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SWINE RATIONS

A profitable swine enterprise depends upon the proper nutrition of swine in each phase of production. The correct nutrition is built into the ration with adequate protein, energy, vitamins, and minerals. The use of grain raised on each farm is essential and will produce satisfactory gains when properly supplemented.

Pigs convert feed into edible meat more efficiently than other four-legged animals. The amount of feed required per 100 pounds gain is lowest in young pigs and increases steadily as they grow older and increase in weight. The rate of gain begins to decrease at about 240-250 pounds.

Our best sources of energy are barley, oats and wheat, and corn in those areas of North Dakota where corn is produced as a grain crop. We believe the grain raised in any area is the source of energy that should be used locally. Do not feed blighted, moldy or ergot-infected grain.

For satisfactory rates of grain and reproduction, grains need supplementary protein to increase both the quality and quantity of protein, or amino acids, provided. This can be accomplished by addition of soybean oil meal, or animal slaughter by-products such as meat and bone meal, fish meal, meat meal, or tankage. A prepared protein supplement for swine can be obtained from a local feed dealer. These supplements will furnish minerals and vitamins as well as high-quality protein. When buying a protein supplement, calculate the best price on the basis of protein content. Liquid whey from cheese plants can be used profitably, providing distance from a cheese plant is not great.

Swine rations always require mineral fortification, because grains are extremely poor sources of calcium and one half to two third of the phosphorous present in grains is nutritionally unavailable to pigs. Minerals can be provided by buying a mineral mixture and adding according to the directions or by adding dicalcium phosphate and limestone at rates of about one percent each in the average grain ration. When protein supplements of animal origin are included,

less calcium and phosphorous need be added.

Growing-finishing pigs should receive 0.7 percent calcium and 0.6 percent phosphorous or more in the ration. Slightly higher levels of both minerals are desirable for young pigs. The calcium to phosphorous ratio for growing-finishing pigs should be kept between 1.0:1 and 1.3:1. Although calcium is comparatively cheap and an essential addition to swine rations, using excess amounts can interfere with absorption and utilization not only of phosphorous but several trace minerals as well, including zinc, iron, and copper.

Sows can tolerate somewhat wider Ca:P ratios. For lactating sows, 0.75 calcium and 0.6 percent phosphorous should be minimum levels. Sows occasionally "go down" following lactation; this is usually due to inadequate calcium in their lactation ration, but could be due to vitamin D deficiency.

Sows that are limit-fed during gestation need higher levels of minerals in their rations because of sharply restricted ration allowance. Sows restricted to four pounds ration or less should have 1.0 percent calcium and 0.8 percent phosphorous in their ration. When sows are allowed more feed daily, mineral levels in rations for limit-feeding can be reduced accordingly.

Salt should normally be included in swine rations at levels from 0.25 to 0.50 percent of the ration. This should be in the form of a special salt, formulated to meet the mineral needs of swine. Where farms have water supplies high in sodium content, no salt or reduced amounts should be included in the ration.

Trace elements also are essential additions to hog rations. Hairlessness in pigs at birth indicates iodine deficiency. Feeding stabilized iodized salt will prevent this problem. Only 0.1 milligram iodine added per pound of ration for bred sows is enough to prevent shortage.

Parakeratosis is a severe skin disease that sometimes shows up in swine when zinc is intake is inadequate or when the calcium content of the ration is excessively high. The disease can be controlled by adding zinc carbonate or zinc sulphate to the ration at the rate of from 0.01 to 0.02 percent.

Real young pigs may develop iron deficiency before they are old enough to eat a creep ration. This comes about from rapid growth of the young pig, low iron reserves at birth, and very low iron content of sow's milk. This is almost

exclusively a baby pig problem and can be controlled by injecting pigs from two to five days of age with from one to two cc's of injectable iron according to directions. If pigs are on concrete dry lot and not on creep feed at two weeks of age another injection is desirable. Do not use injectable iron after four weeks of age or the meat at the site of injection may be stained. If an injection is necessary at that age it should be made into the jowl. Ordinary soil from areas not frequented by hogs also is helpful in providing iron to baby pigs if placed in the farrowing twice weekly.

Vitamins A and D are of extreme importance in swine feeding. Swine on green pasture do not need vitamin A or D additions to their diet. Well cured high quality legume hay fed to sows and boars in drylot will help to insure against vitamin shortage, but it is best to rely on additions of synthetic vitamins for finishing pigs in drylot.

Alfalfa hay additions to growing-finishing rations contribute too much fiber to the ration and cause lower gains and feed efficiency. Alfalfa hay can desirably be provided in a hay feeder for sows and boars in drylot when not included in the ration, however. Alfalfa can be used to dilute a sow's ration when self-fed in order to keep the sows in proper condition, by increasing or decreasing the alfalfa.

For pigs in drylot, the required vitamins - A, D, E, riboflavin, pantothenic acid, niacin, B_{12}, and choline - should be provided in supplements to assure against shortage of these important nutrients. A special vitamin premix prepared for swine or use of either a complete commercial hog supplement or complete commercial rations should be depended upon to avoid vitamin deficiencies in young pigs and growing-finishing hogs. The B complex vitamins are needed in limited amounts and can be supplied by green, growing pasture or high-quality alfalfa hay for breeding sows and boars. Sows and boars on green, growing pasture are unlikely to encounter vitamin shortage. For young and growing pigs in drylot or for breeding stock in drylot, use a product containing synthetic vitamins provided by your feed dealer mixed according to directions.

Remarkable progress has been made in recent years in our knowledge of swine nutrition. Problems have developed with hogs raises in confinement which may be closely associated with nutrition under such a system. Under confinement production all their nutritional needs must be provided in proper amounts and proportions by their ration since they have no opportunity to use their own instincts to select dietary needs. Recent experience and research has suggested need for supplementary vitamin E, selenium, and biotin under certain confinement conditions.

Simple rations based on barley, oats, and soybean oilmeal plus needed minerals and vitamins form an economical basis for production of hogs in North Dakota.

Several rations are listed below as samples of rations useful for pigs of different ages. These rations may be modified to use economical feeds available on the farm or in the locality.

Pre-starter type commercial baby pig feeds are available, but quite expensive. If the young pigs have access to the sows feed, they will learn to eat before weaning and a pre-starter type feed is not necessary. The pig starter to be fed prior to and following weaning should contain 18 percent protein, 0.9 percent calcium and 0.75 percent phosphorous. Ration 1 is adequate for pigs weighing up to 50 pounds.

Ration 1. Grower ration for pigs after weaning	
18 Percent protein	
Oats	285 lbs.
Barley	500 lbs.
Soybean oilmeal	180 lbs.
Dicalcium phosphate	18 lbs.
Limestone	10 lbs.
Trace mineral salt	5 lbs.
Swine vitamin premix	340 grams, or add according to manufacturer's instructions
Vitamin A	30 grams, or 1 million International Units
Vitamin D	14 grams, or 100,000 International Units
Zinc sulfate	180 grams

Total	1000 lbs.

Growing-Finishing

From 50 pounds to market weight of 220 to 235 pounds, groups of healthy, parasite-free crossbred hogs should make average gains from 1.5 to 1.6 daily. Select groups may gain faster. Approximate feed requirements per 100 pounds gain for this whole period will average near 400 pounds gain in summer on meal rations. Pigs fed complete rations in pellet form will gain up to 10 percent faster on about 14 percent less feed, so will require around 350 pounds ration per 100 pounds gain. Both the starting weight and the final market weight have important effects on the calculation of amount of feed needed per hundredweight gain by the growing-finishing pig. Feed requirements per 100 pounds gain are higher during the winter than during the warmer seasons. The amount of increase in feed needed during winter depends upon how much exposure to the elements the pig faces.

Studies show that pigs up to 125 pounds require a high-quality protein supplement and higher ration protein levels whether in dry lot or on pasture for satisfactory gains. Pigs heavier than 125 pounds need supplemental protein for the best gains and feed conversion, although lower levels of protein can be used for pigs over 125 pounds than for smaller pigs. Pigs on excellent pasture that are over 125 pounds have reduced needs for supplementary protein. High quality pasture will maintain satisfactory gains when protein level of the ration is reduced one and a half to two percent, as compared to comparable pigs in drylot. The heavier the pigs are, the less critical is the need for supplemental protein. To minimize feed costs it is best to reduce protein level of the ration as pigs grow, to correspond with their reduced dietary need for protein.

When protein is high in price relative to cost of feed grains, it may be most economical to feed slightly less than the amount of protein needed to give maximum gains and feed conversion efficiency. When protein (amino acid levels) is lower than optimum, efficiency of feed conversion seems to decline more rapidly than gain rate. On the other hand, when grains are high in price relative to cost of protein supplements, it will be most economical to feed higher levels of protein to assure maximum gain rate and feed conversion efficiency.

When reducing protein level, be sure to maintain ration mineral and vitamin fortification at adequate levels. This is especially important when using complete commercial supplements, as one depends upon these feeds to furnish

ration mineral and vitamin additions as well as supplementary protein.

Ration II with the percent protein as indicated will do a good job of growing out pigs.

Ration II. Rations for growing-finishing swine				
Ingredient	16% Protein ration	14% Protein ration	12% Protein ration	No added protein ration
Oats	285 lbs.	305 lbs.	317 lbs.	325 lbs.
Barley	567	607	645	647
Soybean oil meal	120	60	10	---
Dicalcium phosphate	12	12	12	12
Limestone	10	10	10	10
Trace mineral salt	5	5	5	5
Swine vitamin premix	1*	1*	1*	1*
Vitamin A	1,000,000 I. U.	1,000,000 I. U.	1,000,000 I. U.	1,000,000 I. U.
Vitamin D	100,000 I. U.	100,000 I. U.	100,000 I. U.	100,000 I. U.
Zinc sulfate	180 grams	180 grams	180 grams	180 grams
Totals	1000 lbs.	1000 lbs.	1000 lbs.	1000 lbs.
Calculated analysis				
Percent protein	16.0	14.0	12.0	11.7
Percent calcium	0.76	0.75	0.73	0.73

Percent phosphorous	0.62	0.60	0.59	0.59

*use vitamin premix according to manufacturer's instruction

The 16 percent ration is ideal for pigs from 15 to 125 pounds and will produce a firm flesh. The 14 and 12 percent rations will result in good gains but not quite up to that produced by the 16 percent ration. These rations are best suited to pigs over 125 pounds and 175 pounds respectively.

Tankage, fish meal, meat scraps, meat and bone meal, or skim milk can be used in swine rations to bring up the protein to the desired level but may cost more and will probably not give any better gains than soybean oilmeal.

Gestation and Lactation

Sows and gilts can be either hand fed or self-fed during pregnancy. Overfeeding of brood sows may result in smaller litters because of a higher embryo mortality, and adds to the feed cost per pig weaned. It also shortens the productive life of sows. Heavy sows are more apt to lay on and crush newborn pigs. Old sows need to gain slightly more than the weight of the newborn litter plus the weight lost during the previous lactation period. Intake of protein, minerals, and vitamins is more critical during gestation than is energy. Pregnant sows and gilts should get at least 0.6 pound protein during the last third of pregnancy. Protein needs are less during the first two thirds of gestation. Grain and high quality alfalfa plus minerals and vitamins are adequate as protein sources for the first two thirds of pregnancy.

Sows should receive 1.0 to 1.25 pounds of feed per 100 pounds of body weight with an increase up to about 1.5 pounds during the last four to six weeks of pregnancy. Gilts under the same conditions should receive 1.3 to 1.6 pounds per head daily per 100 pounds body weight up to two pounds the last four to six weeks before farrowing. Gilts should gain 100 to 125 pounds weight during the pregnancy period.

Rations of type III are satisfactory for limit-feeding during gestation.

Ration III. Gestation rations for gilts and sows (for limit-feeding)

Ingredient	Low protein for first 2/3 of gestation	Sows and gilts	Ration for mixing with ground alfalfa
Alfalfa hay	400 lbs.	300 lbs.	--- **
Oats	1525	1000	1200 lbs.
Barley	---	385	440
Soybean oil meal	---	245	285
Dicalcium phosphate	55	50	60
Limestone	---	10	5
Salt	10	10	10
Swine vitamin premix	*	*	*
Totals	2000 lbs.	2000 lbs.	2000 lbs.

*use vitamin premix according to manufacturer's instructions. Approximately twice the level used for growing-finishing pigs is needed per ton of ration for limit feeding pregnant sows.

**this grain-supplement formula can be combined with ground alfalfa to make rations for limit-feeding. Mixtures can vary from 5 parts of this formula with one part alfalfa to equal parts of alfalfa and this formula. Greater amounts of ration should be offered per day as proportions of alfalfa in the ration is increased.

Ration IV. Gestation rations for pregnant sows and gilts (for self-feeding)	
Alfalfa hay, ground	600 lbs.
Oats	1165
Barley	100

Soybean oil meal	100
Dicalcium phosphate	20
Salt	10
Swine vitamin premix	*
*use vitamin premix according to manufacturer's instructions.	

When using rations of type III, if sows and gilts appear to be gaining too much, reduce the amount being hand fed daily. Ration IV can be self-fed with continuous access to the feeder, if enough alfalfa is included in the formula. The suggested ration IV contains 30 percent alfalfa. Increase the amount of alfalfa per ton of ration to restrict energy intake and gain of sows. It may necessary to include up to 60 to 70 percent alfalfa in the ration to prevent sows from making excessive and undesirable gains. An alternative to increasing proportion of alfalfa is to permit the sows access to the feeders for only half the day, or keeping the sows away from the feeder every other day. The condition of pregnant sows should determine the amount of feed given each day.

A sow should have no feed for 12 to 24 hours after farrowing. She should have plenty of water available at all times. If she is restless for feed, a handful of bran on the water usually will quiet her. Her first feed could well be half a pound of wheat bran. Bran feeding at farrowing time also helps prevent constipation. Her feed the second day should be from two to three pounds of Ration V split between a morning and evening feeding. Following this, gradually increase her feed so that at the end of a week she is being fed all she'll eat, which can be by hand feeding or self-feeding. Self-feeding is desirable and can be handled with less labor than hand feeding. During the period of lactation a grain ration of about half oats and half barley is satisfactory, as indicated with Ration V. Liquid rations can be used for sows in confinement during lactation, which requires a liquid feeding system and special rations. If a liquid feeding system is desired, information on the system, the ration, and method of handling can be thoroughly checked into and decided upon at that time.

Ration V. Lactating sow ration		

	100 lbs.	2000 lbs.
Barley	45	900
Oats	43.25	865
Soybean oil meal	0.9	180
Dicalcium phosphate	1.25	25
Limestone (calcium carbonate)	1.0	20
Salt	0.5	10
Swine vitamin premix	*	*
Totals	100 lbs.	2000 lbs.
*use according to manufacturer's instructions.		

Summary: There is no one best ration for the different phases of swine production. Make up a balanced ration with the feed available and keep a constant and close watch on how the animals are doing. Occasionally there are economies to be gained by substituting different grains or protein sources.

Trouble should be investigated and corrected at once. Always remove animals that are ailing from the lot at once. They should be isolated until in good health and never under any circumstances returned to the lot until all signs of sickness have disappeared.

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