Care and Feeding of Pigs

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Good breeding is the first step in economical production, but it must be accompanied by intelligent care and feeding.

Brood sows should be selected from the litters of heaviest weights in order to improve the average production of the herd.

The cheapest gains by pigs are made in the early days of their lives.

Corn, No. 1 fattening feed, is low in protein and calcium. Cheap gains are impossible without these supplements. Skim milk, buttermilk, and tankage are the leading protein feeds. One pound of tankage is equivalent to ten pounds of the milk feeds. The economy of a high-protein supplement can be calculated approximately on the basis of the cost of a pound of protein.

Good pastures save high-priced grains and protein feeds. Alfalfa is the best hog pasture. Rape and red clover are nearly as good. Bluegrass is a good pasture in early spring and late fall. During the dry summer months, it is chiefly a place for exercise.

Self-feeding produces rapid gains. It is usually the most economical plan of feeding fattening hogs.

Losses from disease are serious handicaps to profit. Raising pigs on clean ground is the best way to control worms and "necro" infection. Hog cholera causes heavy losses. Vaccination with serum and virus insures pigs against cholera.

Plan to market hogs early (in fall) when receipts are small and prices high.
HOGS comprise one of the principal sources of income for Minnesota farmers. The United States Department of Agriculture estimated that this state raised 6,413,000 swine in 1941, ranking fourth among all the states. While there has been a fairly steady trend toward increased production during the last 25 years, changes in the supplies of feed crops cause yearly ups and downs. Corn and hog production are closely linked, but small grains and dairy by-products are fed in some sections of Minnesota to produce pork as economically as in regions where corn is the major crop. Many farmers who market butterfat could increase their incomes by raising more hogs to utilize skim milk or buttermilk to greater advantage.

Few sections of any state can market corn in the form of pork more profitably than southwestern Minnesota. Each pound of the fat hog represents from four to five pounds of grain and can be transported to market more cheaply than can the grain. Alfalfa, the most valuable pasture crop for hogs, thrives in most parts of the state and contributes to lower costs of production.

There are many markets both within and outside the state which provide the competition necessary to obtain the highest prices, especially in southern Minnesota, where farmers have several market outlets at no greater distance than 75 miles. South St. Paul is one of the leading markets in the United States in handling fat hogs and feeder pigs. The health and thriftiness of Minnesota hogs make them in demand by packers and by feeders who purchase pigs for restocking feed lots.
THE foundation of profitable hog raising is wise selection of the breeding stock. While there are considerable differences between hogs of the leading breeds, there is greater variation within each breed. There are profitable and unprofitable hogs in every breed, so getting the right kind of breeding animals is more important than the choice of a particular breed. Consumers of pork call for cuts of light weight with a high proportion of lean to fat. To supply these, hogs must be well finished at approximately 200 to 225 pounds. Therefore, late-maturing breeding stock is undesirable, as pigs of this type will not fatten at light weights, but breeding stock need not be small to get early maturity.

Choose Long-Bodied Sows

Brood sows should be selected for utility, emphasizing points that indicate profitable production. A long body with well proportioned depth and width is desirable, as long-bodied sows usually farrow larger litters than short, thick ones. The back should be strong, with a fairly well developed arch, but an arch that is too high is accompanied by shallow hams and chest.

The hog is a machine used to turn grains into pork. To accomplish this economically, a strong constitution and good feeding ability are necessary. A deep, broad chest, showing good width between the forelegs, indicates strength of constitution; width of body with deep sides and low flanks provides needed space for the digestive organs. Strong feet and pasterns are important, as producers lose thousands of dollars yearly because many hogs arrive at the markets in a crippled condition. Much of this loss can be prevented by selecting breeding stock with strong bone and short, upright pasterns. To raise a large litter, a sow must have a well developed udder with from 10 to 12 sound teats, as each pig has his own feeding place. Inverted or blind teats are fairly common. All sows, especially those kept to farrow their first litters, should be examined carefully, eliminating those that have this defect. A feminine sow, one with a neat head and neck, usually will be a good mother; a coarse, staggy head indicates a poor mother.

Quality refers to smoothness and other desirable features of the carcass. Fine hair, a skin free from wrinkles, neat ears, and clean bone indicate high quality in hogs. The butcher class of pigs, which sells at the top of the market, is made up of lightweight barrows and gilts outstanding in quality. To obtain good quality in market hogs, breeding stock that is coarse, wrinkled, soft, and flabby must be avoided.
A large vigorous sow usually will transmit size and vigor to her pigs. Pigs that gain rapidly are the most profitable; hence a thrifty, active sow, large for her age, is a good choice.

**Select Sows for High Production**

There are great differences in the ability of sows to raise pigs, and the characteristics for low or for high production are transmitted from parents to offspring. This fact makes it highly desirable to select breeding stock from the best producing animals. In four out of every five pigs, those making the greatest weight for age have made the most economical gains. Therefore, the weight of a litter of pigs is a reasonably accurate measure of the profitableness of the breeding stock. This weight may be taken when the litter is weaned or when the pigs are 180 days of age. Weights of the pigs at weaning time can be obtained easily and are useful in culling the brood sow herd if some sows are to be kept on the farm and others marketed.

The weights of 140 litters of pigs raised in the herd at University Farm showed big differences between litters when 56 days of age. No litter of less than 6 pigs was weighed, and the largest litter weaned consisted of 13 pigs. The average weight of the 140 litters was 251 pounds; the lightest, 127 pounds; and the heaviest, 519 pounds. In general, litters with large numbers of pigs were heavier than small litters, but the largest litters did not always have the heaviest weights.

**Weight the Important Factor**

Weight is a more satisfactory basis than a large number, because there are usually some runts in the larger litters. Many breeders believe that litters of 9 or 10 pigs raised are more profitable than larger litters.

It is not difficult to select brood sows from the most efficient stock in the

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**Poland-China Sows of Good Type**
herd. When a few days old, the pigs of each litter are marked by ear notching. It is not necessary to weigh every litter at a definite age. Calculations can be made with little error when the ages of litters vary no more than 8 days. If the average age of weaning is 56 days, the weights should be taken when each litter is between 52 and 60 days of age. Brood sows to be used for the next crop of pigs should be selected from the litters of heaviest weights in order to pick the most profitable breeding stock in the herd. When buying a boar, choose one from a litter of heavy weight so that he will contribute to the plan of selection for economical production which has been described.

Selection of Boar Important

The selection of the boar is more important than that of the sow, as his characteristics are transmitted to a large number of pigs. As a rule, a purebred boar will sire more valuable pigs than a grade, because he represents generations of careful selection and feeding. Good points are emphasized and undesirable ones are reduced by the care given to selection and mating. Size, vigor, quality, and the body characteristics valuable in the brood sow are also important in a boar. Masculine sires are as important as feminine sows, for masculinity in a boar gives some degree of assurance that the good points will be transmitted to the offspring.

Crossbreeding Gains Favor

The mating of purebred boars and sows of different breeds produces a crop of pigs in which hybrid vigor is manifested. The idea that crossbred sows should not be used for breeding has been disproved by experimental work at the University of Minnesota. Pigs from crossbred sows have shown heavier weights and reached market condition at earlier ages than comparable purebred pigs, and more pigs were marketed per litter. A system of mating has been recommended which involves careful selection of crossbred sows generation after generation and alternating use of purebred boars of two breeds.

To be successful, a program of crossbreeding must be planned in advance and followed out with intelligent selection of both boars and brood sows. Particular attention should be given each year to the selection of a purebred boar that has the type likely to cross well with the sows. Under no circumstances should a crossbred boar be used. If both parents are crossbred, there is apt to be a considerable lack of uniformity in the type, rate of growth, and the time at which the pigs are ready for market. The discouraging results which have followed some attempts at crossbreeding in the past have often been due to a lack of care in the selection of good boars and sows. There has been a disposition to feel that careless selection will be penalized less than under other systems of breeding. Experience has shown that this is not true.

Successful crossbreeding can be followed with any two of the common breeds, and a three-breed cross has also been successful. For a more complete discussion of crossbred swine, obtain a copy of Minnesota Special Bulletin 180, "Crossbred Swine," from the Bulletin Room, University Farm.
The sanitation plan of raising pigs was developed as a means of preventing heavy losses from roundworms. It has also proved effective in controlling losses from "necro," a disease that has been a serious problem in many parts of the corn belt. The object of the plan (McLean County Plan) is to keep the pigs away from worm-infested lots or pastures until they average 90 to 100 pounds in weight. After that they are not seriously affected by roundworms.

Brood sows frequently are infested with roundworms, and pastures and lots regularly used by hogs are badly seeded with them. From the time eggs are passed out in the manure, several weeks are necessary, except in warm weather, for the eggs to ripen and hatch. In cool weather the eggs develop slowly enough so that suckling pigs are not infested with worm eggs from the sow. Pastures where hogs did not range the previous year are provided, and the sow and the little pigs are kept out of old hog lots. See Extension Bulletin 119, "Hog Health Makes Wealth."

Thoroughly Clean Farrowing Pens

Farrowing pens must be thoroughly cleaned and scrubbed with lye and boiling water to be sure they are free from worm eggs. The resistance of these eggs to ordinary disinfectants is shown by the fact that they will develop in a formalin solution.

Before putting the sow in a clean pen, the dirt should be washed from the udder with soap and warm water. Both sow and pigs are kept in clean surroundings, which can be provided around a permanent farrowing house by putting down a strip of concrete. By this means, direct sunlight and exercise are obtained without risk of the pigs becoming wormy.

Movable houses, if used for farrowing, need to be thoroughly cleaned and put on fresh ground. When moving sows and pigs from a clean farrowing house to fresh pastures, they should be hauled and not driven through lots contaminated with worm eggs. Approximately two pigs more per litter are raised in many herds this way.

"Necro" is one of the most serious diseases of hogs in all of the older swine producing areas. It is caused by bacteria which are common in filth; hence sanitary surroundings decrease the risks from the disease. Prevention of "necro" is by far the best way of handling the disease, as there are no certain cures for it. This condition affects pigs both when under 100 pounds in weight and when they are heavier, so that the use of clean lots
and pastures may be desirable until the hogs are ready for market.

**Raising Hogs on Concrete**

A new plan of hog raising has attracted considerable interest lately. It eliminates pasture crops for growing-fattening pigs, keeping them on concrete from the time they are farrowed until they are ready for market. Greater skill and more careful feeding are necessary to raise pigs successfully when they are confined to a floor. Pasture for pigs serves as an insurance that some of the nutrients lacking in ordinary rations will be supplied.

No one, unless it be a specialist working in a laboratory, can tell just what is exactly the right protein, vitamin, and mineral intake for growing-fattening pigs. Therefore, an important function of pasture is to cover up the shortages of ordinary growing and fattening rations. Pigs fed on concrete are very apt to suffer from one or more nutritional shortages, such as vitamin A, manganese or other minerals lacking in feeds grown in certain localities, some of the essential nitrogen compounds, and possibly other little-understood requirements of a perfect ration.

Protecting pigs from diseases has become the greatest problem in swine production in the corn belt. One hundred per cent effort will accomplish this important need better if the pigs are kept on concrete than if they are on clean pasture. However, observations in southern Minnesota and Iowa show that only about one in 25 of the people now raising pigs on concrete live up to the requirements of the plan 100 per cent.

Labor costs are higher if pasture is not used for growing pigs. Just how much this item affects the cost of 100 pounds gain is unknown. A general survey of the present situation shows that only the top-notch hog raisers are making a complete success of the confinement plan of pig production.

**Well-Kept Sows Produce Stronger Litters**

A LARGE percentage of the pigs marketed each year is produced by sows approximately one year old. They are growing rapidly and developing their bodies while raising a litter of pigs. For building both the bodies of the sows and their litters, considerable protein, minerals, and energy are needed. Mature sows need less feed than gilts in proportion to body weight. Grains, especially corn, are low in body-building substances and high in fat-making materials. In order to furnish the necessary protein and minerals, skim milk, buttermilk, tankage, alfalfa hay, or other supplements should
be added to grains. Mixtures of protein feeds usually are more valuable than single feeds, because the lack of quality of the protein of one feed may be made up by another.

**Winter Rations**

A few satisfactory rations for wintering bred gilts are listed. These suggestions are based upon the daily amount of feeds for a 200-pound sow.

1. Shelled corn, 2 pounds; oats, 2 pounds; alfalfa hay, 1 pound.
2. Ground barley, 2 pounds; ground oats, 2 pounds; alfalfa hay, unlimited.
3. Shelled corn, 3½ pounds; tankage or meat meal, ¼ pound; alfalfa hay, 1 pound, or skim milk, 3 pounds.
4. Ground barley, 4 pounds; tankage or meat meal, ¼ pound, or skim milk, 8 pounds.
5. Shelled corn, 3 pounds; skim milk, 7 pounds.

Buttermilk may replace the skim milk in the rations given. Other combinations of feeds will be equally as satisfactory if the supply of protein and minerals is sufficient for body-building needs.

**Use Home-grown Feeds**

It is best to make the ration of home-grown feeds if possible; hence, grain and either skim milk or buttermilk, or grain and alfalfa hay, are preferred. Soybeans satisfactorily furnish a part of the protein needed by brood sows but should be fed sparingly to fattening hogs, because the beans may produce soft carcasses. Fine, leafy red clover hay can be substituted for alfalfa, but sweet clover is not as good. Pregnant sows should always receive a good supply of protein, as rations lacking in this muscle-building food are likely to produce small litters of weak pigs. A little money spent to put the necessary protein in brood sow rations will give big returns. Protein needs are greatest during the last six weeks of pregnancy.

The amount of feed to be given daily can be estimated by the gain in weight and the appearance of fattening as the gestation period progresses. A growthy gilt can average about one pound of gain per day without getting too fat. Older sows fatten more readily. A reasonable amount of fat is an asset when sows farrow, as it is used for milk production, but overfat brood sows are lazy and often careless of their pigs. Farrowing troubles also are more frequent with fat sows than with the thinner and more vigorous ones. It is unwise to keep young and old sows in the same lot, because the older ones will take most of the feed.

Yearlings and older sows, which have made most of their growth, need less protein than rapidly growing gilts, which reach only about half their mature weight at 12 months of age. Grain and good alfalfa or clover hay make a satisfactory ration, but the sows should not be fed all the grain they will eat. A suitable mixture of grains—corn and oats, barley and oats, or corn and barley—furnishes a better supply of protein than one grain only.

**Feed Green Leafy Hay**

It is a good plan to feed all the hay the sows will eat, regulating the amount of grain by the condition of the sows. It should not be expected that the sows will eat the stems of the hay; therefore, the greenest and most leafy hay is the best. It can be fed in a rack, but this
is not necessary unless the ground is muddy. The amount of grain needed daily by yearling or mature sows is about one pound for each 100 pounds of weight. A sow should gain from $\frac{1}{2}$ to $\frac{3}{4}$ pound per day unless in more than moderate flesh when bred. During the pasture season, bred sows and gilts will need less than one half the allowance of grain necessary for winter feeding, if good legume or rape pasture is available. A strong, vigorous condition resulting from good feeding and plenty of exercise is necessary for farrowing of healthy, active pigs.

**Sows Need Exercise**

Exercise is fully as important as feed. Brood sows usually will not take enough exercise during the winter unless forced to hunt for a part of their grain in fields. If snow covers the ground, the grain can be fed some distance from the sleeping quarters. Water should be supplied at least twice daily, or, better still, be available from a constant supply.

It is necessary to record the exact breeding date to know for certain when a sow is due to farrow. The average length of the gestation period is 114 days, but pigs sometimes are farrowed as early as the 110th day or as late as the 120th day. Many pigs are lost each season because no breeding dates are kept and the pigs are born unexpectedly in an unsatisfactory place. Good results are obtained only by having a separate pen for each sow. The sow should have several days to get accustomed to the farrowing pen before her litter is born, or she is likely to be restless and kill some of her pigs. A fender placed about 8 inches above the floor and 8 inches from the side walls saves many pigs from being crushed. A large quantity of bedding, especially if it is long hay or straw, is dangerous for small pigs as they may get entangled in it and the sow may trample the pigs or lie on them. Chaff or shredded corn stover makes good bedding.

Care in feeding a sow for a few days before farrowing and several days after will avoid several common troubles. One of the principal points to watch is to avoid constipation and to prevent a feverish tendency. Very little grain should be fed, but the appetite of the sow can be satisfied by slop made of water and a mixture of half bran and half shorts.

**Handle Sows Gently**

Some sows are naturally bad-tempered near farrowing time, but a quiet, competent caretaker is rarely chased out of the pen. Rough treatment increases the tendency for the sow to be cross. A small hand hurdle carried into the pen when a sow is cross protects the man and allows him to do necessary work without fighting the sow.

**Keep Sows Quiet**

In most cases no aid is needed when the sow is about to deliver her pigs. A skillful herdsman is careful not to disturb the sow or let other hogs make a disturbance near the farrowing pen. If, after several hours, the sow seems unable to farrow her pigs, an experienced man—veterinarian or layman—should be on hand to remedy the trouble.
Keep Baby Pigs Warm

When sows farrow in weather cold enough to chill the pigs, it is a good practice to place each pig, as soon as born, in a barrel or box with some warm bricks or a jug of hot water. Hovers heated by electricity give good results. A plan for a home-made hover can be obtained from the R.E.A. When all the litter has been farrowed, or sooner, if several hours elapse, the pigs should be helped to nurse. A little milk in a pig's stomach does wonders to put life and energy into it. Except in very cold weather, or in case of a sow that is restless and gets on her feet often, the pigs should be left with her. Small pigs nurse frequently; unless they stay in the pen with her they must be put with the sow about every three hours day and night.

Sometimes there is a good deal of fighting among the pigs until each one gets located in the place where he always nurses. The baby tusks or needle teeth are long and sharp-pointed, and the pigs may scratch each other about the face or worry the sow so that she will not nurse the pigs well. If this happens, the ends of the tusks should be clipped off, being careful not to splinter the teeth or injure the gums, as this will open up a way for germs to start an infection. A pair of small cutting forceps is the best tool for this job, but pliers can be used.

Examine Pigs Regularly

Ulcers about the mouth are caused by infection of pus-producing germs, and it is advisable to examine the pigs every few days during the first month to recognize the early symptoms. If treatment is begun early, a solution of potassium permanganate is very effective. Dissolve fresh crystals in warm water, making enough of the saturated solution so that the heads of affected pigs may be quickly dipped in the liquid. If two or three treatments given on alternate days do not check the ulcers, 3% per cent iodine can be applied after the scab is removed from the ulcer.

The sow will get along best if she is not fed for 24 hours after farrowing, but water should be given. Feeding for the first few days should be limited to a little grain and considerable slop containing a good deal of bran. Milk production should not be stimulated for a week or ten days, but bulky, laxative feeds should be given. Oats are more bulky and less heating than corn.
A GOOD brood sow, unless fed carefully, will produce too much milk for her pigs at first and the litter may develop scours. If this happens, each pig should be given a teaspoonful of mineral oil or castor oil. The sow should be fed sparingly, and it will be helpful if she is given from 4 to 5 tablespoonfuls of Epsom salts in the slop. Damp pens and cold rainy weather are favorable to the development of scours. Sunshine is very helpful in drying the floor, and the pens should be cleaned frequently and the bedding kept dry.

Pigs need exercise to prevent them from getting overfat. Before they are a week old, they should be playing around the pen. They can be encouraged to exercise by giving them newspapers to tear or old rubbers to play with. If the farrowing house has an alleyway, the pigs should use this for a runway once or twice a day. If necessary, the pigs can be driven back and forth so that they will get the needed exercise. Sometimes small doors in the front of the pens are used to allow the pigs to run in and out while keeping the sow confined. An objection to this practice is that some pigs become robbers, sucking sows that are not their mothers. When the weather is favorable, the pigs should be outdoors if they can be kept from lots contaminated with worm eggs and "necro" germs.

Pigs that do not have access to the soil are susceptible to anemia, formerly called "thumps." The hemoglobin of the blood decreases rapidly after birth and when the amount becomes low the pigs grow weak and some may die. The symptoms are harsh hair; short, difficult breathing, with a jerky movement of the flanks; and a thickened wrinkled appearance about the neck and shoulders. Milk is low in iron, and the normal amount cannot be increased by feeding iron compounds to the sow. Commercial iron sulphate (copperas) can be used to drench the pigs, but drenching is a tedious process. It must be done every two or three days, and there is some danger of getting the liquid into the lungs. The best method seems to be to give the pigs soil that has been sprinkled with a solution of copperas. As much of the fresh crystals as will dissolve is stirred into warm water. Pigs when only a week old will nose about and eat dirt, and a small amount will prevent serious cases of anemia. If some litters of pigs do not have an appetite for dirt, the solution should be sprayed upon the udders of the sows at least once daily. Anemia ceases to be a problem when pigs are old enough to eat feeds that supplement the low iron of the milk.
Pasture Simplifies Feeding of Sow and Her Family

The loss of live pigs farrowed amounts to from 30 to 35 per cent, most of this heavy tax upon the business coming within the first month. At the end of this time, pigs have passed most of their hardest trials. The use of good pasture simplifies feeding and helps to keep up the milk flow of the sow. The pigs have a never-satisfied appetite, and the sow shows a big shrinkage in weight. When the litter is on pasture, so the pigs have plenty of exercise, the most satisfactory plan of feeding is to allow both sow and pigs access to a self-feeder. Grain and wheat shorts are always good feeds to keep before the pigs, and it is advisable to add tankage or another high-protein feed. The weight which a sow loses while suckling pigs must be made up later. It is well to prevent excessive loss of flesh by self-feeding during the latter half of the nursing period.

Feed Skim Milk and Buttermilk

Skim milk and buttermilk are among the best of all feeds, and one of them should be fed whenever possible. Their greatest value is realized while pigs are growing rapidly. It is immaterial whether the milk is fed in the natural state or mixed with other feeds to form slop. Young pigs make cheaper gains as a rule than older ones, and it pays to start them well. In rainy weather, there is some danger of scours, but this is not likely to happen if sudden changes in feed are avoided. Getting the pigs accustomed to feed so they do not depend entirely upon the sow results in rapid gains and simplifies weaning without loss of flesh.
A good brood sow uses the feed she eats to produce milk and does not fatten while suckling pigs. On the contrary, it is hard to maintain her weight. Corn is the best grain if plenty of protein and minerals are supplied by other feeds. If the more bulky grains (oats or barley) are fed in place of corn, more protein is supplied, but the sow may lose more weight. Many feeders prefer to use a mixture of grains such as equal parts of oats and corn or oats and barley. A rich slop made of shorts and 10 per cent linseed meal or tankage, mixed with water or milk, helps the sow to produce milk.

**Castration and Treatment to Prevent Cholera**

The most favorable time to castrate male pigs is before they are weaned. They shrink less at this time, as they have the milk of the sow to depend upon, and the operation is accomplished with little shock and loss of blood. Warm, sunshiny weather is desirable, and quarters free from dust and mud holes will help a great deal to prevent infection and complications from castration. Don’t overlook these simple precautions.

Despite the almost certain favorable result of the serum-virus treatment, hog cholera still is the cause of a greater loss of pigs than any other disease. This is because of the natural tendency of owners, when cholera has not appeared in the neighborhood for some months, to take a chance that it will not develop. In a section where hogs are raised in large numbers, it does not pay to take this risk. Pigs are successfully vaccinated, at small cost, when from two to six weeks of age. If they are not protected with serum and virus at this time, it may be necessary to treat them later at much more expense. The operations of castrating and vaccinating are best done before the pigs are weaned, but not at the same time. Dipping once or twice is advisable, especially if any lice are noticed and as a means of controlling mange. Use of lime-sulphur solution is an effective treatment for mange.

**Weaning Pigs**

Sometimes weaning results in a considerable setback. To avoid this loss of flesh and to keep the pigs gaining steadily is proof of good management. First of all, the pigs should be eating heartily so that they will not have to learn in a few days to get accustomed to feeds other than milk. Pigs are weaned when from six to ten weeks of age, but the usual time is about eight weeks. From three to five days before the litter is to be weaned, the feed given the sow should be reduced. By gradually cutting off the grain and reducing the slop, the sow will begin to dry up before the pigs are weaned. The pigs should have more feed to allow for the shortage of milk, and the protein part of the ration is especially important. It is best to take the sow away from the pigs and leave them in the lot and buildings to which they are accustomed. Then they will not run around the fences squealing, as they are sure to do if put in a strange place. Oats or barley is a better grain feed for the sow than corn at this time. Feeding less than enough to satisfy the appetite will help in preventing damage to the udder from the accumulation of milk. In some cases it may be advisable to let the pigs nurse once or twice.
When feeding pigs that are being weaned, it should be remembered that they are deprived of a high-protein feed, and some substitute must be given if they are to do well. Slop feeding gives good results at this time, although dry feeding involves less labor and is gradually replacing the older practice. If sows are to raise another litter, they can be rebred from three to five days following the weaning of pigs.

GOOD pastures not only reduce the cost of feeding pigs but help in controlling parasites, because pasture lots can be rotated more easily than dry lots. While most of the nutrition problems of growing pigs are well understood, there are some things supplied by pasture that are difficult to furnish in dry-lot feeding. This is illustrated by the fact that most men are able to grow a much better crop of spring pigs than of fall pigs. Experiments at several stations have established a fair average return from good pasture or forage crops at 250 pounds of pork per acre.

The most common pasture crop in the corn belt is bluegrass, which in early spring and late fall is a fine feed but in the summer is worth little. By supplementing bluegrass pastures with rape or another temporary forage, good feed is available throughout the season. White pigs blister badly on rape, so alfalfa, a clover, or a mixture of several grasses is more suitable for them.

**Number of Pigs Per Acre**

The number of pigs per acre of forage varies with the crop, the favorableness of the season, and the amount of grain fed. Alfalfa, red clover, or rape in good seasons will carry from 25 to 30 growing pigs per acre if the pigs get all the grain they want. On a part-grain ration, the number of pigs will be reduced to about 15. Fall-sown rye makes the earliest of all pastures but should be grown in combination with other crops, as rye is poor pasture after it reaches the joint stage. Small lots can be put in rye in the fall to be used during April and May; then the ground is plowed and seeded to rape, Sudan grass, or other forage. By doubling up in this way, a great deal of feed can be grown on a small space.

**Alfalfa Pasture Is Best**

Alfalfa is the best of all hog pastures. More pork per acre and more hay are obtained from alfalfa than from red
clover, and both these crops give a larger total return than rape. All three crops are high in protein and minerals and reduce the amount of these high-priced supplements that must be purchased. Neither alfalfa nor red clover stands grazing well, but rape is hard to kill out during the one season of its use. Alfalfa is so valuable a feed that the hog producer in a region where the plant thrives should use it for pasture in summer and hay in winter.

Alfalfa cannot be pastured closely without killing it out, but the field can be divided into two parts, which are pastured alternately. One or two crops of hay are harvested, depending upon how heavily the pasture is stocked. The use of two separate fields will provide feed continually as well as protect the new shoots. Thus the stand of alfalfa is preserved for several years, and the pigs have fresh, succulent grazing with less reduction of hay.

Sweet Clover Unpalatable

Sweet clover is used extensively, but it is not very palatable to hogs. The crop grows rapidly and quickly gets too tough and woody to be eaten readily. It should be clipped back with a mower as often as it gets tall, but even then it is not the best hog forage. Alfalfa, red clover, or rape will make more pork per acre by saving grain as compared with the amount necessary when feeding hogs on sweet clover.

The digestive system of the pig is not designed for the use of bulky feeds, nor is its capacity great enough to allow for feeding at long intervals. Pigs gain more rapidly on corn, if the ration is balanced, than when fed oats or barley. The difference is due primarily to bulk, although corn is also more palatable. Growing pigs that must get most of their nutrients from pasture are not able to eat enough of this watery feed to make rapid gains, and some of them are certain to become unthrifty. The smallest amount of grain that it is economical to feed is about a 2 per cent ration. This is 2 pounds of feed daily for each 100 pounds of weight of the pigs. On very limited grain feed, pigs not only gain slowly but are more susceptible to parasites and other diseases than if well fed and vigorous.

Full-feeding shortens the time of getting pigs ready for market, and it allows finishing at desirable weights. There is a distinct advantage in full-feeding March-farrowed pigs, as they will then be ready for an early market.
September prices average about $1.30 per hundredweight higher than December prices. In some years, there is a great decline in price during the fall months. In 1937, early August quotations were $5 per hundredweight higher than those in late November. There have been so few fall seasons during the last 50 years when hog prices have advanced that this abnormal market trend can be disregarded.

Full Feeding Preferable

Limited feeding of grain to growing pigs during the summer does not save on the total amount of grain necessary to put hogs in market condition, but the cost of the grain is lower. March-farrowed pigs which never go hungry are fed chiefly on grains produced the previous year. The reason why so many spring pigs are limited in feed during the summer is that the grain supply on the farm is exhausted, and the owner does not want to buy more at comparatively high prices. It would be a more profitable plan for most hog raisers to carry over corn to feed during the summer instead of always being short of feed after the winter months. Of course, pigs farrowed late in April or during May cannot even by full-feeding be ready for an early fall market, as it takes at least five to six months to produce desirable market hogs. Late spring pigs should be fed enough grain during the summer to be in thrifty growing condition and are then of good weight to be used for hogging-off corn or to follow fattening cattle in feed lots. The hog market usually is advancing in price during February, and late-farrowed pigs can be marketed to good advantage.

If pigs farrowed in March are full-fed grain from the time they begin to eat, they will consume about three fourths old corn and one fourth new corn in reaching market weight. If limited to half feed, about one third of the gain in weight will be made on old corn and two thirds on new corn. The cheaper price of new corn often results in a lower cost of gains when limited feeding is practiced, but the time of marketing may be decidedly unfavorable.

The quantities of grain to produce 100 pounds of pork are practically the same for full-feeding and for limited feeding because the smaller the grain allowance, the longer the feeding period. As long as most of the spring pigs are marketed in winter, and fall prices are appreciably higher than winter prices, full-feeding and early marketing of March-farrowed pigs will probably give the most profitable returns.

Comparative Values of Grains

In most of the hog-producing territory, corn usually is the cheapest grain for growing and fattening pigs, but oats and barley are sometimes comparatively lower in price. When ground, barley is a good substitute for corn and can be fed satisfactorily as the only grain in a ration. Oats, wheat, and rye are seldom fed as single grains but are usually combined with other grains. Wheat and rye should be ground to give most economical results, and oats usually are ground. The feeding values of both barley and oats vary directly
<table>
<thead>
<tr>
<th></th>
<th>$0.50</th>
<th>$0.60</th>
<th>$0.70</th>
<th>$0.80</th>
<th>$0.90</th>
<th>$1.00</th>
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</thead>
<tbody>
<tr>
<td>Shelled corn, bu.</td>
<td>0.50</td>
<td>0.60</td>
<td>0.70</td>
<td>0.80</td>
<td>0.90</td>
<td>1.00</td>
</tr>
<tr>
<td>Ground oats, bu.</td>
<td>0.20</td>
<td>0.24</td>
<td>0.28</td>
<td>0.32</td>
<td>0.36</td>
<td>0.40</td>
</tr>
<tr>
<td>Ground barley, bu.</td>
<td>0.39</td>
<td>0.46</td>
<td>0.54</td>
<td>0.62</td>
<td>0.70</td>
<td>0.78</td>
</tr>
<tr>
<td>Ground wheat, bu.</td>
<td>0.60</td>
<td>0.71</td>
<td>0.83</td>
<td>0.94</td>
<td>1.06</td>
<td>1.18</td>
</tr>
<tr>
<td>*Ground rye, bu.</td>
<td>0.45</td>
<td>0.55</td>
<td>0.63</td>
<td>0.72</td>
<td>0.81</td>
<td>0.91</td>
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</tbody>
</table>

* When fed as the only grain for four weeks or less. For longer feeding periods, in equal parts with other grains.

with the weight per bushel, lightweight grains making considerably poorer quality feed than when weights per bushel are near the standards. The cost of grinding small grains averages close to ten cents per hundred-weight. Table 1 gives the approximate values of ground small grains compared with shelled corn at varying prices.

### Self-feeding

The plan of self-feeding allows pigs to satisfy their appetites at any time during the day and nearly always results in higher feed consumption and more rapid gains than other methods of feeding. Whenever maximum gains are desirable, self-feeding is an economical plan to follow, but it has some limitations. The free-choice, self-feeding method allows pigs to eat whatever amounts they choose of several different kinds of feeds. It is not successful unless the feeds offered are of approximately the same palatability. For instance, corn and tankage are well adapted to this plan of feeding, but oats or barley and tankage often result in costly gains because the pigs are likely to eat more tankage than necessary. An unpalatable feed such as linseed meal may be self-fed by mixing it with tankage, but if offered free-choice little of it will be consumed.

Self-fed pigs do not make as much use of pasture as hand-fed pigs because they can get grain at any time. For maximum use of pasture crops, feeds must be offered in limited amounts by

**SELF-FEEDING HAS MANY ADVANTAGES**
hand-feeding. Self-feeders need daily attention to see that they do not become clogged or that feeds are not being wasted.

**Hogging-Off Corn**

Turning pigs into a cornfield to harvest the crop is one of the most profitable ways of marketing corn. An early maturing variety is needed for hogging-off, as the most favorable time for this practice is in September and October. If fall rains are heavy or there are early snows, there will be some waste of feed. Small fields of corn that can be fed off in two to three weeks should be used. An acre of corn yielding 40 bushels of grain will feed 20 pigs, averaging 125 pounds in weight, for about 3 weeks. To divide a field, a temporary fence of woven wire can be stretched between well anchored end posts and held in place by light stakes or tied to corn stalks.

Supplementary crops are often used with corn, seeding them between the corn rows about the time of the last cultivation or growing the crop by itself near the corn field. Rape sometimes is broadcast ahead of the cultivator, but when sown in this way some of the seed is covered too deep. If the seed can be drilled between the rows after the last cultivation of corn, a much better stand is obtained. Soybeans usually are grown more successfully as a separate crop than on the same land with corn.

**Protein Supplement Needed**

Since hogging-off is a method of full-feeding corn, some protein supplement is needed for most economical gains, even if a good crop of rape or soybeans is also fed. Tankage or other protein supplements will save enough grain to more than pay the cost. Self-feeding the protein supplement is logical until the corn in a field is nearly used up, when the pigs will eat more of it than they need. It does not pay to make market hogs clean up every bit of the grain in a field, as their gains will be checked. Brood sows will salvage whatever feed remains, and the exercise they get will be beneficial to them. Some of the fattening pigs will be ready for market when they have finished hogging-off corn, but most of them will need further feeding in a dry lot.

**Fast Gains Are Cheap Gains**

Corn is cheaper in the fall and early winter than at any other season, and the hog market takes a downward course. The quicker the hog goes to market, the more profit he is likely to show. Unless conditions are unusual and there is a probability of a higher market, full-feeding is the best policy. Oats are too bulky to fatten hogs quickly, but small amounts,
one fourth to one fifth of the total grain fed, can be used. Ground barley usually is worth approximately 85 per cent as much as shelled corn because it is a more bulky feed and is less palatable than corn. Feeding grain without a protein supplement produces slow and costly gains even if prices are low.

**Tankage Gives Low-Cost Protein**

If skim milk or buttermilk is available at a low price, it will balance the ration economically when fed in the proportion of two or three pounds of milk to one pound of grain. At normal prices, tankage is one of the cheapest protein feeds and in periods of high prices the amount needed can be cut down by feeding alfalfa hay. However, alfalfa is too bulky to furnish all the protein needed to balance a full feed of grain.

**Good Protein Mixture**

For a long feed in dry lot, and especially as a supplement for feeding fall pigs, a mixture of two parts tankage, one part linseed meal, and one part alfalfa meal is very satisfactory. This mixture furnishes a variety of proteins and is reasonably high in minerals.

Sometimes wheat shorts is cheap enough in price to compete with other feeds, but it is too low in protein to be used as the only supplement to grain for fattening hogs. The economy of feeding a protein supplement to fattening hogs has been shown many times by feeding experiments.

Costs in table 2 are calculated from the average results of 15 comparisons of corn alone and corn plus tankage. The hogs weighing 148 pounds at the start were fed in dry lots for approximately 67 days. On corn as the only feed, the daily gain was 1.03 pounds per pig. The addition of tankage increased the rate of gain to 1.59 pounds. It took 617 pounds of corn without supplements to produce 100 pounds of gain, but with 43 pounds of tankage only 400 pounds of corn were necessary.

**Unbalanced Feeding Costly In Most Cases**

Unless the price ratio of grain to protein supplements is abnormal, it is expensive to keep hogs on unbalanced rations. Changes in grain prices bring a fairly prompt adjustment in the quotations for purchased protein feeds.

<table>
<thead>
<tr>
<th>Table 2. Economy of Adding a Protein Supplement to Corn</th>
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<tbody>
<tr>
<td><strong>Price of corn per bushel</strong></td>
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<td>-----------------------------</td>
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<tr>
<td>$0.25</td>
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The hog is the fastest growing farm animal, and most of his feed consists of grains. The seeds of plants are low in minerals and supply less calcium than is needed for rapid growth. Fortunately, most of the common protein supplements are high in calcium, and if enough tankage, skim milk, or buttermilk is fed to balance the ration, hogs will get sufficient calcium. Grains and protein supplements are fairly high in phosphorus, so there is little chance that good rations will lack phosphorus. When hogs are on good pasture and are fed balanced rations, the only added mineral necessary is common salt unless the protein feed is chiefly from vegetable sources. Soybeans and soybean oilmeal are low in calcium compared with the percentage of phosphorus, as are other vegetable-protein feeds.

Hogs Need Salt

Hogs, whether on pasture or in dry lots, need common salt. Block or granulated salt can be provided or the salt can be furnished in a mineral mixture. Brood sows in dry lots may need extra calcium or iodine.

The area surrounding the Great Lakes is low in iodine, and goiter or hairlessness of pigs is found occasionally. It is good insurance to feed potassium iodide to pregnant sows during the winter at the rate of one grain per sow each week if iodine is not fed in a mineral mixture. One of the commonly used mineral mixtures consists of 20 parts common salt, 40 parts finely ground high-calcium limestone, and 40 parts feeding-grade bonemeal. To each 100 pounds should be added about 1/100 pound of potassium iodide, unless iodine is fed in another way.

Minerals Needed on Dry Lot

Mineral mixtures are often self-fed, but they may be added to the grain ration or hand-fed at intervals of from three to five days. The amount of a mineral mixture needed by hogs varies with the age, the kinds and amounts of feeds fed, and different conditions of feeding. Sometimes a rate of feeding of one pound per month per head, or one pound of mineral mixture for each 100 pounds of other feeds, is followed. Hogs get most of the minerals they need from ordinary feeds, and a shortage is more likely to occur in dry lot than on pasture.

Lice and mange cause considerable loss of flesh unless kept under control. These parasites have more opportunity to develop in winter than at other sea-
sons. Oil is an effective treatment for lice but not as satisfactory for eradication of mange as lime-sulphur dip. Hogs should not be oiled in either very warm or very cold weather, as it may cause a considerable change in the body temperature. Oil drained from the crankcase of autos and tractors can be used for hog oil, but it must be applied frequently. Hogs will oil themselves if a rubbing post is kept in working condition in a lot where they can get at it. Lice are found chiefly about the neck and jowl. Mange affects the lower parts of the body, especially the skin around the flanks and between the legs.

Dipping for Mange

In summer, the most effective treatment for mange is dipping the pigs in lime-sulphur solution twice within a 10-day period. It may be necessary to repeat the treatment as the parasites are harbored in the sleeping quarters. Thorough cleaning and spraying of the barns or sheds should accompany the dipping of the pigs. If the pigs cannot be dipped, they can be treated by spraying with the lime-sulphur solution, but care is necessary to reach the parts of the body between the legs. It is usually advisable to buy a prepared lime-sulphur mixture and dilute according to directions.

An effective preparation for use in cold weather is a mixture of seven parts of flowers of sulphur and one part of turpentine, with the addition of enough light oil to make a sticky paste. Mange can be cured on brood sows by smearing this mixture over the lower parts of their bodies, and it is essential to keep the suckling pigs from contracting mange from their mothers. For further information see Extension Folder 46, "Control Hog Lice and Mange."

Treatment for Worms

The roundworm is one of the most serious handicaps to pig raising. Lots about the barnyard and permanent pastures are badly contaminated with worm eggs ready to hatch. If the eggs are taken into the digestive tract, the worms develop quickly and migrate in the bloodstream as parasites of microscopic size, frequently locating in the lungs. Here they stay for a time. They result in injury to the tissues and cause the pigs to cough. As the worms grow, they are coughed up or work their way to the mouth, where they are likely to be swallowed. Reaching the small intestine, the worms continue to develop, and, if numerous, cause a serious loss of flesh and of growth. Losses due to worms are heavy unless a real effort is made to control them.

The treatment of pigs for worms is usually necessary on farms where the clean-ground method is not followed. Before pigs are weaned, some of them are small, the head seems too large for the body, and the hair is harsh and wiry. A wormy pig coughs when he is disturbed, and if the infestation is severe he has a potbellied appearance. The worms are very resistant to the action of vermifuges, so only the most effective agents should be used. Even then, as strong a dose as the pig can tolerate is necessary to dislodge the worms. Probably there are few cases in which the pig is entirely freed from worms,
but great improvement often results from one or two thorough vermifuge treatments.

**Use Proper Doses**

Mixing a vermifuge with feed is not an accurate method of dosing, as the smaller, weaker pigs, which most need the drug, usually get only a little. Santonin and wormseed oil are common vermifuges. One gallon of castor oil plus 8 ounces of wormseed oil makes a total of 136 ounces of the mixture. The dose for a pig weighing between 30 and 40 pounds is one ounce. The pigs should be kept off feed but allowed water from 12 to 18 hours before treatment and from 6 to 8 hours afterward. A slop feed with a dose of Epsom salts, two or three tablespoonfuls per pig, is then given. The method of treating with worm capsules is preferred by some hog producers and is satisfactory if standard products are used. A new vermifuge, phenothiazine, is coming into use rapidly. While being treated, the pigs should be confined to a house or a feeding floor so that the manure can be cleaned up to avoid reinfecting the premises.

**Prevent Diseases**

Prevention of diseases of the filth-borne type is necessary to profitable pig raising. There is no very satisfactory treatment for "necro," which manifests itself by ulcerated spots on the lining of the intestines. A related disease is sore mouth, or bull nose, appearing as ulcers about the jaws. Old hog lots badly infested with worms are in many cases dangerous also, because many of these pus-producing germs are present. The clean-ground plan of raising pigs is the only one that can be followed profitably in event of serious contamination by these pus-producing germs.
For several years lard has been hard to sell because many lard substitutes have come into general use. The export trade in American lard has been a big factor in disposing of the product until recently when restrictions of foreign countries have limited the market. The average hog sold at a weight of 235 pounds yields about 30 pounds of lard. This is too much to sell at any advantage with the usual state of the lard market. When the packers have to dispose of a large volume of lard at a low figure, the price of live hogs must bear this charge.

Another important factor in the pork trade is the consumer demand for lightweight cuts. Pork loins weighing from 10 to 12 pounds and cured hams of from 12 to 14 pounds sell considerably higher than heavier cuts. Good merchandising requires the sale to the public of the pork products it wants, because there are many other foods in competition with pork. The hog producer benefits if he supplies to the packer the kind of live hogs that makes the pork products most in demand.

A hog must be at least reasonably fat to make a high quality of pork. Thin, unfinished hogs yield soft, flabby carcases that sell at a low price. Both good finish and light weight of live hogs are necessary if the pork products are going to appeal to consumers. While top prices during recent months have frequently been paid for 160- to 180-pound hogs, the packer can use carcases of hogs weighing up to 220 pounds to good advantage. Because of abnormal conditions due to the war, hogs of 240 to 260 pounds weight sold at the top of the market during the winter of 1941-'42. It is probable that the type of hog that can be finished at weights of from 200 to 225 pounds will be most profitable to the producer.

The time of marketing may make a considerable difference in the returns from the hog crop. Avoiding as much as possible the months of heavy receipts is good business practice. Because of the declining price during the fall, it sometimes pays, even if plenty of corn is available, to sell pigs at lighter weights than to carry them from two to four weeks more and then market them at a lower price per pound. Sometimes pigs can be sold at 200 pounds with more profit than at 225 pounds. The 100 pounds of feed needed to make 25 pounds more weight may cost more than the gain is worth, if the price of hogs per hundredweight is lower at the time of sale.