



SWINE FEEDING and MANAGEMENT

from WEANING to MARKET

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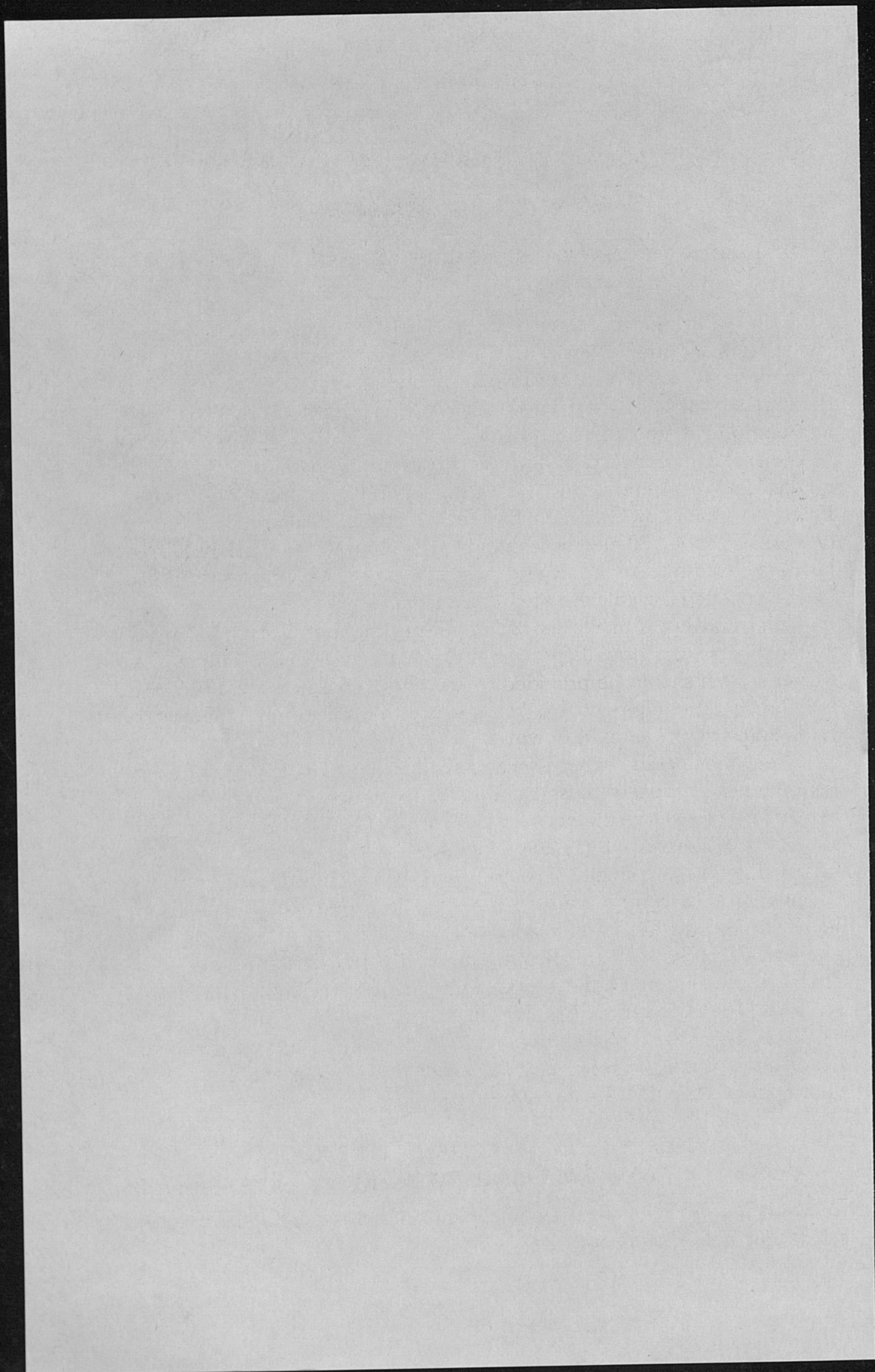
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**UNIVERSITY OF KENTUCKY
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By JOHN C. ROBERTSON, C. E. BARNHART, and C. H. CHANEY

This publication covers the steps in feeding and management of swine from weaning to market. However, our information would be incomplete if we did not mention briefly other factors which also determine profits in the swine industry—(1) breeding, (2) housing and equipment, and (3) herd health.

Breeding, or genetics, is not only important from the standpoint of quality and marketing, but it is also important in feed conversion. Feed conversion, or the amount of feed required to produce a pound of pork, is about 30 percent heritable. So to get the most out of a balanced feeding program, you must also select breeding stock that has been tested for efficient feed conversion.

Good housing is also essential in getting the most out of balanced nutrition. Pigs must be kept warm, dry, and draft-free in winter. A fogger system should be provided to keep hogs cool in the hot summer months. Feed equipment that keeps waste to a minimum is necessary for keeping your feed cost down.

Good herd health is necessary to realize the most from your feed investment. Producers must be able to recognize disease symptoms and follow preventive methods. Swine erysipelas and atrophic rhinitis are the two diseases which cause the greatest losses in feed efficiency in growing-finishing swine. Erysipelas can be controlled by preventive vaccination. To control rhinitis, buy only breeding stock from clean herds. If the disease is on your farm, cull the breeding herd rigidly and add 50 grams of a broad spectrum antibiotic per ton of complete feed. Depopulation of the swine herd and replacement with clean stock may be necessary if the disease is widespread.

Each of these areas—breeding, housing and equipment, herd health—is discussed in more detail in other publications available from your county agricultural extension office.

GENERAL MANAGEMENT OF PIGS FROM WEANING TO MARKET

1. The number of pigs per linear foot of self-feeder space or per self-feeder hole should be:

	<i>On Drylot</i>	<i>On Pasture</i>
Weaning to Market	4	4-5

(A 10-foot self-feeder open to pigs on both sides provides 20 linear feet of feeding space.)

2. The percentage of self-feeder space given to protein supplement should be:

	<i>On Drylot</i>	<i>On Pasture</i>
Weaning to 75 lb	25%	20-25%
76 lb to 125 lb	20%	15-20%
126 lb to market	15%	10-15%

Figure 1 shows a good arrangement of feeder and waterer.

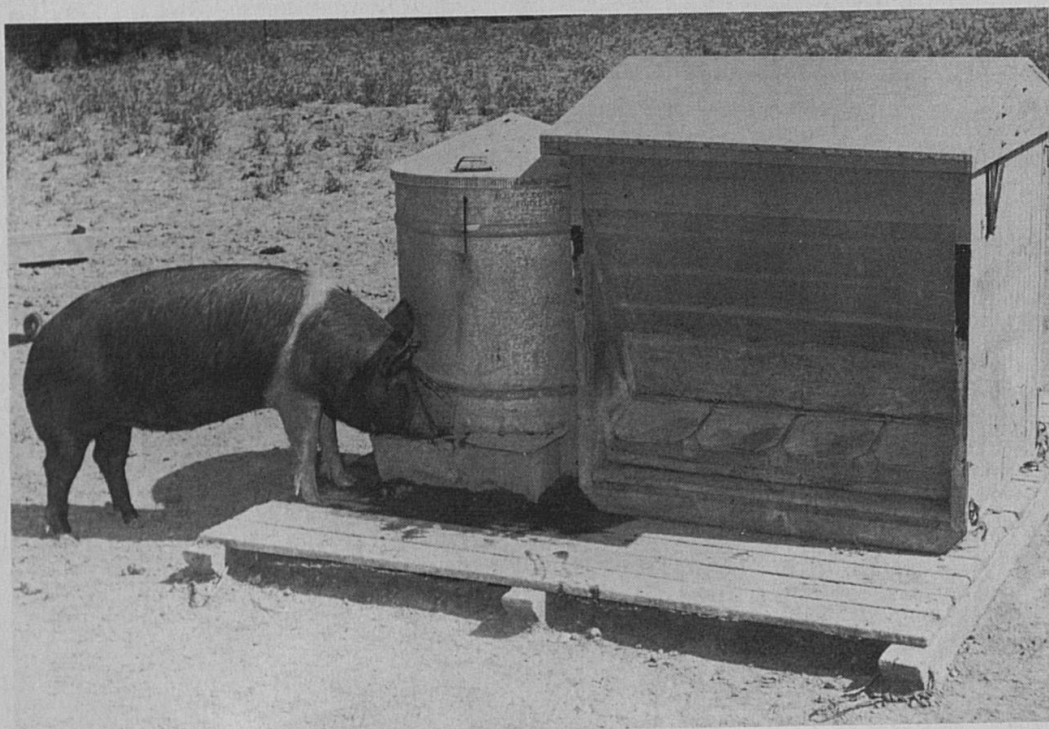


Fig. 1.— Note the platform which can be moved easily to keep feeder and waterer out of mud.

3. For hand-feeding in troughs or for hand-watering, the length of the trough per pig should be:

Weaning to 75 lb	0.75 ft
76 to 125 lb	1.00 ft
126 lb to market	1.25 ft

(A 10-foot trough is considered to provide 10 feet of feeder space whether pigs eat from one or both sides.)

4. One automatic watering cup should be provided for each 25 pigs (Fig. 2). (An automatic waterer with two openings should be considered 2 cups.)



Fig. 2.—This automatic waterer can provide fresh water for 50 pigs and is equipped with a thermostatic heating device.

5. The minimum capacity for a waterer for 10 pigs per day should be 25 gallons in the summer and 15 gallons in the winter.

6. Drinking water temperature should not fall below 35° to 40° F during the winter. The best temperature is about 45° F.

7. When pigs are confined from weaning to market, 12 or more square feet of feeding floor is recommended (Fig. 3).

8. The use of a fogger system is recommended. Each fogger should provide 1 gallon of water per hour at 25 pounds pressure.

9. To control and prevent roundworm infestation, follow a strict sanitation program. When such a program is not effectively carried out, worm pigs soon after weaning and repeat the treatment later if needed. Use pipazine to control roundworms.

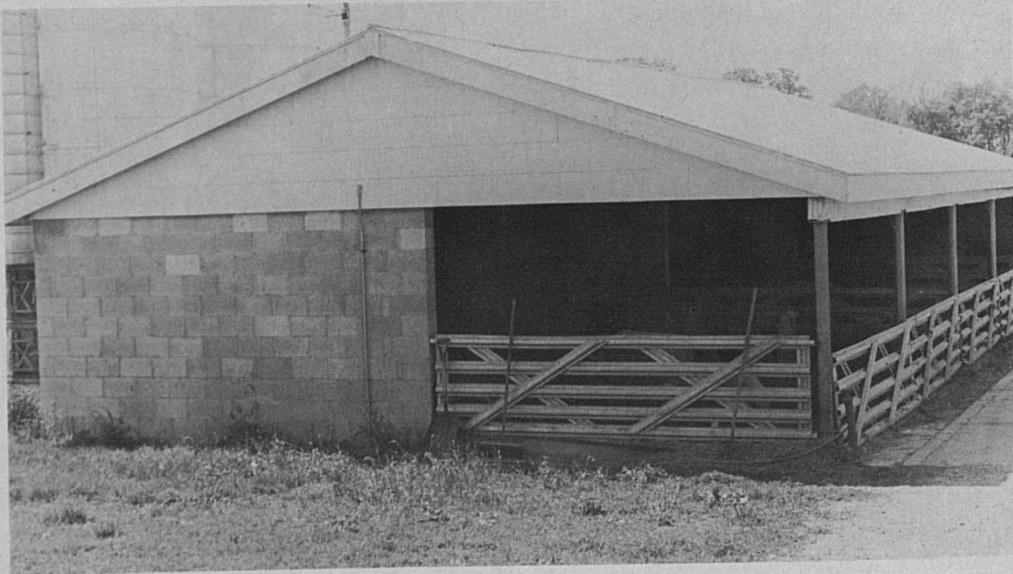


Fig. 3.— A well designed building for feeding hogs in confinement from weaning to market.

10. Effective mange and lice treatment is recommended when pigs are weaned and whenever needed thereafter. Lindane or methoxychlor is effective. Do not treat hogs less than 30 days before slaughter.

11. If you have good legume or legume-grass pasture, allow 20 growing-finishing pigs per acre.

12. Pigs of widely varying weights should not be kept together in the same lot. It is recommended that the range in weight should not exceed 20 percent above or below the average.

13. The suggested number of pigs per lot should not exceed 50.

14. Tail-biting is sometimes a problem. This can be nutritional, but in most cases it is not. It is suggested that you follow the practices listed above especially concerning feeder-hole space and floor space per pig. Many times only one or two pigs are involved, and this can be corrected by observing your pigs and removing these individuals before the problem becomes widespread.

FEEDING FROM WEANING TO MARKET

Feed costs today make up about 70-75 percent of the total cost of producing pigs. Rations that supply proper nutrition at the least cost will increase your profits.

The cereal grains—corn, barley, wheat, oats, rye, and grain sorghums—are the principal feeds for hogs. Farm grains alone do not provide a balanced ration. Balanced rations provide in proper

amounts (1) carbohydrate (in grain), (2) protein (in supplement containing the quality of protein in terms of essential amino acids), (3) minerals, and (4) vitamins.

Corn and Small Grains

Corn is the principal hog feed in this country, and it is an excellent source of energy. Pigs will eat more shelled corn if you grind it. Thus, they gain faster on ground corn and are ready for market sooner. Ground corn can be mixed with other feedstuffs to provide and insure a balanced ration. With a mixed ration, you can be sure that pigs are not over-eating expensive protein supplements, and there are usually fewer "tail end" pigs when ground corn is fed. However, pigs fed ground corn may require slightly more feed per 100 pounds of gain than pigs fed shelled or ear corn. The trend is toward complete mixed rations because (1) they are more suited to automatic feeding, (2) palatable protein like soybean meal is too heavily consumed when fed free-choice, and (3) medication of feeds is simpler and more efficient.

Pigs from 40 pounds to market weight should not eat over $\frac{3}{4}$ pound of 40 percent protein supplement per head daily in drylot or $\frac{2}{3}$ pound when on pasture.

Table 1.— Value of Grains per Pound Compared with Shelled Corn as a Feed for Hogs

Grain	Percent Value of Corn	Rate of Gain	Use as Only Grain for Finishing	Must be Ground for Best Results	Fineness of Grind
Corn	100	---	Yes	No	Fine
Grain sorghum	90	Equal	Yes	Yes	Fine
Barley	85	Slightly less	Yes	Yes	Fine
Wheat	105	Equal	Yes	Yes	Medium
Oats	80	Slower	$\frac{1}{3}$	Yes	Fine
Rye	70-90	Equal	$\frac{1}{2}$	Yes	Medium
Bakery waste	100	Equal	$\frac{1}{2}$	---	---

Yellow corn and white corn have the same feeding value for hogs except for the vitamin A content of yellow corn. Yellow corn may lose most of its vitamin A value after 8 to 9 months storage.

Corn and Cob Meal (ground ear corn)—has 85 to 90 percent the value of shelled corn and slows gain.

Barley—Protein supplements should be either mixed with the barley or hand-fed, since hogs will eat more supplement than is economical when self-fed separately. Do not feed scabby barley to hogs.

Wheat—an excellent feed for hogs but usually is too expensive. For best results feed half wheat and half corn.

Oats—vary considerably in feed value, depending upon weight. This grain is too bulky for maximum gain when fed as the only grain. Oats are higher than corn in protein and minerals and make an excellent feed for breeding stock. It may be fed up to 30 percent of the ration without slowing gains.

Rye—is not so palatable and should be fed with other grains for best results. Ergot-infected rye is harmful to growing and finishing animals and should never be fed to breeding animals.

Protein Is Essential

High quality protein is essential for muscle, tissue, hair, hoof, and tendon development. Research has shown that corn and other cereal grains cannot provide sufficient protein in quantity or of quality to meet the pig's requirements.

The amount of protein needed in the ration decreases as the pig increases in weight. Table 2 gives the recommended protein level for swine rations.

Table 2.— Protein Requirements of Swine in Drylot

Live Weight, lb	Crude Protein, Percent of Ration	36% Supplement		40% Supplement	
		Corn- Supplement Ratio	Protein Supplement Daily	Corn- Supplement Ratio	Protein Supplement Daily
40-75	16	2.7:1	0.75	3.2:1	0.7
75-125	14	4.0:1	0.9	4.7:1	0.75
125-210	12	6.8:1	0.9	8.0:1	0.75

You may feed most protein supplements free choice or mix them in the ration with good results. However, a straight soybean meal supplement is too tasty to be fed free choice unless extra minerals are added to reduce palatability.

Experiments have shown that soybean meal properly fortified is equal in value to a mixture of protein from several sources. Soybean meal is deficient in the B vitamins (riboflavin, pantothenic acid, vitamin B₁₂), vitamin A, vitamin D, calcium, and phosphorus. When

these deficiencies are corrected, it is an excellent supplement to corn as a feed for hogs.

By using the following method, you can determine how much grain and how much supplement to use to make a mixture with a certain protein content.

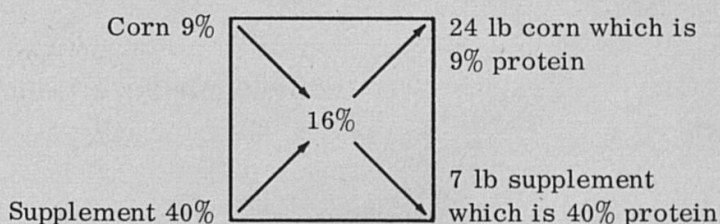
Example I.— A mixture containing 16 percent protein is to be made from corn containing 9 percent protein and supplement containing 40 percent protein.

Draw a square. In the center of the square, put the protein content desired in the final mixture.

At the upper left-hand corner of the square, write "corn" and its protein content (9); at the lower left-hand corner, write "supplement" and its protein content (40).

Subtract diagonally across the square (the smaller from the larger), and enter the results at the corners on the right-hand side ($16-9=7$); ($40-16=24$).

The number at the upper right-hand corner gives the parts of corn, and the number at the lower right-hand corner gives the parts of supplement needed to make a mixture with 16 percent protein.



Thus, 24 pounds of corn mixed with 7 pounds of supplement gives 31 pounds of feed with 16 percent protein.

To convert this to a 100-pound basis, divide 31 pounds into 24 pounds. The result, 0.774, multiplied by 100 gives 77.4. This means that 77.4 pounds of 9 percent corn mixed with 22.6 pounds ($100-77.4$ pounds) of 40 percent supplement will provide 100 pounds of 16 percent feed.

Example: $24/31 \times 100 = 77.4$ lb of lower protein material to be used

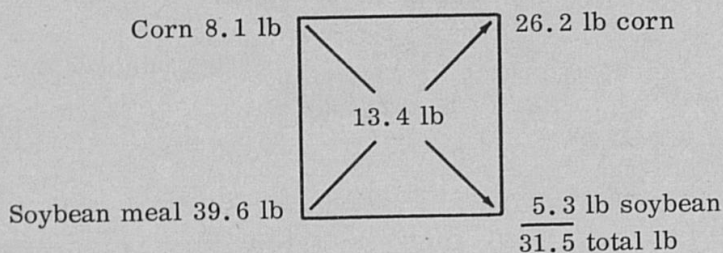
Blending	77.4 lb of corn with	= 1,548 lb/ton
	22.6 lb of 40% supplement gives	= 452 lb/ton
	<u>100.0 lb of 16% feed</u>	<u>2,000 lb 16% feed</u>

Example II.— Mix corn, soybean meal, and alfalfa meal so that the mixture will contain 15 percent crude protein and exactly 10 percent alfalfa meal. The corn contains 9 percent, soybean meal, 44 percent,

and alfalfa meal, 16 percent crude protein. For convenience in figuring, use 100 pounds (percent) of the mixture.

STEP 1. The 10 pounds of alfalfa meal will furnish 1.6 pounds of protein ($0.16 \times 10 = 1.6$). This leaves 13.4 pounds of protein to come from the remaining 90 pounds of corn and soybean meal.

STEP 2. Since 13.4 pounds of protein must come from 90 pounds of corn and soybean meal, multiply the amount (%) of crude protein in both corn and soybean meal by 90 before setting up the square for obtaining the amounts of corn and soybean meal needed. For the square, put 13.4 (protein required after subtracting 1.6 furnished by the 10 pounds alfalfa meal) in the center of the square. In the upper left corner place 8.1 ($90 \times 9\%$ crude protein in corn = 8.1). Place 39.6 in the lower left corner ($90 \times 44\%$ crude protein in soybean meal).



STEP 3. Repeat step 3 shown in Example I.

$$13.4 - 8.1 = 5.3 \text{ lb soybean meal}$$

$$39.6 - 13.4 = 26.2 \text{ lb corn}$$

$$\text{Total lb} = 5.3 + 26.2 = 31.5$$

$$26.2 \div 31.5 = 83.2\% \text{ corn} = 83.2 \text{ lb corn}$$

$$5.3 \div 31.5 = 16.8\% \text{ soybean} = 16.8 \text{ lb soybean meal}$$

However, recall that corn and soybean meal make up 90 percent of the ration, not 100, thus:

$$83.2 \times 0.90 = 74.88 \text{ lb corn}$$

$$16.8 \times 0.90 = 15.12 \text{ lb soybean meal}$$

$$\underline{90.00 \text{ lb}}$$

Therefore, the ration is:

	lb
Corn	74.88
Soybean meal	15.12
Alfalfa meal	10.00
	<u>100.0</u>

Minerals

Minerals supply the materials needed for building the skeleton and body fluids. The minerals essential for swine nutrition are calcium, phosphorus, sodium, chlorine, manganese, iron, copper, iodine, cobalt, and zinc. Each of these is needed for a specific purpose, and for optimum health they must be in the ration at the proper level.

The common source of calcium and phosphorus is limestone, dicalcium phosphate, and steamed bone meal. Sodium and chlorine are provided by salt. One-half pound of salt per 100 pounds of complete feed is recommended for all ages of swine. The other minerals can be provided in a trace mineral mixture.

Vitamins

Vitamins are required in very small amounts for growth, maintenance, reproduction, and lactation. Vitamins differ from other nutrients in that they do not build body tissues but are essential for specific biochemical reactions in the body. An example of this function is vitamin D which is needed for the utilization of calcium and phosphorus.

To prevent deficiencies, vitamins must be provided regularly in the ration at adequate levels because the body does not store them in significant quantity.

The essential vitamins for swine are vitamins A, D, riboflavin, pantothenic acid, niacin, choline, and B₁₂.

Table 5 (page 13) gives the suggested level of vitamin supplementation for both supplements and complete rations.

Water—An Essential Nutrient

Water is not generally considered as a nutrient in animal feeding, but in reality it is more important than solid foods. An animal can go without solid foods for some time without serious body damage, but it must drink water regularly at short intervals.

The importance of fresh water cannot be overemphasized in both good nutrition and disease prevention. Water is immediately absorbed into the body fluids through the walls of the stomach. If the water contains disease organisms, there is an immediate danger of those organisms infecting the animals.

An automatic waterer attached to a pressure system or a self-watering device in a tank are dependable methods of providing water. Swine require 2 to 3 gallons of water per head per day, depending on age and size.

Non-Nutritive Feed Additives

Feed additives are not nutrients, but they may, under certain circumstances, improve growth. This effect is probably due to the destruction of certain harmful micro-organisms or parasites which tend to inhibit growth.

The most common feed additives are antibiotics and anthelmintics. Research work has shown the beneficial effects of feeding low levels of antibiotics continually to growing-finishing pigs. Under most systems of management 10 grams per ton in complete mixed feed is optimum. Most research work shows that very little is gained from feeding arsenic compounds to growing-finishing pigs.

Anthelmintics are compounds used in the ration to control worms or internal parasites. Piperazine is one of the most effective chemicals to control and prevent worms in swine.

Supplements for Swine

Table 3 lists two protein supplements which may be self-fed free choice with corn or ground small grains.

Table 3.— Protein Supplements for Swine

Ingredients	(2,000-lb mix)	
	Supplement A	Supplement B
Percent protein	40.45	36.30
50% solvent soybean meal, lb	1,050	-----
44% solvent soybean meal, lb	-----	1,650
50% meat and bone scraps, lb	500	-----
17% dehydrated alfalfa meal, lb	200	-----
Steamed bone meal, lb	100	100
Ground limestone, lb	100	200
Iodized salt, lb	40	40
Trace minerals (see Table 4), lb	10	10
Vitamins (see Table 5)	+	+
Antibiotic, grams	80	80
Total	2,000	2,000

Table 4.— Content of Suggested Trace Mineral Mixture, Percent of Each Mineral

Mineral	Approximate Percent
Manganese	12
Iron	10
Copper	0.73
Zinc	5.00
Cobalt	0.26
Iodine	0.38

Table 5.— Vitamin Additions to Swine Rations, Amount to Add per Ton¹

	Supplements A-B-C-D	Complete Rations (Table 7)
Riboflavin, grams ²	20	4
Panthenate acid, grams	40	10
Niacin, grams	80	30
Choline, grams	400	100
Vitamin A, I. U.	15 million	3 million
Vitamin D, I. U.	2 million	600,000
Vitamin B ₁₂ , milligrams	80	16

¹ Many good vitamin premixes are on the market. It is only suggested that you follow these recommendations as closely as possible.

² 1 gram = 1,000 milligrams; 1 pound = 454 grams.

The supplements listed in Table 6 are recommended for mixing with ground corn or small grains.

Table 6.— Suggested Supplements for Grinding and Mixing

Ingredients	Supplement C (38%)	Supplement D (40%)
44% soybean oil meal, lb	1,730	1,470
50% meat and bone scraps, lb	-----	300
Salt, lb	50	50
Dicalcium phosphate or steamed bone meal, lb	110	110
Limestone, lb	100	60
Trace minerals, lb (Table 4)	10	10
Vitamin premix, lb (Table 5)	+	+
Antibiotics, grams	80	80
Total	2,000 lb	2,000 lb

Mixing instructions for Supplement C:

	16%	14%	12%
Corn, lb	1,520	1,650	1,750
Supplement C, lb	480	350	250

Mixing instructions for Supplement D:

	16%	14%	12%
Corn, lb	1,550	1,680	1,800
Supplement D, lb	450	320	200

If you do not want to mix your own supplements, many good commercial supplements are available.

Many producers prefer to build complete rations rather than mix a supplement and corn together at the proper ratio to get the desired protein levels. This eliminates making a supplement and, of course, requires less handling of feedstuffs. Table 7 gives suggested rations for various weight ranges.

Table 7.— Complete Growing and Finishing Rations

Ingredients	16% Crude Protein	14% Crude Protein	12% Crude Protein
	Fed from Weaning to 75 lb	Fed from 75 lb to 125 lb	Fed from 125 lb to 200 lb
Ground yellow corn, lb	1,590	1,690	1,780
50 % soybean oil meal, lb	370	270	180
Steamed bone meal or di-calcium phosphate, lb	10	10	10
Ground limestone, lb	14	14	14
Salt, lb	10	10	10
Trace minerals, lb (see Table 4)	6	6	6
Vitamin premix, lb (see Table 5)	+	+	+
Antibiotics, grams	10	10	10
Total	2,000	2,000	2,000

STEPS TO HOG HEALTH

1. At first sign of sickness, remove ailing animal from the herd. Place in isolated quarters.
2. Place pigs on clean pasture not used by hogs for the past 2 years or on clean concrete pens. Old hog lots are usually a source of infection for diseases such as necro and erysipelas.

3. Keep manure piles removed from hog areas. Manure from infected animals is a common source of internal parasite infection in young pigs.

4. Keep pens and lots well drained; make sure there is no drainage from lots with older pigs to lots with younger ones.

5. Maintain a closed herd as far as possible.

6. Isolate purchased stock for 1 month.

7. Keep visitors to a minimum.

8. Provide fresh water.

9. Avoid the 3-D's—drafts, dust, and dampness.

RECORDS

Feed efficiency records are a valuable tool to aid the swine producer in culling and selecting replacement breeding stock. The efficiency with which hogs convert feed into pork is vital to your final profit or loss. Producers are reminded that feed efficiency is about 30 percent heritable. To get the most out of a balanced feeding program, you must select those individual pigs that are efficient in converting feed to pork.

Different methods are used to figure feed conversion. These are listed with some examples of typical results.

1. Total feed fed from about 50 pounds to market weight at about 200 pounds divided by the total weight gain for the same period. Typical average figures may range from 300 to 370 pounds of feed per 100 pounds of gain. The important use that can be made of these figures is in assessing the value of breeding stock.

2. Total feed fed during shorter periods of the pig's life divided by the total weight gain for the same period. These figures are useful in assessing the value of your breeding herd, but use caution in comparing them with figures obtained on animals fed to 200 pounds. Feed conversion becomes less efficient as pigs grow older and heavier.

A set of scales will give accurate information on market weights and rate of gain data (Fig. 4).

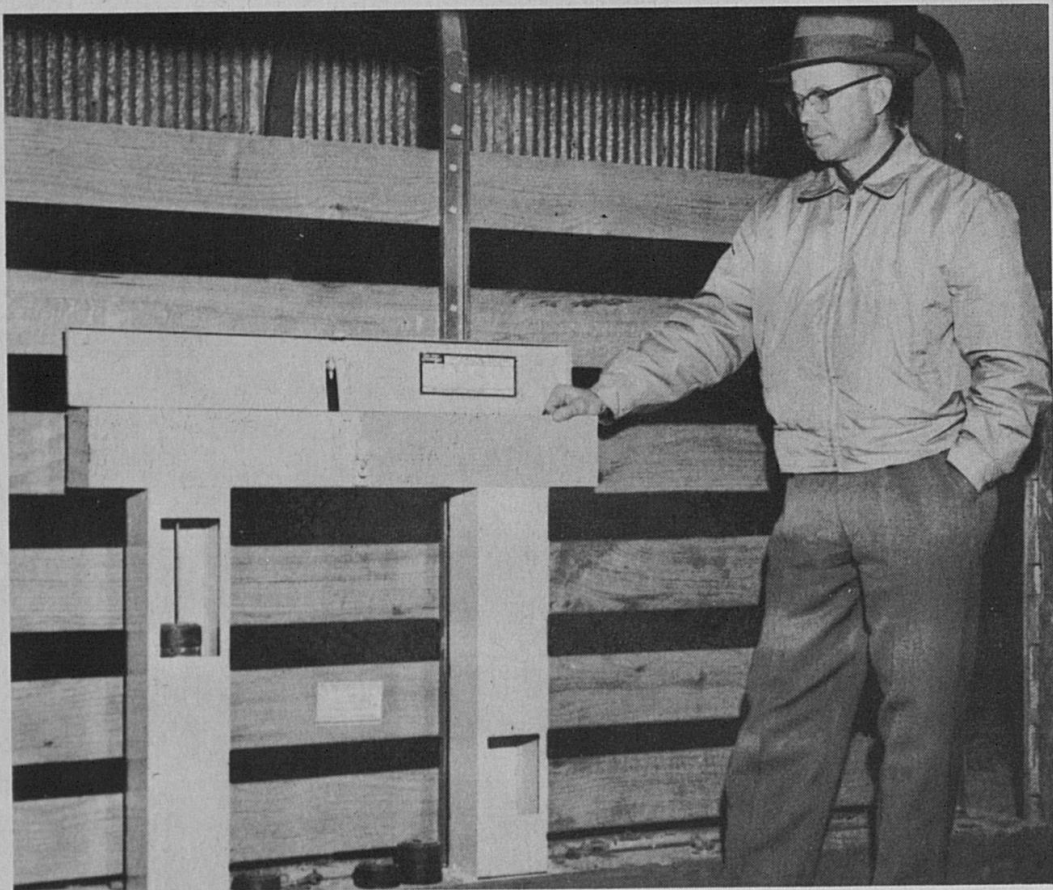


Fig. 4.— A set of scales is a "must" for any swine operation.

This circular and Circular 591, "Swine Feeding and Management from Farrowing to Weaning," replace Circular 368, "Pigs—From Birth to Market in Six Months."

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