Feed to Growing-Finishing Hogs, and If So, at What Weight Should You Start?

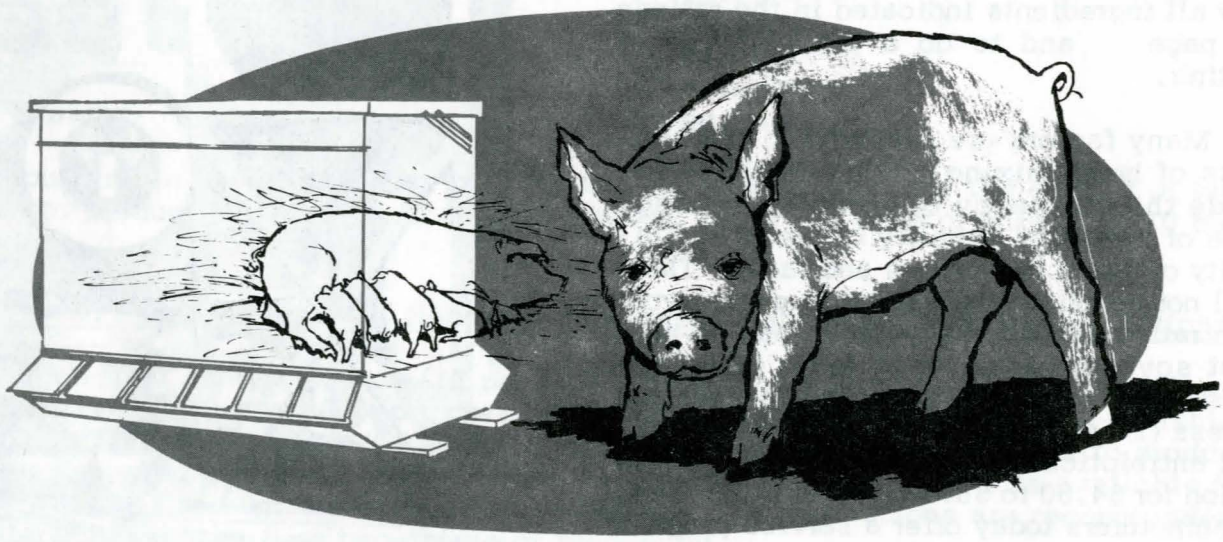
This question must be answered on an individual farm basis. There are two primary reasons for limiting feed for finishing hogs. These are (1) the amount of feed required to produce a pound of gain may be reduced by 5 to 15 percent, and (2) the backfat thickness can be reduced 0.1 inch at 200 pounds. The economic advantages here will depend upon the extra investment required in automatic feeding systems and housing. Also, limited feeding will increase the time required for pigs to reach market weight. Thus, reduced feed costs may be offset by increased investment and a longer feeding time.

If limited feeding is planned, pigs should weigh about 125 pounds before feed intake is reduced. Feed intake may be reduced by feeding 70 to 80 percent of full feed or feeding a constant amount of 5 pounds per pig daily to market weight.

## Rations for Various Classes of Swine

### Baby Pig Rations

The complexity of good starter rations plus the small amount consumed are the primary factors responsible for recommending commercial pig starter rations. If you wish to mix your creep feed, the following rations are suggested. The 22 percent protein pre-starter is needed primarily by orphan or early weaned pigs. When used, feed 5 to 10 pounds per pig depending upon age and weight. Use the higher level for younger and lighter pigs. Creep feed a 20 or 18 percent starter ration and feed until all pigs weigh 30 pounds. Producers who have used this starter ration prefer the 18 percent for pigs nursing good milking sows; the 20 percent ration is preferred for pigs on poor milking sows, or to follow the pre-starter on early weaned pigs.



Keep the creep feed fresh and in a well-lighted area.

| Ingredients | Percent Protein a/ 22 Pre-Starter | 20 Starter | 18 Starter |
|---|---|---|---|
| Sugar (beet or cane) | 15.00 | 10.00 | 10.00 |
| Ground yellow corn | 19.35 | 17.65 | 27.85 |
| Oat groats | 5.00 | 10.00 | 10.00 |
| Ground wheat | 5.00 | 10.00 | 10.00 |
| 44% soybean meal | 4.00 | 12.50 | 12.00 |
| Dried skim milk | 40.00 | 20.00 | 15.00 |
| Dried whey | --- | 10.00 | 5.00 |
| 70% fish meal | 5.00 | 2.50 | 2.50 |
| Dried brewer's yeast | 1.00 | 1.00 | 1.00 |
| Lard or fat (stabilized) | 2.50 | 2.50 | 2.50 |
| Trace minerals (10% zinc, swine) | 0.15 | 0.15 | 0.15 |
| Dicalcium phosphate | 0.10 | 1.20 | 1.50 |
| Monosodium phosphate | 0.40 | --- | --- |
| Salt (iodized) | 0.50 | 0.50 | 0.50 |
| Vitamin-antibiotic mix | 2.00 b/ | 2.00 c/ | 2.00 c/ |
| | 100.00 | 100.00 | 100.00 |

a/ All rations are calculated to contain 0.7% calcium and phosphorus.

b/ Added at the following rate per pound of ration: Vit. A, 2000 I.U.; Vit. $D_2$, 180 I.U. Vit. $B_{12}$, 20 mcg.; riboflavin, 1.0 mg.; calcium pantothenate, 3.0 mg.; choline chloride, 80.0 mg.; thiamine, 2.0 mg.; niacin, 6.0 mg.; pyridoxine, 2.0 mg.; menadione, 1.0 mg.; Vit. E, 1.0 mg. and antibiotics, 50 mg.

c/ Added at the following rate per pound of ration: Vit. A, 2000 I.U.; Vit. $D_2$, 180 I.U.; Vit. $B_{12}$, 20 mcg.; riboflavin, 1.5 mg.; niacin 10.0 mg.; calcium pantothenate, 2.0 mg.; choline chloride, 100.0 mg. and antibiotics, 25 mg.

· Is There a Secret to Getting Pigs On Starter Rations Early?

There is no deep dark secret, however, sprinkling the feed with clean dirt or with sugar usually encourages pigs to start eating feed. Keep the creep feed in a well-lighted area. Baby pigs do not like dark areas.

Growing-Finishing Rations

| Ingredient | Percent Protein | | |
|---|---|---|---|
| | 16 Lbs. | 14 Lbs. | 12 Lbs. |
| Ground corn or milo | 1456 | 1552 | 1674 |
| 44% Soybean meal | 420 | 324 | 210 |
| 17% Dehydrated alfalfa | 50 | 50 | 50 |
| Ground limestone | 4 | 4 | -- |
| Dicalcium phosphate | 38 | 38 | 34 |
| Salt (iodized) a/ | 10 | 10 | 10 |
| Trace mineral mix a/ | 2 | 2 | 2 |
| Vitamin-antibiotic premix b/ | 20 | 20 | 20 |
| | 2000 | 2000 | 2000 |

a/ The trace mineral mix and/or iodized salt should supply: 90 grams of zinc; 0.15-0.20 grams of iodine; 45 grams of iron and 10 pounds of salt per ton of feed.

b/ The vitamin-antiobitic mix should supply the following amounts per ton of complete feed for 16%, 14%, and 12% protein rations, respectively: Vitamin A - 3,000,000, 2,400,000, 2,400,000 I.U.; Vitamin D - 360,000, 240,000, 240,000 I.U.; riboflavin - 2.5, 1.5, 1.5 grams; niacin - 8.0, 8.0, 8.0 grams; calcium pantothenate - 9.0, 6.0, 6.0 grams; choline chloride - 100, 100, 200 grams; Vitamin $B_{12}$ - 15, 10, 10 milligrams; antibiotics - 40, 20, 20 grams.

Some possible substitutions when using these rations are:

(1) Milo can be substituted for corn pound for pound if milo contains more than 9 percent protein; otherwise, substitute on a protein basis if milo contains less than 9 percent protein.

(2) Fifty percent soybean meal can be substituted for forty-four percent soybean meal by substituting 86 pounds of 50 percent soybean meal and 14 pounds of corn or milo for each 100 pounds of 44 percent soybean meal.

(3) Dehydrated alfalfa meal is included as a nutrient safety factor in these rations. Therefore, if excellent mixing is available, dehydrated alfalfa can be replaced by corn pound per pound provided adequate vitamin and mineral supplement is available.

(4) Iodized salt and trace minerals can be replaced by trace mineralized salt so that it will supply 90 grams of zinc and 45 grams of iron, .2 gram of iodine, and 10 pounds of salt per ton.

(5) Leafy ground alfalfa hay can replace dehydrated alfalfa meal.

(6) Steamed bone meal can be substituted for dicalcium phosphate pound for pound in complete rations.

• Can I Mix My Own Protein Supplement?

Here is an example of a good home-mixed protein supplement.

36 Percent Protein Supplement

| Ingredient | Lb. |
|---|---|
| 44% Soybean meal | 1535 |
| 17% Dehydrated alfalfa | 175 |
| Dicalcium phosphate | 180 |
| Salt (iodized) a/ | 50 |
| Trace mineral mix a/ | 10 |
| Vitamin antibiotic premix b/ | 50 |
| | 2000 |

a/ The trace mineral mix and/or iodized salt should supply: 450 grams zinc; 1.0 gram iodine; 45 grams iron; and 50 pounds of salt per ton of supplement.

b/ The vitamin-antibiotic premix should supply: 15,000,000 I.U. Vitamin A; 1,200,000 I.U. Vitamin D; 8.0 grams riboflavin; 40.0 grams niacin; 24 grams dicalcium pantothenate; 500 grams choline chloride; 50.0 mgs. Vitamin $B_{12}$ and 100 grams of antibiotic or comparable equivalent of arsenicals per ton of supplement.

Gestation-Lactation Rations

The 16 percent and 14 percent corn-soy ration previously described can be hand-fed to sows and gilts as indicated on page . However, extreme care should be taken to prevent overeating on the part of boss sows. If boss sows become a problem, individual sow feeding stalls should be considered.

For producers who wish to self-feed sows, the following rations are suggested. If sows become overly fat, add alfalfa hay at the expense of corn.

If constipation is a problem before and immediately after farrowing the substitution of 5 to 10% wheat bran or dried beet pulp for corn or milo is recommended.

| Ingredient | Rations | |
|---|---|---|
| | Gestation (Self-Fed) Lbs. | Lactation (Hand or Self-Fed) Lbs. |
| Ground yellow corn | 825 | 1088 |
| Ground oats | 400 | 250 |
| 44% Soybean meal | 220 | 350 |
| Wheat bran | 150 | 150 |
| Good quality alfalfa hay | 175 | --- |
| Dehydrated alfalfa meal | 175 | 100 |
| Dicalcium phosphate | 25 | 25 |
| Ground limestone | --- | 7 |
| Salt (iodized) | 10 | 10 |
| Vitamin mix | 20 a/ | 10 b/ |
| | 2000 | 2000 |

a/ Contributed a minimum of the following amounts of vitamins per ton of ration: Vitamin A, 2,200,000 I.U.; Vitamin $D_2$, 240,000 I.U.; riboflavin 1.0 gm; pantothenic acid, 3.0 gm.; and Vitamin $B_{12}$, 10 mg.; niacin, 8.0 gm.

b/ Vitamin A, 2,200,000 I.U.; Vitamin $D_2$, 240,000 I.U.; riblflavin, 1.2 gm.; pantothenic acid, 5.0 gm.; niacin, 4.0 gm. and Vitamin $B_{12}$, 10.0 gm.

Analysis Table

| Feedstuffs | Protein % | Fat % | Fiber % | Calcium % | Phosphorus % | Ribo-flavin | Niacin | Pantothenic Acid | Choline |
|---|---|---|---|---|---|---|---|---|---|
| Alfalfa meal (dehydrated) | 17 | 2.0 | 26.0 | 1.40 | .20 | 6.5 | 14.0 | 13.5 | 400 |
| Alfalfa meal | 13 | 1.5 | 33.0 | 1.20 | .20 | 4.0 | 9.0 | 10.0 | 300 |
| Barley | 11.5 | 1.8 | 8.0 | .06 | .40 | 0.70 | 24.0 | 2.5 | 450 |
| Corn (yellow) | 8.8 | 3.8 | 2.5 | .01 | .25 | .50 | 9.5 | 2.2 | 200 |
| Corn & Cob meal (yellow) | 7 | 3.0 | 8.0 | .04 | .20 | .40 | 7.2 | 2.0 | 160 |
| Fish meal, sardine | 65 | 4.0 | 1.0 | 4.5 | 2.4 | 2.50 | 28.0 | 3.0 | 1,300 |
| Meat & bone scraps | 50 | 6.0 | 2.5 | 10.00 | 5.00 | 1.5 | 21.0 | 1.8 | 750 |
| Milo(maize) | 9.0 | 2.5 | 2.5 | .02 | .30 | 0.40 | 18.0 | 4.0 | 280 |
| Molasses, beet | 6 | 0.0 | 0.0 | .10 | .02 | 1.00 | 17.0 | 2.0 | 400 |
| Molasses, cane | 3 | 0.0 | 0.0 | .50 | .05 | 1.00 | 20.0 | 17.0 | 300 |
| Oats | 12 | 4.0 | 12.0 | .10 | .33 | .50 | 7.5 | 5.0 | 425 |
| Oats, feed rolled, oat groats | 16 | 5.5 | 3.0 | .05 | .40 | 0.50 | 3.7 | 5.6 | 500 |
| Rye | 11 | 3.0 | 2.0 | 0.05 | 0.35 | 0.80 | 6.6 | 3.5 | |
| Skim milk, dried | 33 | .5 | 0.0 | 1.25 | 1.00 | 9.00 | 5.0 | 1.50 | 500 |
| Soybean meal (solvent) | 45 | .5 | 7.0 | .25 | .60 | 1.30 | 12.0 | 6.0 | 1,200 |
| Soy meal (solv.) (dehulled) | 51 | .5 | 3.0 | .20 | .65 | 1.2 | 9.5 | 6.0 | 1,300 |
| Tankage | 60 | 8.0 | 3.0 | 6.00 | 3.00 | 1.00 | 18.0 | 1.0 | 1,000 |
| Wheat, hard | 11.0 | 1.5 | 2.9 | .05 | .40 | 0.40 | 24.0 | 5.0 | 350 |
| Wheat, bran | 15 | 3.5 | 11.0 | .10 | 1.20 | 1.00 | 65.0 | 12.0 | 460 |
| Wheat middlings | 16 | 4.0 | 8.0 | .10 | .90 | 0.80 | 44.0 | 8.0 | 460 |
| Whey, dried whole, | 12 | .5 | 0.0 | .80 | .70 | 12.00 | 5.0 | 20.0 | 900 |
| Dicalcium phosphate | --- | --- | --- | 26.0 | 18.0 | --- | --- | --- | --- |
| Steamed bonemeal | --- | --- | --- | 24.0 | 12.0 | --- | --- | --- | --- |
| Steamed bonemeal, special | --- | --- | --- | 26.0 | 13.0 | --- | --- | --- | --- |
| Defluorinated rock phosphate | --- | --- | --- | 34.0 | 14.5 | --- | --- | --- | --- |
| Disodium phosphate | --- | --- | --- | --- | 21.4 | --- | --- | --- | --- |
| Monosodium | --- | --- | --- | --- | 25.5 | --- | --- | --- | --- |
| Ground limestone | | --- | --- | 38.0 | --- | --- | --- | --- | --- |