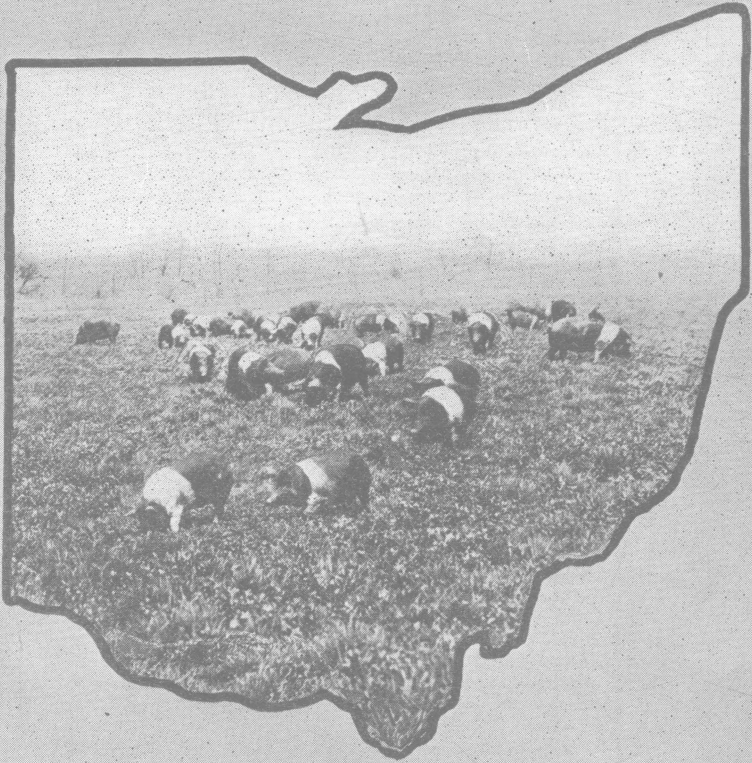


PORK PRODUCTION IN OHIO



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Pork Production in Ohio

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PORK PRODUCTION logically divides itself into four general problems, namely, selection or breeding, management, feeding, and marketing, with many subdivisions of the four main factors.

The degree of efficiency with which the details and especially the fundamentals of production are carried out by the individual producer will essentially determine the degree of success which he may expect from his operations. It is not to be implied that each producer may meet the same success by following approximately the same system, because there are many local and seasonal factors which will greatly influence results. However, there are certain principles which, if carefully followed, should lead in most cases to satisfactory production.

THE SELECTION OF BREEDING STOCK

THE BREED TO SELECT

There is no best breed under all conditions. Most hogmen may have some preconceived breed preference, and that breed should be just as profitable under their care as any other. However, more depends upon the strain, or blood lines within the breed, than upon the breed itself.

When there is no marked breed preference and other things are equal, it would seem advisable to select the breed which is already most prevalent in the locality, for it is probable that there are sound economic reasons why one breed predominates. To some, especially purebred breeders, the selection of the breed already well established in the community may seem merely to increase the competition among the breeders, but it is a well known fact that localities which have become famous for the successful production of one breed, are able to command higher prices for their product than where there is a limited number of the breed in the same area. Another advantage in selecting the breed already in the locality, is the easy exchange of breeding stock and the partnership ownership of valuable sires.

In general, there are two types of hogs: the lard type, as represented by the Duroc Jersey, Poland China, Spotted Poland China, Hampshire, Berkshire, Chester White and O. I. C. (Ohio Improved Chester); and the bacon type, as represented by the Yorkshire and Tamworth. For Ohio, one of the lard breeds should be preferable, because they are generally better adapted to cornbelt conditions. In special instances, one of the bacon breeds may prove better adapted to the local situation. For some time there has been considerable demand for a so-called "meat type" hog which will produce a carcass with less fat than the strictly lard type hog but still with a fair degree of finish. However, on practically all markets the hog with the highest finish will top the market, provided it comes within the popular weight limits.

PUREBREDS, CROSSBREDS, OR GRADES?

Since the terms, purebreds, crossbreds, and grades are frequently misused, it may be well to present some generally accepted definitions:

A purebred is an animal whose sire and dam are both registered or eligible to registry in a recognized breed association. The term, thoroughbred, should never be applied in this case, as there is an established breed of running horses bearing that name. The term, full-blood, is also a misnomer.

A crossbred is the offspring of a purebred sire and dam of two different breeds. Frequently, the term crossbred is applied to animals of any mixed breeding, but this is not correct unless the sire and dam are purebreds.

A grade is the offspring of parents one of which, usually the sire, is a purebred.

Animals which do not come under one of the above definitions of breeding are properly classified as scrubs.

Only to a limited few, will the production of purebred hogs for seed stock appeal. Probably, too many men are already engaged in that business—not alone from the standpoint of profit for those so engaged, but also because many are mere handlers of purebred animals and not constructive breeders. One should realize before going into the purebred business, that it is harder to maintain or improve the standard of a purebred herd than to improve stock of commoner breeding.

The situation in regard to the development of purebred herds for commercial production is very much the same. Only those men who are willing to make a study of some of the fundamental breeding principles will make satisfactory progress in producing purebred feeders. To such a breeder, or to the man of natural ability, the purebred hog should give increased returns in the feedlot.

Purebreds will usually breed more uniformly to type if proper selection is followed, and uniformity in a bunch of feeding hogs is a factor well worth considering. It is worthy of note that, in the carload class at the International Livestock Show, for more than twenty years the grand champion loads have all been purebreds. Therefore, there must be something in the purebred that produces market quality. There is also the possibility for the occasional sale of outstanding purebred individuals for something above the market price.

For many years stockmen have claimed that crossbred animals have proven to be better feeders than either purebreds or high grades. While this has long been recognized, there has been some question as to the value of crossbreds as breeding animals. Results of 6 years' study at Minnesota Exp. Station seem to have answered this question so far as swine are concerned.

The so-called "crisscross" system of breeding seems to offer the most promise under average conditions. For example, with this system a Poland China boar might be mated to a Duroc Jersey sow for the first cross, then the crossbred gilts might be bred back to a Poland China boar, and the gilts from this mating would then be bred to a Duroc Jersey boar. In other words, a boar of one of the breeds involved in the original cross would be alternated for each succeeding generation. Any other breeds may be used as well as those indicated.

For the average commercial producer, the grade herd will also prove quite satisfactory. It usually costs less to get started than where purebred sows are involved and several years of selection of purebred boars of superior quality should develop a herd for satisfactory commercial production.

THE TYPE TO SELECT

It is a reasonably well established fact that the so-called present-day type of hog is a more profitable kind than the one of twenty or more years ago. By present-day type is meant a fairly stretchy, deep-sided, smooth hog capable of reasonable finish at from 180 to 225 pounds. It is practically impossible to finish the extremely big type at weights ranging close to 200 pounds, and the hog lacking in finish is nearly always discounted on the market, as are hogs weighing considerably above the 200-pound level. The short, chuffy type are not satisfactory as breeders because they are generally lacking in prolificacy and vitality, and as feeders they are not the most economical users of feed.

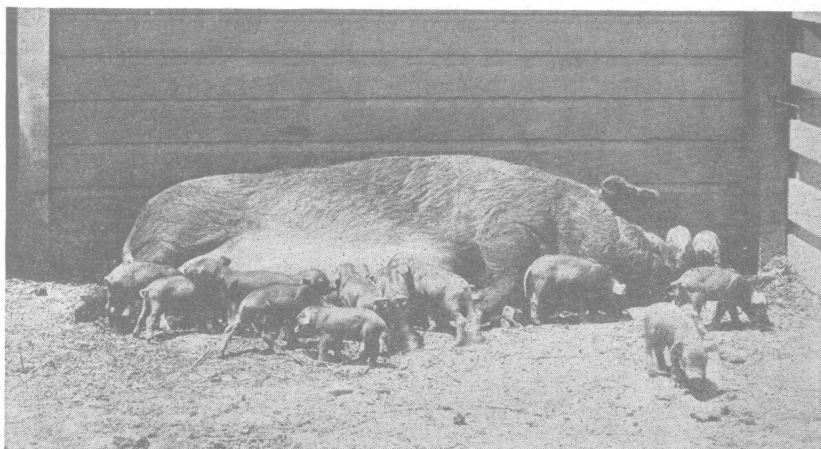


Fig. 1.—The profitable brood sow must be prolific.

PROLIFICACY

One of the most important factors in the selection of breeding stock, and one not often given serious enough consideration, is the matter of prolificacy, which refers to the ability of the sows to produce large litters. Many available figures show that the cost of each pig at weaning time is in inverse ratio to the number of pigs weaned, and that the cost of producing a hundred pounds of pork up to marketing, follows the same ratio. When one considers that for every hundred pigs produced a year, twelve brood sows must be kept if less than five pigs are raised per litter, while if seven pigs are raised per litter, only seven sows will be necessary to produce the same number of pigs, then the fact that the size of litters is such an important item in costs is not so surprising after all. It is the cost of keeping the extra five sows that raises the entire production cost to such an extent.

In selecting both the sow and the boar, the size of the litter from which

they have been produced should be considered. Too often, particularly in purebred herds, all animals of even fair individuality are kept for breeding purposes, regardless of the prolificacy of the strain. Also, in the selection of gilts from grade herds, the pigs may not have been marked before weaning, and then the only basis for selection is individuality, which certainly is not always a safe basis for the selection of future breeders. It is always advisable, therefore, to mark all pigs at farrowing time or shortly after, whether they be purebreds or grades, and then keep a record of the litter. This will assist in selecting the future breeding gilts, and also in culling the unprofitable sows.

EAR MARKING

Several systems of ear marking may be followed. Some prefer to use the aluminum tags on which are stamped the name of the farm and a number. This system has some disadvantages, particularly in marking small pigs, for, although the tags are very light, sometimes the weight of the tag causes the ear to break over unnaturally, and frequently the tags are lost or torn out and all identification is lost. With large purebred hogs, it will probably be advisable to use the metal tags for individual identification at breeding time.

Perhaps the most satisfactory method of ear-marking pigs is an ear-notching system. In small herds almost any plan may be used for identification, but in larger herds it will be best to follow some definite system. Several such systems have been devised and all have their advantages and disadvantages.

When not more than twenty or thirty different markings are needed at one time, the system shown in Fig. 2 is satisfactory.

The main advantage of this system is its simplicity, as the number of notches in any one ear is small, and it makes no difference whether the notches appear at the base, middle, or tip of ear. It is important only that the notches appear properly in the upper or lower rim of the ear. This system will mark up to No. 29 by placing two notches in the upper rim of the right ear as shown for No. 20, and adding the notches indicated for the various unit numbers.

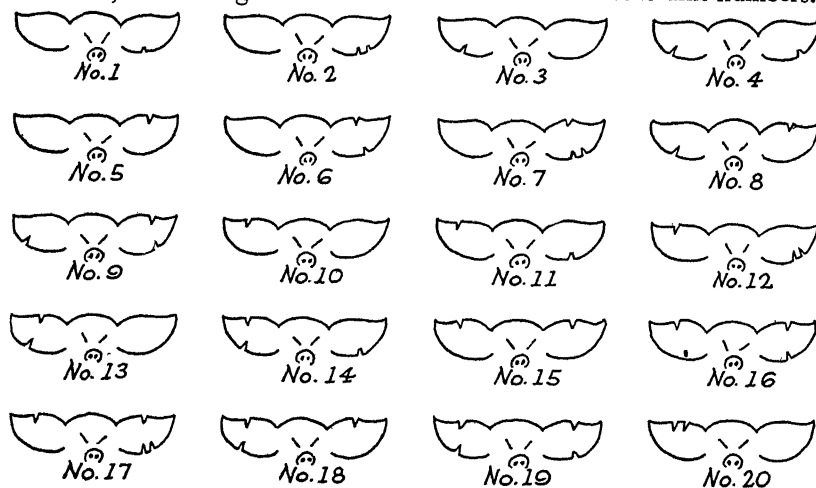


Fig. 2.—Plan for marking small herds.

For large herds or when each pig is to be given an individual mark, the system shown in Fig. 3 will permit numbering up to several thousand. This system depends not only upon placing the notches properly in the upper or lower rim of the ear, but also upon dividing the rims into tip, middle, and base, as shown in No. 1, Fig. 3. The unit numbers are placed in the lower rim of the right ear, the tens in lower rim of the left ear, the hundreds in upper rim of the right ear, and the thousands in upper rim of the left ear.

For example, No. 1 is a single notch at the base of the lower rim of the right ear, No. 10 is a single notch at the base of the lower rim of the left ear, and with Nos. 100 and 1000 the notch is placed in relatively the same position in the upper rim of the right and left ear respectively. All other numbers are combinations of the unit numbers as indicated in Fig. 3. It is possible to make any combination of numbers up to 9999, although for some of the larger numbers considerable notching will have to be done.

A special tool or a large sized harness punch may be used for notching.

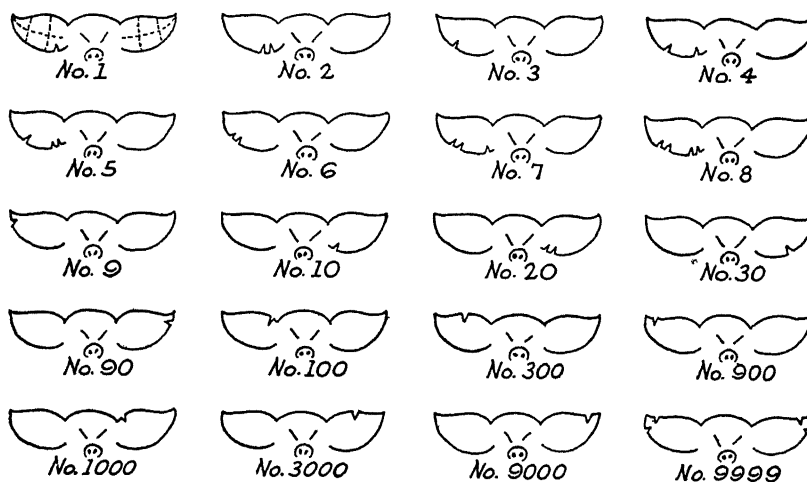


Fig. 8.—Plans for marking large herds.

THE HERD BOAR

There is a saying as old as the industry that "the boar is more than half the herd," and yet in many cases the selection, feeding, and management of the boar are given least attention of any phase of pork production. Since the boar will be sire of every pig in the herd, he wields as much influence on the herd as all of the sows. Always select a boar that is rugged and masculine in appearance, of good constitution, with strong back and a good set of feet and legs. In his selection, bear in mind the weaknesses of the sows, if any, and use a boar that is especially strong in those features. In a commercial herd, the boar may be more compact and thick-set than is desirable for purebred production, especially if the sows are rangy.

Very frequently the boar is confined in a small pen with little chance for exercise, but exercise is one of the most important factors in keeping the boar

in vigorous, healthy, breeding condition. If a fair-sized yard or lot cannot be provided in connection with his shelter, see to it that he is required to take exercise in some manner. Also provide decent shelter; it need not be elaborate but it should give protection against unfavorable weather conditions.

The boar should never be allowed to become too fat, nor should he be permitted to stop growing before he has attained maturity at about 2 to 3 years of age. Corn may be fed, but should not be given in large quantities. The bulk of the feed should consist of ground oats, ground barley, shorts, oil meal, milk and such feeds. The proportions and amount of feed to be given will depend largely on the age and condition of the boar. Pasture should be provided in summer, preferably legume, and alfalfa hay or meal in winter.

The young boar should not be used in service when under 8 months of age, and not then unless growthy, vigorous, and in good condition. The following services are suggested as a maximum: at 8 months, 12 matings a season; at 10 months, 15 to 20; at 1 year, 25 to 30; and at 2 years, 50 to 60 matings a season.

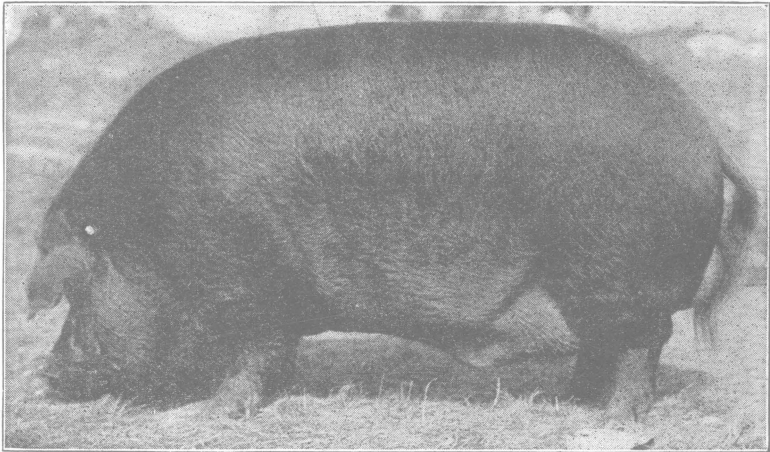


Fig. 4.—A good type of breeding boar.

The boar will have little or no direct influence upon the size of the litters which he may sire, except in so far as his general vitality may have an influence on the vitality of the male cells. It is a fact that frequent matings of a boar within a short time tend to lessen the vitality of the male cells, consequently double or multiple services are likely to decrease the size of litters rather than increase them, yet pasture or barnyard breeding is a common practice. Pasture breeding is also undesirable because no record can be kept of the farrowing dates, which may result in unnecessary loss of pigs at that time.

The influence which the boar may have in the matter of prolificacy is that he will transmit to his offspring his prolific tendencies, or the lack of them, as the case may be. There are some breeders who are convinced that the boar can have some influence on the size of the litters of which he may be the sire, but a study of the physiology of the reproductive processes of both sexes will show that such a condition is impossible.

MANAGEMENT AND FEEDING OF SOW AND PIGS

THE BREEDING SEASON

THE ABILITY to produce a reasonably large litter of strong, healthy pigs is the prime function of the brood sow. Much of the success in this direction may be obtained by proper feeding and handling.

Flushing.—The process of flushing is a practice which has been well known among sheep men for many years in securing twin and triplet lambs, but has not been generally followed by producers of pork. The process simply means that beginning about 10 days or more before breeding time, the sows should be kept in a rapidly rising state of nutrition by a liberal use of corn, supplemented with tankage, skimmilk, buttermilk, or a combination of those feeds.

A successful flushing mixture may also be made of tankage, 50 pounds; linseed oil meal, 25 pounds; and alfalfa meal, 25 pounds. It should be fed liberally (as much as three-fifths of a pound daily for each sow or gilt) along with a generous allowance of good yellow corn. In experiments conducted at the Iowa Experiment Station, gilts fed such a mixture averaged 8.8 pigs a litter, while those fed corn alone averaged 7.6 pigs. In another experiment gilts fed corn alone averaged only 5 pigs, while those given buttermilk or tankage in addition to corn, averaged 10 and 9 pigs to the litter, respectively.

Flushing is a process well worth trying. Care should be taken, however, to prevent the sows becoming too fat during the breeding season, or later, or the value of flushing may be counteracted by sluggishness. There will probably be little danger on that score if the sows are producing two litters each year, as they should be.

Time of Mating.—Various theories have been expressed as to the proper time in the period of heat at which the sow should be mated to the boar. Some claim that at the beginning and others at the end of the period of heat is the best time for service. However, it is probable that from the middle to the end of the period is the best time for mating the sow, because it is then that the ova will likely attain their greatest number and maturity. Each period of heat will last approximately three days and normally will recur every 21 days until conception takes place.

Feeding the Pregnant Sow.—It is essential to keep in mind just what the pregnant sow is doing. She is making bone and muscle tissue in the fetus as well as maintaining her own bodily functions. Merely because the sow seems to be in good, thrifty condition, it does not mean that she is receiving the proper ration for the development of a strong litter. Feeds such as oats, middlings, oil meal, tankage, skimmilk, and alfalfa, fed with corn and in proper proportions, should secure good results.

There is another factor to consider in the feeding of pregnant sows, and this might be termed physical tone of the animal. Other than from a specific disease, one of the most common reasons for lack of physical tone in the brood sow is constipation. One should be on the lookout for this trouble, especially during the winter months when it is most likely to occur. The most effective means of preventing or correcting this trouble is through the use of bulky

and laxative feeds. Such feeds as oats, chopped alfalfa, clover or soybean hay, bran, oil meal, or combinations of those feeds in the ration, will serve to prevent constipation.

For average conditions, the bulk of the grain ration may consist of a mixture of 75 to 80 pounds of corn and 25 to 30 pounds of medium ground oats, plus 10 to 12 pounds of tankage or 12 to 14 pounds of the so-called trinity mixture, which consists (by weight) of 2 parts tankage, 1 part linseed oil meal, and 1 part alfalfa meal. This latter high-protein supplement is especially valuable for winter feeding, or when the sows are not on legume pasture. The exact proportions of these various feeds will depend on the size, age, and general condition of the sows.

Skimmilk may take the place of at least part of the protein supplement in the ration. Most brood sow rations will also be benefited by the addition of some mineral feeds, particularly where tankage and alfalfa are not fed consistently as part of the ration. Mineral feeds and specific combinations will be discussed later.

PREPARATION FOR FARROWING AND THE FARROWING PERIOD

Loss of pigs at farrowing, and for a week or two following, is much greater than it should be. Not more than 60 per cent of the pigs farrowed ever reach a marketable weight. Much of this loss may be eliminated by right feeding and care, and especially by adoption of a system of sanitation as outlined under the discussion of round worms on page 32. Such a system of management will not only prevent infestation of round worms, but will successfully control most other parasites, and also many minor swine diseases.

The saving of a large number of pigs farrowed is one of the most important factors in profitable pork production. Since this factor may mean the difference between profit and loss, the adoption of management and feeding practices which put a large number of thrifty pigs per litter into the feedlot should pay big dividends.

Housing.—There is some argument as to whether individual or central hog houses are preferable. There are advantages to both types. Individual conditions on the farm will probably determine which type is preferable, or whether both should be used. For herds containing not more than six to eight sows, the individual houses will probably be the most satisfactory as well as the most economical. For large herds, a central house offers some advantages, particularly in bad weather. In a central house, the sow and pigs can be given better attention at farrowing time; the water, or slop feed, can be kept from freezing more easily than if out in the open, and the pens kept in better condition than if scattered in various lots. The central hog house does, however, somewhat complicate the parasite and disease control problem unless special attention is given to the cleanliness of the pens and the freshness of the surrounding lots.

Where central hog houses are in use, individual houses or shelters of some kind will have to be provided so that the sows and pigs will have protection from inclement weather when turned out on pasture. For fall farrow-

ing, the individual house is preferable under most conditions, but the lots in which they are placed should be reasonably free from parasites.

The pens themselves should not be too large, especially for cold weather farrowing, unless some means is provided to heat them. For average sized sows, individual houses 6 by 6 feet or 6 by 8 feet will be large enough, but where the feeding is done in the pens they should be somewhat larger, about 8 by 10 feet. Be sure that the pens are dry and free from drafts. Guard rails should be provided in all pens, as they will materially lessen the danger of the sows lying on their pigs. For valuable sows that are nervous and irritable and in the habit of lying on their pigs, a type of individual house with guard rails through the center is recommended. Plans for this and other houses are available in Extension Bulletin 57, "Hog Houses and Equipment."



Fig. 5.—Individual farrowing houses, with portable pens for each house, on an Ohio hog farm. These houses are moved to fresh ground each season.

Preparation for Farrowing.—At least 3 to 4 days prior to farrowing, the sow should be placed in her farrowing quarters so that she may become thoroughly accustomed to her surroundings before farrowing. Sows that are forced into strange quarters just at farrowing time may become irritable and feverish because of the unfamiliar surroundings, with a consequent loss of pigs. As was suggested before, a record of breeding and farrowing dates should be kept so that proper precautions may be taken before and at farrowing time.

Occasionally, the sow which is allowed to find her own nest in the pasture or woodlot seems to have better success with her pigs than those placed in special quarters. However, for success to be obtained by such a method, the weather conditions must be nearly ideal, the lot free from parasites, and the sow not bothered by other hogs.

Beginning a week or 10 days before farrowing, the corn in the ration of the brood sow should be reduced gradually to not more than one-half of the total grain, or the corn may be cut out entirely. It may be replaced by such bulky feeds as barley, oats, bran, or combinations of these feeds. Alfalfa or clover hay, either whole or ground, will prove a valuable addition to her ration; in fact, it will be a worth-while part of her ration at any time.

For 3 or 4 days prior to farrowing, the entire ration should be reduced in quantity, but the sow should not be allowed to become irritable from hunger. A ration too heavy or too rich may stimulate an abnormal milk flow and result in scours among the pigs; with heavy milking sows it may cause milk fever. Feed some animal protein, either in the form of tankage, fish-meal, or skim milk, from breeding to weaning time. If pasture is to be had, especially legume, it should be made available to the sow and pigs as much as possible.

Farrowing.—While most sows at farrowing time should not be disturbed, it is always advisable to be on hand to render any assistance to the sow or pigs which may be necessary. Such assistance may be the means of saving many pigs which might otherwise be lost in the farrowing process.

In extremely cold weather, some provision should be made for keeping the little pigs warm. It may be advisable to dry the pigs as soon as they are farrowed and be sure they nurse the sow. In case the pigs become chilled and are apparently lifeless, they may sometimes be revived by a warm bath at 95 to 98 degrees Fahrenheit. The pigs should be submerged (all but their heads) until thoroughly warmed. Dry them off and give them a little warm milk or get them to nurse the sow.

Sometimes pigs are given birth slowly, and often they appear lifeless after such a procedure. If the attendant will open the mouth of the pig and blow lustily down its throat, he may be able to start respiration and thus save its life.

When sows are extremely nervous during parturition, and show a tendency to get up and down, it is often advisable to remove each pig at its birth, or place it beneath the guard rail.

Another trouble is difficult parturition. This may occur with young sows, or when presentation is abnormal. It is also likely to result from poor feeding prior to farrowing. The only thing to do in these cases is to assist the sow. Precautions should be observed in giving assistance. All instruments used in helping the sow should be sterilized. Care should be exercised to prevent laceration and tearing. If assistance is rendered during periods of labor pains, the desired results can often be obtained without difficulty.

When abnormal presentation is the cause of difficulty, the thing to do, if possible, is to straighten the pig so that it may be given a normal birth. Some abnormal presentations are described as "crosswise," "feet folded back," or "head folded back." The best presentation is fore feet foremost, with the head lying snugly between them. Rear feet first is not a bad presentation.

Another difficulty which may be experienced at farrowing time is that of the sow eating her pigs. This may be due to improper feeding before farrowing; feverishness, which may be the result of disturbance during the farrowing process; and from the sow eating the afterbirth, which may stimulate an appetite for flesh. Aside from eliminating the causes mentioned above, the feeding of salt pork or cracklings is advocated by some breeders.

Some breeders prefer to keep the pigs away from the sow until she is through farrowing but, generally speaking, the sooner the pigs nurse the sow the better off they will be. Immediately after farrowing, the sow should be

fed lightly; in fact, for the first 24 hours nothing but water or a very thin slop should be given. In cold weather, heat the water enough to remove the chill.

SUCKLING AND WEANING PERIODS

The periods from farrowing through weaning are probably the most important in the life of the pigs. If they are to grow into strong, vigorous hogs, the sows must be properly fed and handled during this time. The period of greatest mortality in the pig crop comes at this time, and much of the loss can be directly attributed to improperly feeding the sow, and the lack of sanitary or clean-up precautions prior to and during the suckling period.

When born, pigs have long, sharp teeth commonly known as "black teeth." These are temporary tusks and, as far as can be learned, are of no benefit to the pigs. However, they frequently scratch the udder of the sow while the pigs are nursing, or lacerate pigs during friendly scrimmages which seem to be a necessary part of the life of every healthy young pig. These cuts often become infected and cause serious trouble. It is well to remove these teeth close to the gums with sharp nippers, being careful not to injure the gums, as infection may set in at that point.

After farrowing, feed the sows well but not too much, being careful not to overfeed the first few days. At least a week or 10 days should elapse before putting the sow back on full feed; reverse the order of feeding, as suggested for the period in *Preparation for Farrowing*. The object is to feed so that the milk flow of the sow is gradually increased from the first few days until the pigs are several weeks old, rather than to have the maximum flow during the first week or two. Overfeeding soon after farrowing will almost invariably cause scours; if this occurs, reduce the ration of the sow and use some feeds that are bulky and laxative until the trouble is relieved. Sour, moldy, and fermented feeds should be barred.

As soon as possible, turn the sow and pigs on fresh pasture, where other hogs have not been running for a year or more, or put them into lots that have been plowed and sown to a forage crop. Fresh meadow pasture will probably be best. Alfalfa, clover, rape, or a combination of rape and oats all make good forage. They not only save feed but also provide a cheap and most satisfactory source of protein and minerals. Bluegrass makes a fair forage early in the spring and late in the fall, but during the dry summer months is practically worthless as a source of feed, and is likely to be infested with parasites, particularly if previously used as a hog pasture.

The boar pigs that are not to be kept for breeding should be castrated at from 5 to 7 weeks of age, or at least 10 days before weaning. Performed at this time, the operation is much more easily done and the danger of a setback is much less. Care should be taken to disinfect the parts both before and after the operation, and to have the instruments and hands clean. Watch the pigs closely after the operation for possible abscesses or infection.

Rations for the Brood Sow.—It must be remembered that during the nursing period, one of the chief functions of the sow is to produce a plentiful supply of milk. It is claimed that a good brood sow will produce during the nursing period more milk per pound of live weight than that given by the

average dairy cow. If a sufficient milk supply is to be maintained, a ration relatively high in protein must be supplied. Some suggested rations follow:

No. 1	Lbs.	No. 2	Lbs.
Corn	60	Corn	60
Whole or ground oats ...	35	Wheat middlings	35
Tankage	5	Tankage	5

No. 3 (FOR SLOPPING)

Ground oats	100 lbs.
Middlings	100 lbs.
Tankage	50 lbs.
Corn	full feed

When prices or availability justify it, wheat or barley may be substituted for part of the corn; wheat is worth a little more and barley a little less than the same weight of shelled corn. As substitutes for the tankage in the above rations, one may use skim milk, buttermilk, or the trinity mixture; this latter consists of 50 pounds tankage, 25 pounds linseed oil meal, and 25 pounds alfalfa meal. Unless the sows are on legume pasture, the trinity mixture will probably give better results than any single high protein feed. With all rations provide plenty of clean, fresh water.

Skim milk or buttermilk from the farm supply are always good sources of protein, but for most satisfactory results from 2 to 3 pounds of grain should be fed for every gallon of milk consumed. Whether the feeder can afford to buy one of these products or not will depend on the price at which they can be had. Skim milk or buttermilk is worth about one-tenth the same weight of tankage. Semi-solid or dried buttermilk is used by many feeders for nursing sows and getting the pigs started on a feed, particularly when skim milk or whole buttermilk is not available on the farm. Both of these products have a place in many hog rations under such circumstances, but their use as the main source of protein supply, particularly for feeding hogs for market, is too expensive to compete successfully with the tankage or the trinity mixture.

Feeding the Pigs.—When the pigs are 3 to 4 weeks old, a “creep” should be provided where they can get in to feed independently of the sow. In making this creep, have the slats for the opening vertical instead of horizontal. Requiring the pigs to dip down under a board every time they want to feed is very likely to cause low backs later in life. This is important, particularly to the purebred breeder. A very useful type of creep may be made by having an enclosed platform on skids which can be readily moved from place to place as occasion demands.

Provide in the creep a self-feeder containing such feeds as corn, barley, oats, middlings, tankage, or the trinity mixture. All of these feeds are not necessary, but it will be advisable to use at least two in addition to the protein supplement to add both variety and palatability to the ration. If skim milk is fed, follow the same proportion of milk to grain as suggested for the brood sow. Do not allow the milk to become rancid; wash the troughs frequently. Sanitation and cleanliness will do almost as much to keep the pigs healthy and growing as will feed, for without sanitary precautions the feed may be practically wasted.

Weaning.—The pigs will have to be weaned at the age of 8 weeks or less if the sows are to raise two litters every 12 months, and from the standpoint of economical production, this should be the aim of every hog breeder and feeder. The average gestation period is 112 days, to which add 60 days for the suckling period, and you have only about 10 days left between weaning and time to breed for the next litter. This means that every precaution will have to be taken to see that the pigs receive no setback from farrowing through the weaning period.

When weaning time comes, take the sows away from the pigs rather than remove the pigs from the sows. By following this procedure, the change of the weaning process will be reduced to a minimum. It is well to reduce the feed of the sows at this time, particularly the high-protein feeds, and in

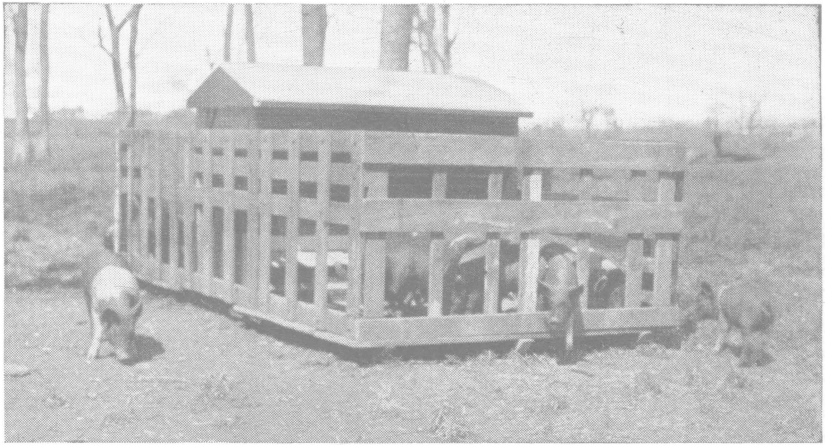


Fig. 6.—Portable creep mounted on skids. Note construction of the openings so that pigs can get in and out easily, while the larger hogs are kept out.

the case of heavy milking sows it may be advisable to turn the sows with the pigs once or twice a day for several days to avoid caked udders.

Some of the suggestions offered may seem to be unimportant factors in successful production, but it is a combination of these relatively unimportant points which may mean the difference between success and failure.

RE-BREEDING THE SOW

Usually, the sow will take the boar readily the third day after farrowing, but this practice is not to be recommended unless the sow has farrowed late and it is necessary in order to get her next litter caught up with the balance of the herd. Some breeders are successful in getting the sow in pig 4 to 6 weeks after farrowing but before the pigs are weaned. To do this, the sow will have to be kept in good flesh, and it is advisable to keep the boar entirely away from the sows until ready to breed. It may help to shut the pigs away from the sows a few nights in succession and feed the sows a little heavier. Normally the sow will come in heat again the third day after weaning, and it probably will

be a good practice to breed at that time unless the sow is badly suckled down. In such a case, it will be best to allow her to go over to the next period, which will occur three weeks later.

RAISING ORPHAN PIGS

SOONER OR LATER every hog breeder is confronted with the problem of raising pigs which for one cause or another the sow is not able to take care of. There are times when the sow dies almost immediately after farrowing; sometimes the sow develops milk fever, or proper milk secretion fails to develop. In most cases (unless the pigs are valuable purebreds), the breeder is inclined to dispose of the pigs as quickly as possible, to save bother and expense of trying to do something which he considers very doubtful of success. However, if conditions are at all favorable and proper management methods are followed, the loss ought to be no greater than that generally encountered by raising the pigs in the normal way.

Practically all of the discussion which follows on this subject is taken from material gathered by the Iowa Experiment Station, which has done considerable work in an attempt to solve this problem.

It is admitted that when the sow dies immediately after farrowing, before the pigs have a chance to receive any of the "first milk" or colostrum, the problem of getting the pigs safely started is greatly increased. The chances of success are much greater if the pigs are at least 2 days old before the sow dies. However, in either case an attempt to save the pigs will be worth trying.

METHODS USED IN FEEDING ORPHAN PIGS

In cases where the sow has died immediately after farrowing, it will help considerably if the pigs can be made to nurse once or twice a sow that has recently farrowed; the more recently the better, but it probably will be worth while trying even though the other sow has farrowed some time previously.

Teaching the Pigs to Drink.—To get the pigs started feeding themselves is usually a fairly easy matter if care and patience are used. The bottle and nipple method is tedious, because even after the pigs have been taught to drink from the bottle, each pig will have to be handled separately. It will be better to try to teach the pigs to drink from a shallow dish or trough, and dispense with the bottle after the first 2 or 3 days. Place a small amount of milk in the container, then take the pig by the back of the head and neck, pushing his nose and mouth gently into the milk. By using judgment and patience the little pigs can usually be taught to drink in two or three lessons.

Number of Feedings Daily.—Best results will be secured by feeding about six times daily for the first few weeks, perhaps oftener if the pigs are only a few days old. This may gradually be cut down to three times daily. Regularity of time of feeding and amounts is essential. Absolute cleanliness of the utensils is another important item.

Milk Modification.—Since sow's milk is more concentrated in dry nutrients than cow's, it would seem that the addition of either cream or sugar

to cow's milk would make up such deficiency. However, experimental work indicates that modification of cow's milk is poor practice. As the pigs get well started, some materials high in vitamins may be added to the milk with good results. Tomato juice, orange juice, or eggs are good carriers of some of the essential vitamins, and may be mixed with the milk at the rate of the juice of one orange, 5 ounces of tomato juice, or one egg daily per pig.

Later Feedings.—After the pigs become old enough to take some solid food, which will be when they are 3 to 4 weeks old, provide a self-feeder containing shelled or cracked corn, tankage or meat meal, and salt. A good grade of middlings might also be added, as this is quite palatable to small pigs.

If the pigs are on alfalfa pasture, this ration may be all that is necessary. If pigs are being fed in pens or dry lot, however, it will be well to add a mineral mixture consisting of 40 pounds wood ashes or finely ground limestone; 40 pounds bone meal or spent bone black; and 20 pounds salt. To this should be added $\frac{1}{2}$ ounce of potassium iodide, and all thoroughly mixed.

MANAGEMENT OF ORPHAN PIGS

See that the pigs get plenty of sunlight in their pens, as sunlight is an important factor in growth as well as an aid in sanitation. Make the pigs take exercise, as that is essential to the development of strong muscles and strong bones. If pasture is available, preferably legume, and the weather is favorable, feed the pigs on pasture. Be sure that the quarters are dry, clean, free from drafts and reasonably warm.

Above all things, be sanitary both in regard to quarters and utensils used in feeding. Be certain that the milk is always fresh.

One can hardly expect 100 per cent success in the first attempt to raise orphan pigs, but by perseverance and careful management, reasonable success may be attained with practice.

GROWING AND FEEDING PIGS

AFTER THE PIGS are weaned, since maximum growth is the thing most desired, it is questionable whether there should be much difference in the feeding of the prospective breeding gilts and the balance of the shotes to be fed for market, particularly if the type of hogs in the herd is of the reasonably growthy, stretchy kind. This may be qualified to the extent that toward the end of the usual feeding period, the gilts which are to be selected as replacements in the breeding herd may be separated from the rest of the bunch, and given feeds which are less concentrated but of a kind which produce growth without the danger of fattening the gilts too quickly. A little less grain on pasture, or a more extensive use of bulky feeds such as barley, oats, alfalfa hay, or alfalfa meal may be used for the gilts, than would be recommended for feeding for market. However, do not let the gilts stop growing and gaining in weight each day.

MAKING RATIONS

It is impossible to lay down any definite rules for hog feeding under all conditions, but there are some main rules of feeding. Perhaps the first of

these is "balance." Generally, when speaking of a balanced ration, one thinks only of the relation between the proteins in a feed and the carbohydrates and fats; the last two being grouped together because of their similarity of composition. When the proper amounts of nutrients of these two groups exist in a ration to meet the requirements of the hog for maintenance and growth without excess or deficiency, it is said to be balanced. The ratio or proportion existing between these two types of nutrients is referred to as the nutritive ratio of the ration.

The requirements for maintenance and growth vary with the age and weight of the animal. In the case of the brood sow, the requirements vary with her condition, age, and weight. Thus, there can be no balanced ration for hogs under all conditions. Further, there are practically no single feeds which may be considered balanced. So, to get best results, two or more feeds must be fed to bring about the proper balance. When two feeds make up the ration, one should be high in protein and the other high in carbohydrates. A similar relationship should be maintained when more than two feeds are used.

In making any hog ration, keep the following points in mind. Each is an important factor in making a well rounded and palatable ration:

1. Balance.
2. Sufficient suitable mineral matter.
3. An ample quantity of vitamins.
4. Palatability.
5. Low in fiber (especially for fattening hogs).
6. Non-toxic.
7. Low in softening fats and oils.
8. Economy.

SUGGESTED GRAIN RATIONS

I. SUCKLING PIGS, 5 to 40 pounds (feed in creep):

1. Corn 80 pounds, tankage 20 pounds.
2. Corn 40 pounds, hominy 40 pounds, tankage 20 pounds
3. Corn 75 pounds, middlings 10 pounds, tankage 15 pounds
4. Corn 30 pounds, ground barley 30 pounds, ground oats (screened) 25 pounds, tankage 15 pounds.

II. WEANLING PIGS, 30 pounds to 100 pounds:

1. Corn 80 to 85 pounds, tankage 15 to 20 pounds
2. Corn 75 to 80 pounds, middlings 10 pounds, tankage 10 to 15 pounds

III. SHOTES, 100 to 175 pounds:

1. Corn 85 to 90 pounds, tankage 10 to 15 pounds
2. Corn 75 to 80 pounds, middlings 10 to 15 pounds, tankage 10 pounds
3. Corn 50 pounds, ground barley 40 pounds, tankage 10 pounds
4. Corn 60 pounds, ground oats 30 pounds, tankage 10 pounds.

IV. HOGS, 175 to 250 pounds:

1. Corn 92 to 96 pounds, tankage 4 to 8 pounds
2. Corn 60 pounds, ground barley 35 pounds, tankage 5 pounds

These rations are only suggestions, and may be modified similar to the suggestions under "Rations for the Brood Sow," both in regard to the main

part of the ration and the protein supplement. The feeds may be hand-fed or self-fed. If hand-fed, the corn may be fed in the ear and the other feeds provided in the proportions suggested. If the ration is self-fed, it generally will be preferable to have the various feeds supplied in separate compartments of the self-feeder. However, under some conditions, it may be advisable to mix the feeds together in the proportions indicated and feed in one compartment. In that case, the corn should be ground so as to mix better with other feeds.

Suggestions on Feeding Oats.—There are several factors which will determine the value of oats in the hog ration, namely, (1) quality of the oats, (2) amounts fed, (3) whether whole or ground, and (4) size or age of the

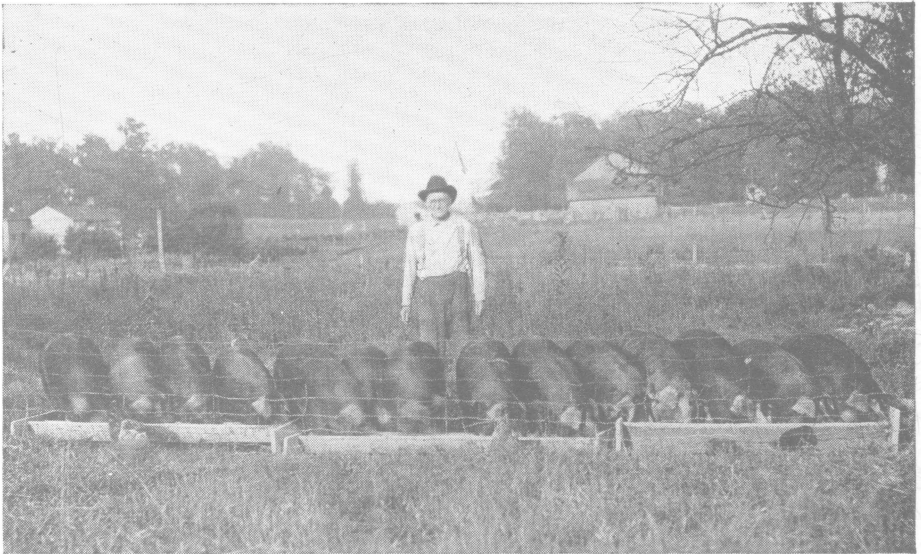


Fig. 7.—These pigs from one litter averaged 314 pounds at six months of age. It pays to feed well.

hogs. The better the quality of the oats, the more satisfactory they will be as a hog feed because the less will be the proportion of hulls to kernel. Hulls have practically no feed value in the ration for fattening hogs.

Some experimental results have shown that whole oats, even in amounts less than 25 per cent of the total feed, when added to a corn and tankage ration resulted in a decreased rate of gain, and the amount of feed required to produce 100 pounds of gain was increased. However, when medium-ground oats replaced the whole oats, the rate of gain was higher, and the amount of feed required per 100 pounds gain was lower than for corn and tankage alone. Coarse-ground or fine-ground oats were both less favorable in rate of gain and feed required than when medium-ground oats was used.

From these results, it would seem that when whole oats are relatively cheap, they may form a part of the ration up to 25 per cent of the total, but

that their value as a feed for shotes will be increased by grinding and that best results will be obtained when they are medium-ground.

Hulled oats are more satisfactory for fattening hogs than the entire grain, either ground or whole, because with the removal of the hulls much of the fiber is eliminated. Fiber is largely indigestible and quite bulky. Since the digestive system of the pig is relatively small, bulky or fibrous feeds cannot be handled satisfactorily in any great amount. Whether hulled oats can be used economically in the ration will depend on costs of hulling and grinding.

Feeding Wheat.—When the price of wheat compares with that of corn, or the wheat is damaged to the extent that it will not bring a fair price on the market, it is a satisfactory hog feed. For best results it should be cracked; it should never be ground fine. Some feeders report good results when using the whole soaked grain, but unless wheat is extremely cheap, the increase in feeding value of the cracked or ground wheat will more than offset the cost of grinding.

Soybeans for Hogs.—Soybeans are frequently advocated for use in hog feeding, but there seems to be quite a diversity of opinion on this point as the result of feeding tests made at various experiment stations. Trials at the Ohio Experiment Station indicate that good soybeans (unless they are cooked) are worth more for seed than for feeding to pigs. A summary of these trials showed that in comparison with tankage, the soybeans were worth only one-fourth to one-third as much as an equal amount of tankage. However, when the beans were cooked, the rate of gain and costs compared very favorably with a ration where tankage replaced the cooked soybeans. From these results, it would seem that raw soybeans will prove unprofitable as a hog feed unless their price is greatly out of line with other protein feeds, or the beans are of such poor quality as to have little market value.

Similar trials at the Indiana Station, except that the pigs at the start of the experiment were approximately 25 pounds heavier than at Ohio, show rather contrary results. In fact, one of the conclusions from that Station is that soybeans and corn fed with minerals to fattening hogs are practically equal to tankage and corn in producing rapid and economical gains. Further, that fattening hogs eat whole soybeans as readily as ground soybeans and gain equally well on them.

The Illinois Station states the use of soybeans in hog feeding should be confined to brood sows, because the beans are unpalatable to pigs. This reduces the total feed they will consume, resulting in abnormally slow gains. Also the quality of pork produced by soybean feeding is poor.

From the available data on feeding soybeans, it would seem that a great deal depends on the weight of the hogs when soybeans are being fed, as to their value in the ration. Apparently hogs weighing 75 to 100 pounds or more find the beans more palatable and use them to better advantage than pigs of lighter weights. No matter how soybeans are used, their value will always be increased by the addition of some mineral feeds.

Salt in the Ration.—Salt should be fed as a part of all rations. If a mineral mixture is being used, good results will be obtained by having the salt as part of this mixture. Salt may be fed mixed with the feed, or it may be

self-fed, but the hogs should be accustomed to the salt before having free access to it.

Limited or Full Feeding?—The question frequently arises as to whether or not it will be more profitable to “carry the hogs over” a certain period when feed is either scarce or high in price, or to buy the feed regardless of price and finish the hogs as soon as possible. The answer is that the hogs which are gaining at their maximum are making the most economical use of their feed or they would not be gaining rapidly, and they will usually prove more profitable regardless of feed and hog prices unless both prices are very abnormal and out of line.

The main point here is that during the added number of days which will be required to make hogs on limited feed reach market weight, more feed will be used than can be saved by the limited feeding during the fore part of the feeding period. In illustration of this, a certain experiment may be cited. Two groups of hogs were fed on alfalfa pasture; Lot 1 received a full grain ration, while in Lot 2 the grain was limited to approximately one-half that received by the other lot. The pigs in Lot 2 required 47 days longer to reach the same weight as attained by Lot 1, and in all, required more grain feed to reach the weight made by the pigs in Lot 1, 47 days earlier. The same situation will certainly hold true with pigs fed in a dry lot.

At another Station, from the results of 5 years' comparison of limited with full feeding it was found that in feeding pigs to a market weight of 200 pounds, an average of 46 days was saved by full feeding as contrasted with limited grain rations during the summer, and that full fed pigs consumed less feed for 100 pounds gain than pigs limited in feed. The feed costs for 100 pounds gain were practically the same for the two methods of feeding, due principally to the lower price of corn in the fall than in the summer, but the labor cost of feeding was 44 cents a head more where the grain was limited in amount. The labor cost may be all or partly offset where any large part of the corn fed to the hogs is to be hogged down, but compared to the total amount of corn fed to hogs only a small proportion is ever hogged down.

The greatest difference was in the fact that on the basis of the average quotation for the 5 years, full fed pigs sold for \$1.35 per hundredweight more than pigs on a limited ration during the summer. This item, coupled with the additional labor costs with limited feeding, the greater risk of loss, and overhead charges, which must be added because of the extended feeding period, make it very doubtful that limited feeding will prove profitable.

With fall farrowed pigs there is probably not the same tendency to carry them over, because corn is relatively cheaper in the winter, yet quite a few hogs are fed somewhat limited grain rations in the winter and fed off in the early summer on grass. With the exception of a slight difference in feed costs, the same factors will prevail in determining ultimate profits as with spring farrowed pigs.

Under very unusual circumstances concerning feed prices and the probable price of hogs when they are ready for market, there may be some profit in limited feeding, but all circumstances concerning the situation should be carefully studied before following that practice.

THE SELF-FEEDER

A great deal has been said and written about the use of the self-feeder, but when all of the facts are considered, the situation can generally be summed up with the statement that intelligent hand-feeding will produce as good results as the self-feeder. However, much depends on the intelligence of the feeder, and unless he is a close student of his hogs, the self-feeding will probably prove the more profitable method.

One advantage of the self-feeder is that it will probably save some labor, but the amount of labor saved depends somewhat on the size and type of the feeder. A small feeder requires frequent filling, and practically all feeders require considerable attention to see that the feed is feeding down properly, and is not being nosed out and wasted. If the feeds are in separate compart-



Fig. 8.—A good type of self-feeder. This feeder is being used for a breeding herd.

ments, the feeders should be inspected frequently to see that the hogs are not eating too much of the protein feeds and not enough of the others, or vice versa. The hog is not infallible in his selection of the feeds he needs. He is inclined, when on a self-feeder, to eat more than the required amount of those feeds which are the most palatable and less than he needs of those with less palatability. It is well, therefore, to have all feeds in the self-feeder of as near equal palatability as possible in order to get best results.

The Iowa Experiment Station reports excellent results from the use of the self-feeder, not only for producing market hogs, but also for raising breeding gilts and for feeding nursing sows with their litters. In regard to raising breeding gilts on a self-feeder the suggestion is made that, in order to keep them from getting too fat, such bulky feeds as ground alfalfa, ground clover,

ground oats, bran, or similar feeds be mixed with the concentrated feeds such as ground corn, barley, wheat, rye, tankage, and so on. Ground alfalfa seems to give the best results, as it apparently stimulates growth. In order to regulate the degree of fatness on the gilts, simply increase or decrease the amount of the bulky feeds according to the tendencies of the gilts.

For nursing sows, it is advisable not to have them on the self-feeder for the first 10 days or 2 weeks after farrowing; but after that, if a well balanced ration is fed, they will do well. The combination that gave the best results was corn, middlings, and tankage or meat meal; in addition, the hogs were allowed limestone, charcoal, and salt. No trouble was noted from scours, and in some instances, the sows actually gained in weight during the nursing period.

It seems possible, from results obtained at various experiment stations, to use the self-feeder to considerable advantage in nearly all departments of swine feeding, if it is properly handled and the right sorts of feeds are provided.

FORAGE CROPS

Growing and fattening hogs in the summer time without the use of some good forage crop is usually not an economical practice, as a saving of from 20 to 35 per cent in the total amount of grain and supplements may be expected through the use of forage. Pasture crops, when combined with grain feeds and tankage, will produce the cheapest gains for both breeding and fattening hogs, and the costs of the gains will range from one-fifth to one-third cheaper than when grain is fed in a dry lot.

The results of a large number of feeding trials under various conditions show that it requires about an average of 5 pounds of grain to produce 1 pound of gain on pigs fed in a dry lot, while similar feeding on some good forage has reduced the amount of grain needed to produce a pound of gain to 3.2 pounds. This would show a saving of better than 35 per cent of the grain when fed on some good forage.

It may be possible in some cases with an abundance of good forage to obtain fairly satisfactory growth for a time, particularly for the breeding gilts, by the use of forage alone. For market hogs, however, the greatest returns will be obtained when grain is fed in addition to the forage at the rate of 2 to 3 pounds daily for each 100 pounds live weight of the hogs.

However, if the hogs are on good alfalfa, clover, or rape pasture, the tankage or protein may be reduced one-half or more. It will nearly always be advisable to keep some tankage or skim milk in the ration in order to supply the much desired animal protein.

The number of hogs which may be supported on an acre of forage will depend on the size of the hogs, the abundance of the forage, and the amount of grain fed. Since no single pasture crop fulfills the forage requirements for the entire season, it is advisable to provide several kinds of forage crops, if possible, in order to supply the maximum of pasturage through the whole season. Change of pasture is good for the hogs and the pasture as well, for it gives the pasture a rest and adds variety to the ration for the hogs, both of which are good practices, provided that forages are of about equal palatability.

SUGGESTIONS ON THE GROWING AND USE OF FORAGE CROPS FOR SWINE

Crop	Soil Adaptations	Varieties or Sources of Seed	Methods of Seeding	Time of Seeding	Rate of Seeding per acre	Duration and Character of Pasture Provided
ALFALFA	<i>Soils</i> —Well drained, reaction of pH 6.5 or above, with liberal supply of mineral nutrients.	“Variegated” alfalfas, such as Hardigan and Grimm, preferred. Second choice—adapted “commons” from Kansas or further north.	<i>With</i> a companion crop— 1. With 3 to 4 pecks of spring sown winter wheat. 2. With barley or oats. 3. With fall sown winter wheat. <i>Without</i> a companion crop— 1. Seeding alone in early spring. 2. Seeding alone in the summer.	Spring seedings— March 15 to April 15 Summer seedings— July 1 to Aug. 15	10 to 12 pounds	Ordinarily alfalfa should not be pastured during the season of seeding; if growth from spring seeding has been abundant, light pasturing <i>may</i> not be injurious provided plenty of top growth is left for winter cover. In later years, pasture is available from May 15 to Sept. 15, and later if the stand is to be plowed. Light pasturing, that permits the removal of one or two hay crops during the season, favors long-lived stands. Carrying capacity 10 to 20 shotes per acre.
RED CLOVER	<i>Soils</i> —Medium to well drained, reaction of pH 5.7 or above, with liberal supply of mineral nutrients.	First choice—Ohio-grown seed. Second choice—Seed from adjacent states. <i>Avoid</i> —Oregon seed, or imported seed (except from Canada).	As for ALFALFA—With the exception that summer seedings are less safe than with alfalfa.	Spring seeding— Feb. 15 to April 15 Summer seeding— July 1 to Aug. 15	8 to 10 pounds	New seedings should not be pastured heavily nor late in the fall. The second year red clover may be pastured from early May as long as growth continues. As red clover is not expected to live over the second winter, it may be pastured more severely than alfalfa. Carrying capacity 8 to 16 shotes.
SWEET CLOVER	<i>Soils</i> —Reaction of pH 6.5 or above, with liberal supply of mineral nutrients.	<i>Late-flowering Biennial White Sweet</i> <i>Avoid</i> —Grundy Co. and other early-maturing strains.	As for ALFALFA—Except summer seedings are not advisable.	<i>Scarified seed</i> : March 15 to April 15 <i>Seed in the hull, or unscarified seed with 50% or more of “hard” seeds</i> : Feb. 15 to March 15	If scarified or dehulled— 10 to 12 pounds If in-the-hull— 18 to 20 pounds	In the seeding year sweet clover may be pastured from August 15 to November 1. This late heavy pasturing will result in winterkilling and marked reduction in pasturage and soil improvement value the next spring. Sweet clover is not adapted for hog pasturage the second year of growth, except until about May 15. Hence, the area should be plowed May 1–15 for another crop.
RAPE	Requires a fertile soil, high in nitrogen and mineral nutrients, for satisfactory growth.	Dwarf Essex <i>Avoid</i> —Bird Seed and other annual rapes.	Seeded alone without a companion crop. May be sown in corn at the last cultivation.	April 1 to July 15	If broadcast or drilled solid— 5 to 8 pounds If drilled in rows— 2 to 3 pounds	Rape may be pastured 6 to 8 weeks after seeding for the rest of the season, provided the hogs are removed for two or three weeks as necessary to allow renewed growth. Two or more seedings made at different dates provide continuous pasture during summer and until freezing. Carrying capacity 10 to 20 shotes.

SUGGESTIONS ON THE GROWING AND USE OF FORAGE CROPS FOR SWINE (Continued)

Crop	Soil Adaptations	Varieties or Sources of Seed	Methods of Seeding	Time of Seeding	Rate of Seeding per acre	Duration and Character of Pasture Provided
RAPE AND OATS	Sowing this combination may be desirable on the less fertile soils.	Dwarf Essex Rape. Any adapted oats variety	Drill the oats— Sow the rape either through the grass seed attachment or broadcast after drilling the oats.	March 20— April 15	Rape— 5 pounds Oats— 4 to 6 pecks	This combination is probably not superior to rape sown alone, except on the less fertile soils. Clovers, especially sweet clover, may be added to this combination to furnish additional carrying capacity in late summer and fall.
SOYBEANS	Practically all soils. Endures lower reaction than clovers or alfalfa.	Manchu, Illini, for northern half. Scioto, Virginia, and Pekwa for southern half.	Seeded alone.	May 1–June 15 May be sown to July 15, but yields decrease rapidly after early June seedings.	Manchu, Illini and Scioto—6 to 8 pecks if drilled solid; 3 to 4 pecks if drilled in rows. Virginia—5 to 6 pecks solid; 3 pecks in rows. Pekwa—4 to 5 pecks solid; 2 to 2½ pecks in rows.	When grazed, soybeans do not produce appreciable new growth. Hogs should be turned in when the pods are well formed.
CORN AND SOYBEANS	As for SOYBEANS	Corn — varieties adapted to the farm Soybeans— Manchu, Illini, and Scioto.	Drill corn and soybeans at same time, preferably using soybean attachment on the corn planter.	May 1 to May 31	Corn — normal rate Soybeans—6 to 10 pounds Lower rates for the small seeded varieties.	This mixture is used for hogging-down. The soybean variety should mature with the corn and the hogs be turned in when the corn is ready.
RYE OR RYE AND VETCH	Practically all soils.	Rye—any variety. Vetch—Hairy, Winter or Sand.	Seeded in combination, following small grain or corn removed early. Provides fall and winter cover of soil.	Sept. 1 to Oct. 15	Rye alone— 6 to 8 pecks. If sown together— Rye—5 to 6 pecks. Vetch—15 to 30 pounds.	Primarily valuable as forage crops for late fall and early spring pasture. Ripe rye may be hogged-off. Vetch, being a legume, adds to the feeding value of the rye. Vetch seed is apt to be expensive.

There are several requirements of good forage crops. They should provide abundant growth for a short time or continuous growth for a fairly long season, and they must be palatable. A combination of these essentials adds to the value of the forage. The palatability will be increased by turning in the hogs when the crop is young and tender, and by keeping it pastured down fairly well. Care should be taken, however, that it is not pastured so closely that new growth is injured.

Following are some suggestions regarding best forage crops:

Alfalfa.—Alfalfa pasture will produce more pork per acre on the average than any other forage crop. It is one of the earliest pasture crops to be available in the spring, and it will provide good forage until late in the fall. Under average conditions an acre of alfalfa will pasture from 10 to 20 shotes,



Fig. 9.—Good forage makes healthy hogs and cheaper gains.

depending on the conditions previously mentioned. It should not be pastured too closely, as it does not stand very heavy foraging. It probably would be best to pasture it in such a way as to permit the cutting of one or two small crops of hay during the season in addition to the pasture furnished.

Alfalfa is a crop that is high in protein, mineral matter, and certain vitamins, all of which are very necessary in animal growth and which are lacking to a large extent in corn, the feed that forms the basis for practically all hog rations. For these reasons, alfalfa is particularly valuable as a forage crop.

Red Clover.—Red clover makes an excellent pasture for hogs and ranks close to alfalfa as a forage crop. However, it will not usually support so many head per acre, nor will the forage season be quite so long, but, if not

pastured too closely and not allowed to go to seed, it will generally produce an abundance of good forage all summer.

An acre of clover should furnish ample pasture for from 8 to 16 shotes if properly handled. Clover is high in protein and will replace a large part of the tankage or similar feeds necessary to get maximum growth.

Sweet Clover.—Since sweet clover has come into prominence as a soil builder and is a crop yielding abundant forage, it is receiving some consideration as a pasture crop for hogs. During the first year, especially if sown alone without a nurse crop, it will supply a good source of forage, but during the second year it becomes entirely too woody to be of much value as a pasture crop for hogs. Also, it does not always prove readily palatable, and some time may elapse before the hogs become accustomed to it. However, if sweet clover is available and some of the other legumes are not, it will certainly pay to turn the hogs on to the sweet clover.

Rape.—Rape is also one of the valuable crops for pork production. Although it is not a legume, rape compares favorably in composition with alfalfa and clover, and is particularly valuable as a forage to help out those two crops during July and August when they are likely to make short growth. Rape ranks close to alfalfa in the number of hogs it will pasture per acre. With a favorable season it will support from 10 to 20 shotes.

Rape may be sown any time after the danger of hard freezing is past and, if sown early, it should provide pasturage by the middle of May or a little later. It is advisable to sow rape several times during the season so that continuous forage will be provided. The Dwarf Essex rape is the variety which should be used. It may be broadcast at the rate of from 5 to 8 pounds per acre on a well prepared seedbed.

An old feedlot is an ideal place in which to sow rape. The great value of this crop lies in the fact that it can be sown almost any time during the growing season and will make abundant growth quickly. It will renew itself readily if not pastured too closely and the hogs removed for two or three weeks.

While rape is usually quite palatable, complaint is sometimes made that it is difficult to get hogs to eat it. However, if they are given access to no other green feed, they will usually learn to like it before receiving any serious setback. Pasturing hogs on rape will sometimes cause scabs and sores, particularly on light-skinned hogs, or on the thin parts of the skin. If this occurs, remove the hogs from the rape for a time and apply sulfur and lard to the sores.

Rape and Oats.—Rape and oats are sometimes sown together, and some feeding results give this combination as preferable to rape alone. However, results at the Ohio Experiment Station indicate that mixtures are less valuable as forage than rape alone.

Soybeans.—The best results from the use of soybeans may be expected when they are planted in connection with corn where both crops are to be hogged down. Even when this combination is used, experimental results indicate that it will pay well to add some tankage to the ration, either self-fed or,

at least, in amount one-half that which would be given were soybeans not present.

Soybeans do not make a very satisfactory forage crop because neither the vines nor the pods are especially palatable and they do not produce new growth when eaten off, consequently their season is quite short. To be used as a forage, the hogs should be turned in when the pods are just well formed. For hogging down, a variety of beans should be used that will mature with the corn, and the hogs turned in when the corn is ready.

Rye.—Rye when sown early in the fall will furnish later green forage than almost any other crop, and will also furnish good pasture quite early in the spring. However, its value as a pasture is limited, because it soon becomes woody in the late spring, which renders it unpalatable and indigestible. Hogging off rye after it has become ripe has proven a fairly successful practice. If this plan is followed, the rye should be allowed to become thoroughly ripe



Fig. 10.—Rape ranks close to alfalfa in the number of hogs it will pasture per acre.

and the heads crinkled down. The grain does not shatter easily, which makes it an ideal crop for hogging down. About the same returns may be expected from rye harvested in this way as when harvested for the grain.

Bluegrass.—Bluegrass is probably used more extensively as pasture for hogs than any other grass crop, and during the spring before jointing or heading out and late in the fall it makes a fairly good pasture. During the summer, however, it becomes dry, woody and unpalatable, which makes it of very little value as a feed for hogs. Furthermore, it is much more likely to be contaminated with parasites and diseases than pastures of a less permanent nature, and will require more protein supplement than any of the others mentioned.

HOGGING DOWN CORN

Hogging down corn is a practical and economical way of harvesting part of the corn crop and feeding hogs at the same time. The opinion some-

times expressed, that hogging down corn is a wasteful practice, is not borne out by feeding tests. Rapid and economical gains are usually made by the hogs, and satisfactory returns have been made for the corn so harvested. Hogs should be accustomed to green corn before they are turned into a field to be hogged down. They should be fed new corn gradually until they are on full feed. The corn should be practically ready to cut to put in the shock before the hogs are turned in.

The practice of hogging down has some objections, particularly because of the fact that hogs fattened out on the new corn crop usually reach market at the season of lowest prices. This may be partly or, in some instances, wholly offset by the fact that the cost of harvesting the crop is saved and the manure left on the field, well distributed. A field which has been hogged down is usually not in the best of shape for getting in order for the succeeding crop.

If hogging down is to be made a general practice, it will usually be found more profitable to have the pigs farrowed a little later than the usual season, so they will not have to be carried over a long period until the corn is ready. It is also generally advisable to divide the field with temporary fencing so that the hogs are required to clean up the corn as they go rather than having the run of the entire field from the start.

HOGS FOLLOWING FEEDER CATTLE

In some sections of the state, hogs are used extensively as scavengers following beef cattle on feed, because in the droppings of the cattle there is a considerable amount of undigested grain. It is advisable, therefore, to have hogs follow the cattle to utilize this material which would otherwise be wasted. The production of hogs for this special purpose presents a few problems different from those for general feeding.

Since cattle usually are not started on feed until November or later, it will be advisable to have the pigs farrowed later than usual, about May or June. This will obviate carrying the pigs over an extended period, and they should be about the right weight to follow cattle most satisfactorily. Pigs that are active and weigh at least 100 pounds will do a better job than those less active and of lighter weights. Brood sows may be used to follow cattle on feed, up to within 4 to 6 weeks of farrowing, but they should be watched to prevent injury and not be allowed to become too fat.

The number of hogs to be used following a specified number of cattle will depend upon the size of both the cattle and hogs, and the way they are being fed. It is obvious that the larger the cattle and the heavier the ration, the greater will be the number of hogs which can be used. Also where the grain for cattle is ground before feeding, a smaller amount of undigested feed will be available for the hogs. It is advisable to have an excess of hogs rather than too few, because the feeder is assured of the utilization of all the waste grain, and any lack of sufficient nourishment can be made up by additional grain for the hogs. It will also be advisable to provide the hogs with a protein supplement in addition to what they may receive from the droppings of the cattle.

MINERAL FEEDS

The development in comparatively recent years of a stretchier, growthier type of hog has apparently brought about an increased need for more mineral matter in the ration. This is probably due to the fact that the hog of today carries a larger skeleton than formerly, in which is found most of the mineral constituents of the body. Also, because these hogs are required to mature much more rapidly than those of some years ago, and in most cases are not permitted to root up pasture for a natural source of mineral supply, it becomes more imperative to supply the needed minerals, or growth will be impaired.

Corn is especially deficient in minerals, as are most of the grain feeds or grain by-products that are commonly fed to hogs. When rations consist almost entirely of such feeds, it will be necessary to meet the mineral requirement of the hog with some substances that are largely mineral in their make-up.

The two mineral elements most frequently lacking in the common grain feeds are calcium (lime) and phosphorus, and if these are supplied most of the

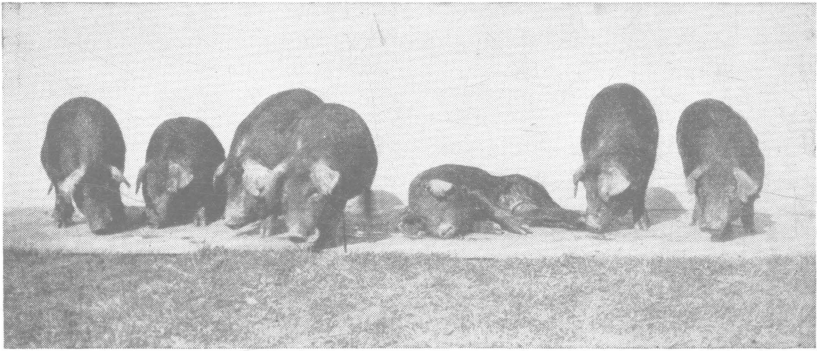


Fig. 11.—Hogs showing lack of both minerals and vitamins in the ration. The feed consisted of white corn, middlings, linseed meal and salt.

deficiencies will be met. With certain restricted rations, several other minerals may be lacking in a small degree. However, with an ordinarily good ration containing a fair variety of feeds, no great concern need be felt about any deficiency in minerals other than those mentioned, with the possible exception of iron and iodine. Recent experiments at the Ohio Station show rather remarkable results in favor of 3 per cent iron oxide in combination with limestone and salt. Iodine in the form of potassium iodide might well be added to most mineral combinations, especially where there is any occurrence of the trouble of "hairless pigs" or where pigs do not reach full development at birth. This probably need only be used in the ration for brood sows and gilts that are being developed for breeding use.

Minerals are particularly valuable for hogs when there is no green feed available, and when the hogs are being fattened on corn, with vegetable proteins being used to supplement the corn. Minerals are not quite so essential where the hogs are on some good forage or when the corn is being supplemented with tankage, fish meal, or dairy by-products. However, from much

available evidence, it has been found beneficial to feed some minerals no matter what other feeds are used, and the addition of the minerals has resulted in a saving of feed, particularly of the high-priced protein feeds.

Complete or Simple Mixtures?—Since, as stated before, calcium and phosphorus are the two minerals most likely to be lacking, it would seem that the so-called simple mixtures are all that will be needed for practical purposes. Bulletin No. 250 of the Illinois Experiment Station states that Glauber's salts, epsom salts, potassium chloride, lye, and copperas have no place in the rations of healthy farm animals; that healthy pigs do not need these drugs, and sick pigs need medicines chosen with reference to the particular disorders from which they suffer. The use of such substances as slack coal, charcoal, and sulfur do not add anything to the value of mineral mixtures, though possibly they may improve intestinal conditions in some unknown way.

Specific Mixtures.—Probably as satisfactory a mixture as any may be made of two parts finely ground limestone, two parts steamed bone meal, and one part common salt. As suggested previously, it may be worth while to add to each 100 pounds of this mixture, 3 pounds of iron oxide and $\frac{1}{3}$ ounce of potassium iodide. The Purdue Experiment Station suggests a mixture of ten parts wood ashes, ten parts acid phosphate, and one part salt. With this combination, it probably will be necessary to provide salt other than that contained in the mixture. The Iowa Experiment Station has suggested a simple mixture consisting of equal parts by weight of air-slaked lime, bone meal, and salt.

Any of these mixtures should give satisfactory results, since they all contain the essential elements of a good mineral mixture. It is probably best to self-feed these mixtures, because the amount required will be determined by what other feeds are being used; but if the feeder prefers to mix them with the grain feed, they may be fed at the rate of 2 pounds to each 100 pounds of grain consumed.

Do All Rations Require a Mineral Mixture?—Professor F. B. Morrison, co-author of Henry and Morrison's "Feeds and Feeding," made the statement that if a good ration is fed which contains sufficient amounts of both tankage and alfalfa—either hay, meal, or pasture—there will be no appreciable return from the addition of a mineral mixture. It is probably true, however, that not many hogs in Ohio receive rations in which both of these materials are consistently fed, and, since a simple mineral mixture is comparatively cheap, it may prove a worthy addition to most rations.

VITAMINS

Just as most of the grain and grain by-product feeds are deficient in minerals, they are also rather deficient in vitamins. White corn is especially deficient in certain vitamins and should not be used for winter feed, unless the deficiency is met through other feeds. The best sources of the essential vitamins are alfalfa hay or forage, sunlight, cod liver oil, milk, tankage, and fish meal, although the last two will supply vitamins only in a limited way.

If, as suggested in the discussion of mineral mixtures, the ration contains sufficient amounts of both tankage and alfalfa, the feeder need have little

worry about the vitamin supply. The most noticeable effect of lack of sufficient vitamins is the development of rickets, which results in enlarged joints, weak bones, and eventual paralysis. If this condition occurs, it may partially or wholly be corrected by the addition of cod liver oil to the ration, at the rate of about $\frac{1}{2}$ pound to each 100 pounds of the ration. It will be best, however, not to allow that condition to occur, by providing feeds that are rich in vitamins.

PROVIDE DRINKING WATER IN ABUNDANCE

Hogs require an abundance of water. It should be clean and available at all times. If there is not a natural supply in the hog lot or pasture, it should be carried or piped there, to allow the hogs all the water they want. There are various types of fountains or hog-waterers on the market, and one of these or a home-made type will help solve the watering problem. It will be more satisfactory if some means is provided to keep the water from freezing, because during the winter hogs frequently do not take enough water.



Fig. 12.—A good type of hog fountain. Clean water is essential for healthy hogs.

PARASITES AND DISEASES

IT APPEARS TO BE increasingly difficult to produce hogs without some parasitic infestation. This problem is consequently of considerable interest to the producer of pork. It will be impossible to enter into a lengthy discussion of all parasites which infest swine, but the symptoms, life history, and methods of control or eradication of a few of the most prevalent of the pests are given.

THE ROUND WORM (*Ascaris Lumbricoides*)

The most common of the internal type of hog parasite, and the one which causes the most damage, is the common round worm. It infests the intestines primarily, but may be found in the other organs of the body. If these worms become numerous, they will cause serious digestive and other disorders. Scientific investiga-

tions have proven that they may cause damage other than as a mere internal parasite, because they will so lessen the general vitality that the hogs are more susceptible to other diseases.

Young pigs are most susceptible to these parasites. As the pigs grow older they become more resistant, but if the infestation is very bad when they are small, they will become unthrifty and may eventually die. In any case, considerable damage will be done.

The prevalence of these parasites is not always recognized, because the pigs may not immediately become unthrifty. In fact, a number of cases have been noted where apparently perfectly healthy, thrifty pigs have died suddenly without showing symptoms of any disease, but upon post-mortem showed extremely severe infestation of round worms.

Sources of Infestation.—The worm eggs containing young worms are picked up from the ground in infested places by the pigs while rooting around; another,

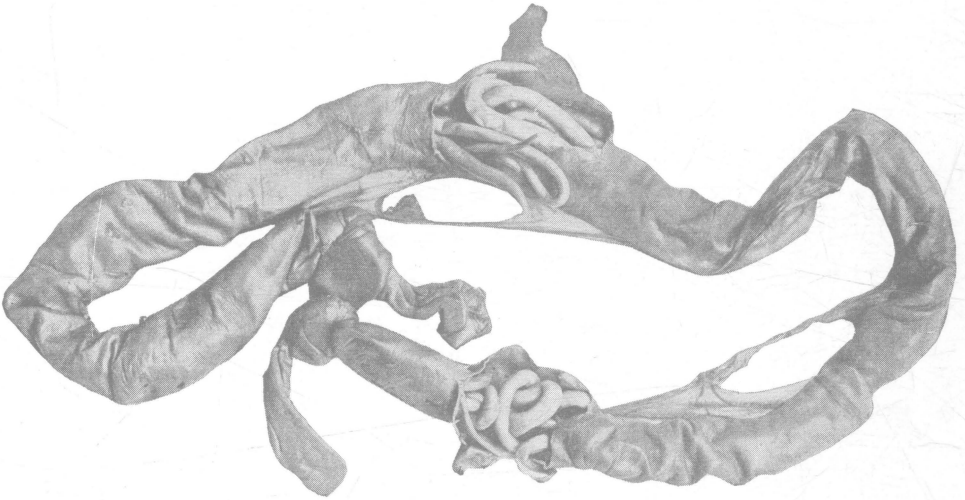


Fig. 13.—Showing section of small intestines almost filled with round worms.

and perhaps a greater source of infestation, is from the eggs adhering to the skin of the sow and being taken into the mouths of the suckling pigs while nursing, and swallowed.

The Journey Through the Pig.—In the early development of the worms, when too small to be seen without the aid of a microscope, they find their way into the blood stream, flow into the liver, then from the liver to the heart, and from the heart to the lungs. In the lungs they develop several times larger and usually collect in patches at the lower part of the lungs. After a few days in the lungs, the young worms crawl up the windpipe, and the irritation thus caused is the reason for much of the coughing often noted in young pigs. Some of the worms are coughed out, but probably most of them are swallowed.

The time required for the journey as described is usually about 10 days, and after settling down in the intestines the worms will grow to maturity in about 2 months. When full grown they are about a foot long. They continue to live in the intestines and adjacent tubes, such as the bile duct, and produce millions of eggs.

It is estimated that one mature female worm may lay as high as 80 million eggs. The eggs pass from the hog in the manure and drop to the ground. In a few weeks the tiny worms form inside and are ready to go through the process described.

Preventive Measures

Since much of the damage which may be done by the round worms is that done while the worms are in the lung stage, and since treatment is not possible until after they have passed to the intestines, some definite system for the prevention of infestation should be practiced. The so-called McLean County System, as worked out by the United States Department of Agriculture, not only will be found effective in the prevention of round worms, but will control practically all other parasites and many of the minor swine diseases, such as bull nose, sore mouths, necrotic enteritis, thumps, etc. Details of this system follow.

The McLean County System:

1. Clean all farrowing pens with boiling water and lye (30 gallons of water to 1 pound of lye). The heat of the water, if applied plentifully and very hot, will be destructive to the worm eggs and the lye will help remove the dirt. Disinfectants will have little or no effect on the worm eggs, but will help in making the pens generally more sanitary. Cleanliness is the important factor in this system. If individual farrowing houses are used, they should be cleaned as indicated and then moved to areas not recently used as hog lots, preferably meadow pastures.

2. Wash the sows with soap and warm water before placing them in the clean pens. Pay particular attention to the udders. In extremely cold weather it may be that a thorough brushing will have to suffice, but again in this instance cleanliness is the important point.

3. As soon as possible after farrowing, move the sow and pigs to clean lots or pasture, being careful that the hogs do not become contaminated by passing through infested places. In some instances it will be best to HAUL the sow and pigs to the fresh lots, particularly where it would be necessary to cross infested areas.

4. Keep the young pigs in the clean lots or pastures for at least four months, or until they reach an average weight of 100 pounds; after that time they will usually have enough natural vitality to keep them from becoming badly infested. Pastures should not be used more than one year, certainly not more than two years in succession, but should be plowed and put in a system of crop rotation. The eggs of the round worm have a wonderful vitality, and may remain alive from three to five years under favorable conditions.

5. Provide proper feed, water, and shelter; an undernourished pig is always more susceptible to parasites than one properly fed.

If this system of management is carefully and consistently practiced, the infestation of intestinal worms will soon be reduced to a minimum and eventually eradicated.

Treatment for Round Worms

In some instances, it may not be possible to practice the above system in its entirety, or infestation may creep in for one reason or another. In such instances treatment must be resorted to. It should always be borne in mind, however, that treatment is somewhat like "locking the barn after the horse is stolen." The preferable time for treatment is when the pigs weigh from 40 to 60 pounds, or within two or three weeks after weaning.

Santonin Capsules.—The most effective and efficient treatment is by the capsule method. This consists of keeping the pigs off feed for 24 hours and then

giving a capsule containing the following, which is a sufficient dose for pigs of the weight suggested:

Santonin	2 grains
Alain	3 grains
Sodium bicarbonate	8 grains

These capsules are best administered by the use of a capsule or balling gun and a speculum or jaw spreader. In giving the capsule, place it over the ridge of the tongue into the back part of the mouth but do not attempt to force it down the throat, as that might prove injurious to the pig. Keep the pigs off feed an additional 18 hours following treatment.

If the weather is warm, water will have to be supplied during the fasting period, but withhold it for several hours before and after treatment. Use care in getting the pigs back on feed. Feed lightly at first; a slop or laxative feed is best. If clean pasture is available the treated hogs should be turned in it.

If the pigs treated have been infested, results should be noted within 24 to 36 hours. It is well to keep the pigs confined for about two days following treatment so that the manure may be spread on a field which is to be plowed soon. Any worms or eggs which may be passed and eaten by the pigs will do them no harm as the worms are not then in the infestive stage.

When hogs weighing much over 60 pounds are to be treated, two or more capsules should be given in proportion to the weight of the hogs. However, it is hardly advisable to treat hogs much over 100 pounds by this method, as hogs over that weight are hard to handle while giving the capsule; then, too, the need for treating pigs of that weight is so much less, because their natural resistance is sufficient to prevent serious infestation.

Oil of Chenopodium Treatment.—This drug is sometimes recommended as a treatment for intestinal worms, but its action is rather inconstant and uncertain. Its general use is, therefore, not recommended unless santonin is unobtainable or prohibitive in price. If oil of chenopodium is used, it is probably best to get the commercial capsules containing the oil and administer the same as the santonin capsules. In case the regular oil of chenopodium is used, give as a dose for a 50- to 60-pound pig, 2 cubic centimeters of the oil in 1½ ounces of castor oil as a drench. To use the oil as a drench requires much more technique and experience in administering. Doses of oil of chenopodium should always be used with a purgative.

Areca Nut Treatment.—Where it is entirely impracticable to use the capsule method of treatment because of the size or large numbers of hogs to be treated, probably the best treatment is to use 1½ to 2 grains of areca nut mixed with a small amount of feed, to each pound live weight of hog. As with other methods of treatment, the hogs should be kept off feed some time before and after giving the areca nut.

OTHER INTESTINAL PARASITES

The Thorn-headed Worm.—This worm is whitish in color and somewhat larger than the round worm. Its head end has a hook which is covered with many smaller hooks. It is with these hooks that the worms attach themselves to the inside walls of the intestines.

The Pin Worm.—This is a small, brownish-white worm about ½ inch long and usually found in the beginning of the large intestine.

The Whip Worm.—This worm is about ½ inch long, small at the head end and quite thick at the other end.

It is seldom that any of these worms cause any serious disorders except that their presence may aggravate the conditions caused by other parasites. The source of infestation is very much the same as the round worm, and the same treatment will usually be effective. However, with these worms, as with the round worms, sanitation and frequent plowing of hog lots will do more toward control and elimination than any treatment which may be prescribed.

HOG LICE

The most prevalent of the external parasites is the common hog-louse. When a hog is badly infested with lice, hundreds of eggs will be found on the hair back of the ears, along the front of the shoulders, and on the flanks. The time required for the eggs to hatch will vary with the temperature and weather conditions, but they will usually hatch in a period of from ten to fifteen days. The louse itself is a blood-sucking parasite about $\frac{1}{4}$ inch long.

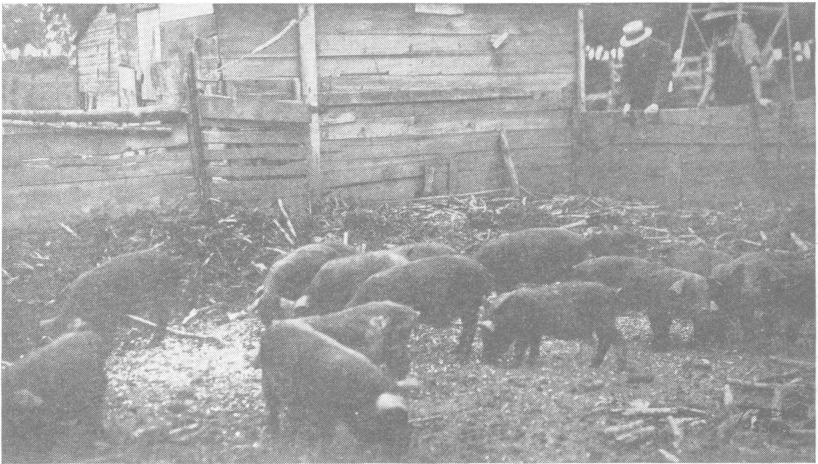


Fig. 14.—Pigs showing effects of worms and other lot infections.

Apparently, because hog lice are so common and their distribution so general, the serious effects where they exist in large numbers is not generally recognized. Often when hogs become unthrifty, they are said to be “off feed” or “out of condition,” and the stock-tonic salesman finds a ready buyer. On close examination the trouble may be directly traced to the existence of large numbers of lice on the hogs. If the lice are permitted to increase unmolested, they may become so numerous that the skin of the hogs will become covered with scales or sores, and in extreme cases inflammation and swelling develops. Such a condition will cause the hogs considerable irritation, and result in the serious impairment of growth and fattening ability, particularly of young pigs. Not only will the lice cause direct injury in this way, but they also lessen the vitality of the pigs, and lower their resistance to other diseases.

Treatment.—Since the killing of these parasites is a comparatively easy matter, there is but little excuse for a herd becoming badly infested. Perhaps the most economical and, at the same time, effective treatment is the use of crude oil or petroleum.

Use of oil drained from the crank case of an automobile or tractor will generally prove effective.

The common coal-tar dips, if used strictly according to directions, or a little stronger, will usually do the work for which they are intended. These materials may be applied with a spray pump, sprinkling can, or the use of a dipping tank. The method used is not so important as making sure that the job is thoroughly done. If a dipping tank is used with oil, only enough of the oil to keep the surface of the water well covered is necessary. At the same time, the hog quarters should be cleaned and disinfected. The use of a coal-tar creosote dip, diluted according to directions, is suitable for the purpose.

Such treatment as above prescribed will have no effect on the lice eggs, so it will be necessary to apply the treatment several times at about 2-week intervals. If this system is practiced consistently and the hog quarters are kept in reasonably good sanitary condition, the lice should eventually be eradicated.

MANGE

Mange in swine is not nearly so prevalent as lice, and is harder to get rid of when it does occur. The cause of mange is a small external parasite, commonly called the mange mite. There are two distinct species of these mites. One burrows into the skin and the other one into the hair follicles. Both species are so small that they cannot be detected readily on the skin of the hog without the aid of a microscope, but the symptoms described below are sufficient evidence of their existence. The parasites are spread by direct contact or by infested bedding, etc.

Symptoms.—At first, mange usually attacks the weanling pigs, but will soon spread to the older hogs. The first symptoms are an inflamed and irritated condition about the eyes and ears; this gradually spreads to the neck, flanks, and inner surface of the thighs. The skin becomes wrinkled, the hair stands erect, and soon either falls out or becomes matted with the scabs or crusts that form at the roots of the hair. The scales may eventually extend the full length of the body. The symptoms are usually more pronounced in the winter season, probably because circulation in the pig's skin is slower and conditions more favorable for development of mites.

Treatment.—The treatment is much more difficult than for lice. In addition to external applications of something to kill the mites, it will be necessary to have a general clean-up of quarters, and also to give the pigs plenty of nourishing feed, as a poorly nourished pig is more susceptible to the disease.

Where the number of infested pigs is small, it is advisable to wash them thoroughly with soap and water before applying the remedy. Dipping is the only practical method where large numbers are to be treated, and thoroughness is one of the first essentials of successful treatment. It is necessary to keep the hogs in the dip until the scabs are thoroughly soaked through; one dipping, if properly done, should kill the mites. However, this dipping will not kill the eggs, so, a second immersion should follow six days after the first one. Usually an improved condition of the hogs will be noticed within a day or two following the first treatment, but perseverance will be necessary to effect a complete cure.

How to Prepare a Lime-Sulfur Dip.—The best remedy is lime-sulfur dip made as follows: 10 pounds fresh lime, 24 pounds flowers of sulfur, water to make 100 gallons. Slake the lime, then add enough water to make a thin paste and stir in the sulfur. Boil the mixture with 25 to 30 gallons of water for 2 hours. Pour into a barrel or other vessel and allow the sediment to settle, as only the clear orange-colored liquid is used. Draw off the liquid and add enough warm water to make

100 gallons. Use while warm (100°-110°Fahrenheit) and use care in getting the measurements of the ingredients exact. The commercial lime-sulfur may be used in place of the above mixture by diluting 1 gallon of the commercial product with 15 gallons of water and applying as suggested for the home mixture. If the powdered lime-sulfur is used, mix 1 pound to 30 gallons of water. In aggravated cases, the water may be reduced to 20 or 25 gallons. Apply as with the other dips. After treatment, the pigs should be placed in clean, disinfected quarters.

Coal-Tar and Oil Dips.—Other remedies which may be used are some of the common "coal-tar dips," but usually they are not quite so effective as the lime-sulfur dip, especially in severe cases. A heavy grade of crude oil used as a dip has also given good results in some instances. This should be used in the same manner as described in dipping for lice.

HOG CHOLERA

It is probably safe to say that from 150,000 to 250,000 hogs are lost annually in Ohio from the ravages of hog cholera, and this refers only to the direct loss from definite cases. This loss is almost entirely preventable; every effort should be made to diagnose the case quickly, and at the least warning to call in the services of a competent veterinarian.

It will be even wiser to anticipate any possible outbreak by keeping the entire herd, including each new crop of pigs, immunized by vaccination through the use of the double or simultaneous treatment. This consists of injecting into the hog by means of a hypodermic needle a definite amount of hog cholera virus and also a sufficient amount of anti-hog cholera serum to produce immunity. Amounts of both virus and serum will depend upon the weight of the hogs to be treated.

In case a herd is attacked by cholera, prompt attention is essential to prevent heavy losses. The treatment should be administered as soon as the disease is recognized, or preferably when there is reason to suspect that the animals have been exposed to the infection. The treatment should always be given by a licensed veterinarian, principally because there are several other diseases showing much the same symptoms in the early stages, not readily recognized by the layman. Treatment for cholera in such cases would merely serve to infect the herd with cholera and aggravate the conditions already existing.

Symptoms.—The symptoms vary in different hogs, and different herds, depending on the virulency of the germs and the ability of individual animals to withstand the disease. Cholera is, therefore, said to exist in two forms—acute and chronic. In the former type, the hogs sicken and die quickly, while in the chronic, or less severe type, hogs may be sick for weeks or even months before death occurs.

At the first appearance of cholera in the herd, not all the hogs become sick at once, probably only one or two refusing to eat. These may remain in the nest at feeding time and if driven out will hunch up their backs and appear cold and shivery. Later, the sick hogs become gaunt and walk with a weak, staggering gait, being most affected in the hind legs. If the lungs are affected the hogs will cough. The eyes are usually inflamed, causing a whitish discharge. In the early stages, constipation is usually present, followed by diarrhea. As the disease progresses, red or purple spots appear on the skin of the ears, belly, and under the flanks.

Treatment.—Separate the sick from the well hogs as soon as possible. For those hogs seriously affected, no "cure" or treatment of any sort will prove of value, and the only hope lies in giving the balance of the herd the proper administration of anti-hog cholera serum. Proper care, in regard to both quarters and feed, will help the situation. The dead hogs should be burned or buried.

In order to eliminate possible loss from cholera and reduce the cost of vaccination, treat the pigs early in life. Recent investigations indicate that pigs may be successfully immunized to market age or longer by giving the double treatment during the suckling period. The treatment may be given between the time the pigs are a week to 8 weeks old, but probably the best time will be when the pigs average 5 to 6 weeks of age. There is practically no retarding of growth, the risk and cost is less, and the immunity seems to be just as strong as when the treatment is given after weaning. It may be safer, however, to treat again the next season those hogs which are to be kept for breeding purposes.

TUBERCULOSIS

Tuberculosis is one of the most prevalent diseases of hogs, but is not easily recognizable unless in advanced stages; even then one may be certain only through post-mortem examination. Probably not many hogs die on the farms from tuberculosis, yet the condemnation of carcasses or parts of carcasses in inspected slaughter houses in Ohio exceeds the number of condemnations from all other causes combined. From available statistics, typical tubercular lesions appear in more than 2 per cent of the carcasses slaughtered, requiring total or partial condemnation of the carcasses involved.

Symptoms.—As stated before, the disease cannot be recognized in its early stages in the live hog, but later as the disease becomes generalized, certain symptoms may develop. Among the general signs are a certain degree of unthriftiness, followed by a decided loss in weight, the mucous membrane becomes pale, and the hog becomes dull and sluggish.

As the disease advances it will depend upon which organs are most affected, which symptoms will become noticeable. If the lungs are affected there will be a dry, hacking cough which may eventually become violent enough to cause vomiting. Tuberculosis of the digestive organs may result in alternate periods of diarrhea and constipation, accompanied by loss in weight. If the bones are particularly affected it may give rise to paralysis, or the bones may show enlargements of the parts affected, especially the joints. Most of these symptoms may also be due to other causes, but where all are present it is reasonable to suspect tuberculosis.

Treatment.—There is no treatment for the animals affected, but where typical symptoms are present or where it is known that tubercular cattle have been on the premises, tuberculosis is almost certain to exist in the hogs and proper measures should be taken. If one desires to make doubly sure of the existence of the disease, he may have a post-mortem examination made of apparently affected hogs by a veterinarian, or he may have them tuberculin tested in a manner similar to that used for cattle. If infection is found, all such animals should be disposed of and a thorough cleaning and disinfecting of the premises made. It probably will be best not to attempt to raise hogs on the place for a year. If this is not practicable, move the quarters temporarily to different areas.

In order to prevent a recurrence of the trouble, have the cattle and poultry on the farm tested for tuberculosis, as these are the main sources of infection, although infected sows will readily transmit the disease to their pigs. While feeding of infected milk to hogs is probably the most prolific source of infection, yet hogs may easily contract the disease by running in lots frequented by infected cattle or poultry. If the cattle and chickens are not known to be free from tuberculosis, do not allow the hogs the run of cattle and poultry yards.

INFLUENZA

This is referred to by various names: hog flu, swine plague, and hemorrhagic septicemia.

Symptoms.—The symptoms would seem to indicate pneumonia, but the presence of round worms in the lungs would show much the same symptoms and it is, therefore, hard to correctly diagnose. It is also hard to distinguish flu or swine plague from hog cholera in its early stages, and both diseases may occur in the same animal. Even the presence of the apparently characteristic bacilli does not prove the existence of swine plague, because these bacilli are found frequently as secondary organisms in cases of hog cholera, and are also often present in the nose and throat of healthy swine.

Treatment.—No form of treatment has time to become effective for animals seriously affected. Apparently healthy animals should be separated from the diseased ones and placed in clean, uninfected quarters, where they should receive the best of feed and care. It has been claimed that bacterial vaccines have seemed to be effective in some instances in checking an outbreak, but it is very probable that the better feeding and care given incidentally with the treatment has been more effective than the administration of the bacterin.

“NECRO” OR NECROTIC ENTERITIS

In spite of the fact that many “sure cures” for necro are advertised, there is no specific treatment for the disease, according to the best veterinary authorities. It is a highly infectious disease caused directly by specific germs or micro-organisms, resulting in extreme inflammation of the intestines. Secondary causes may be poor or inadequate feed, insanitary hog lots or quarters, and intestinal parasites, although necro has been known to exist where none of these factors are apparent. Ordinary digestive disorders are frequently a forerunner of necro.

Symptoms.—The disease may assume either an acute or chronic form. In acute cases, the pigs may show evidences of being sick only 3 or 4 days before death occurs, while in chronic cases the pigs may linger two or three weeks or even longer. Not infrequently chronic cases will apparently recover, but usually they will remain stunted in comparison with those not affected.

The affected pig usually becomes dull and drowsy, the hair loses its luster and becomes harsh and dry. The skin appears dry and rough, and frequently a bluish discoloration of the skin will be noticed. As the disease progresses, the pig becomes weak and wobbly. Either diarrhea or constipation may develop but the pigs will seldom stop eating entirely.

Treatment or Control.—Treatment is not very satisfactory for hogs already affected. The first thing to do is to isolate the sick ones from the well ones. It will be better to place the unaffected hogs in fresh quarters, if possible, but if only a few are sick, it may be more feasible to isolate them.

The feed of the pigs affected with necro should preferably be fed as a slop. Ground oats or barley fed as a thin slop has sometimes given fair results. It may be increased in thickness as the pigs improve. A diet consisting entirely of skimmilk or buttermilk has also been found effective in many cases. The pigs on a milk diet should not be given any water but allowed to consume all the milk they will take. After several days of the milk diet, ground oats or barley may be mixed with the milk.

In many instances sufficient milk is not available, and in such cases it may be worth while to try the lye and copper sulfate treatment, although there is always some danger in using such irritating substances. However, if directions are carefully

followed, the danger will be negligible. Dissolve 1 pound of lye, 1 pound of copper sulfate, and $\frac{1}{4}$ pound of common salt in 1 gallon of water and boil 5 minutes. Add 1 pint of this mixture to 15 gallons of water and stir thoroughly. Then mix about 3 bushels of whole oats or barley with the 15-gallon mixture and allow to soak for 24 hours before using. This feed may be used for from several days to a couple of weeks, if necessary.

It should be understood that none of these treatments are specific cures for necro, but in many cases have been found to be reasonably effective. In other instances, all of them used alternately have not relieved the trouble to any great extent. However, if anything at all will be effective, one of these treatments or a combination of them, should prove as much worth trying as anything else.

ANEMIA

During the first 3 to 6 weeks in the life of the pig, there is likely to be considerable danger from anemia due to a deficiency of iron and copper in the blood of the pigs. This is caused by a similar deficiency in the milk of the sow, but no method has been found to correct the trouble by feeding these minerals to the sow. External symptoms of anemia are a shrinking in flesh, a rough hair-coat, and a thumping of the sides. Pigs badly affected usually die within a few days. This trouble is likely to occur only with pigs that are kept closely confined for the first several weeks; it does not occur generally when the pigs have the run of a pasture.

There are several methods which have been found successful in correcting this trouble. Probably the easiest method is to place a chunk of clean bluegrass sod in the pen. It will be best to get this from along the roadside, where it is not so likely to be contaminated as if taken from a lot or pasture. Renew the supply when necessary. The sow and pigs will work over this material and usually will get enough of the needed minerals to relieve the anemic condition.

In obstinate cases, it may be preferable to dose each individual with a teaspoonful a day of a solution made of 4 ounces of copperas dissolved in 5 quarts of water. This may be given as a drench. Another method which has been fairly successful, is to use a solution similar to the above but replace 1 quart of the water with a like amount of syrup or molasses. Then paint this solution on the udder of the sow two or three times a day where the pigs will get a little each time they nurse. Where pigs are confined indoors for the first few weeks after farrowing one of these methods will certainly help to save many pigs which otherwise would be lost.

INFECTIOUS ABORTION

This disease is sometimes referred to as contagious abortion or abortion disease, and is apparently becoming more prevalent among the swine herds in this state. It appears to be similar to but not identical with that of infectious abortion in cattle.

Symptoms.—There are no reliable symptoms which distinguish this type from abortion due to other causes. In fact, if abortion occurs in the early stages of gestation no visible evidence of abortion having taken place may be noted. Mere failure of the sow to produce living pigs is not always evidence of the existence of infectious abortion, although in many instances abortion may be the cause. Fairly positive diagnosis may be had by having a test made by a veterinarian similar to that made for infectious abortion in cattle.

Treatment.—There is no treatment other than prevention. Medicines, serums, vaccines, and bacterins have not proven of sufficient value to justify their use under average farm conditions. Also, in most cases hogs will hardly prove valuable enough

to attempt any plan other than disposing of all animals which have been exposed and then making a new start after a thorough clean-up.

DIARRHEA OR SCOURS

There are several causes of scours, especially in suckling pigs, namely: diseased condition of the sow, improper methods of feeding and care for the sow and litter, and specific infection. Regardless of the type of scours, preventive measures are likely to prove the most effective method of combating this trouble. Proper diet for the sow, feed free from moldy or decomposed material, with the sow and pigs fed in fresh lots or pastures, will help more than any possible treatment which might be prescribed. If the fault is with the diet of the sow, the trouble may be more quickly corrected by giving the sow a purgative of 2 to 3 ounces of Epsom salts for each 100 pounds of live weight.

PARALYSIS

Partial or total paralysis, particularly of the hind quarters, has been claimed by some to be due to so-called kidney worms, but there is no scientific evidence to support the statement. It is probably due to malnutrition, the lack of the proper amount of minerals or vitamins, or both. It may also be due in some instances to a germ infection of the spinal cord in the lumbar region. In any case there is little of practical value that may be given in treatment, except to provide the best of care and give such feeds as are rich in minerals and vitamins.

LOSS OF TAILS

Sometimes the tails of little pigs will become sore at the base, dry up and slough off. This trouble is usually associated with damp, steamy bedding, but does occur even under almost ideal conditions. The source of the trouble is somewhat in doubt. Aside from keeping the bedding clean and dry, various treatments have been suggested. Painting the affected parts with tincture of iodine has been found effective in some cases. A thick paste made of lard and powdered sulfur or some disinfectant powder when applied to the sores has frequently arrested the trouble. Usually three or four applications will be necessary to control the cases.

FILTH DISEASES

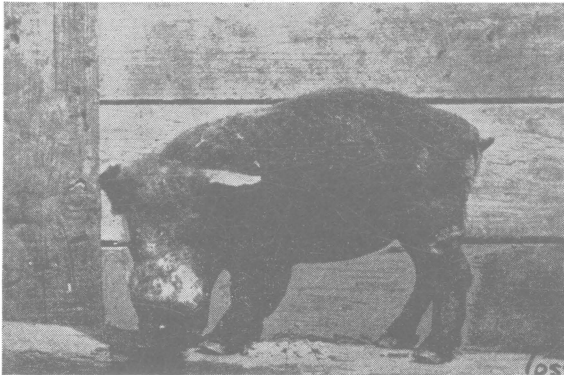


Fig. 15.—Bull nose, mange, and general unthrifty conditions due to filthy surroundings.

Under this heading might be listed such diseases as certain forms of scours, sore mouths, thumps, bull nose, etc. Such diseases are generally the result of infection from filthy houses or lots, and may be practically eliminated by following the system of clean-up suggested in the discussion of "Round Worms" (see "The McLean County System," outlined on page 34).

CONCLUSIONS

From the length of the foregoing discussion of swine parasites and diseases, one might be led to believe that the hog producer is constantly beset with various ailments in his herd. This is not necessarily true, provided proper management and feeding practices are followed. However, it is well to know the causes, symptoms, and treatment of some of the more common ailments so that the herdsmen may recognize the trouble at its first appearance and be in a position to adopt proper remedial measures. In serious cases, or when the symptoms are not easily recognized, it is always advisable to secure the services of a licensed veterinarian.

MARKETING

WHILE THE marketing of hogs may not be strictly a problem of pork production, yet it is a phase of the entire situation in which the producer of hogs should be vitally interested. All too long has the producer felt that his interest ceased with the production of his hogs to a marketable weight. It is because of this lack of interest in some of the marketing problems that many of the so-called evils of our marketing system have developed. By a little study of the important phases of marketing, the producer can, if he will, meet some problems which seem to detract from the profits of his business.

METHODS OF MARKETING

Methods of marketing livestock have undergone numerous changes. In the early days, much of the livestock was slaughtered and consumed locally. With the movement of the larger farming areas westward, quite a little stock was driven overland to the more populous areas for sale and slaughter. Then, with the advent of the railroads as a ready means of transportation for livestock over long distances, came the development of the so-called terminal markets.

Along with this development came the local stock buyer in the country and the commission agencies on the markets. The local dealer bought, assembled, and sold the livestock through the commission companies, and up to the present time much of the livestock is marketed through similar channels.

During comparatively recent years, the cooperative livestock marketing system has developed over large areas. With this plan there is a paid manager who assembles, weighs, and grades the stock of the individual shippers and then ships the consignment to what he considers the most advantageous market. Returns are made to the individual on the basis of the actual selling price of his animals, with only the necessary overhead charges deducted. The cooperative plan offers some advantages, particularly in that practically all speculation is eliminated and the small producer has equal advantage with the large for having his stock sold on the basis of grade and quality, and returns made accordingly.

Another plan of marketing is the so-called "direct shipments." This plan is feasible only where large numbers of any one species of livestock are available, and is used especially in the marketing of hogs. Under this system, concentration yards are set up, livestock is assembled and graded, then shipped

direct to packers on order from them for a certain grade or grades. According to the United States Department of Agriculture figures for 1931, slightly more than 40 per cent of the hogs in the country were marketed in this manner. Both private and cooperative agencies are engaged in this type of marketing.

In recent years, the local livestock auctions have come into existence as another method for the sale of livestock. At these auctions, which are usually held weekly at various points, both breeding and market stock is offered for sale, although the latter generally predominates.

It is impossible to state which system or plan of marketing is the best under all circumstances, and it is possible that they may all have a permanent place in the whole marketing scheme. As the newer forms develop, their fundamental economic soundness will determine which of the existing types will survive.

BEST TIME TO MARKET HOGS

The month of September is the month of highest average hog prices, with the price usually starting on the decline shortly after the first of October. The month of April is next in line after September, with July following closely. The principal reason for the high September price is because most of the hogs have been carried through the summer on grass and are being fed off on the new corn crop and consequently are not yet ready for market. This causes a shortage in hogs on the September market, with a resulting relatively high price. It should be understood that these conditions are average and do not always apply to specific years.

The high price points in the late spring are due to the same general causes, as many of the fall farrowed pigs are carried over the winter on a limited grain ration, and are not ready for market at these periods of high prices. The production phases of this part of the problem were discussed under "Limited or Full Feeding" (see page 21).

The question is sometimes asked, "What if every hog feeder would feed for the months of high prices, wouldn't those months change to periods of low prices?" If there were the possibility of any great number of feeders following such a plan, the answer would have to be in the affirmative. However, the situation which prevails on most farms with reference to feed and other circumstances, precludes the possibility of many producers feeding for early September and April markets, even though they may know it would be more profitable to do so. But for the man who is willing to adjust his operations in order to be a little ahead of the crowd, feeding for the months of high prices offers an opportunity for returns not enjoyed by many.

WEIGHT TO MARKET THE HOGS

A survey of Ohio packers has shown that almost 54 per cent of the hogs desired ranged in weight from 180 to 240 pounds, and more than 40 per cent are wanted between the weights of 180 and 220 pounds. This would indicate that the most desirable weight from the packers' standpoint is the hog weighing close to 200 pounds. This is probably the most desirable weight at which to market, from the standpoint of the producer as well as the packer.

Hogs marketed at weights much less than 200 pounds have in most cases cost more per pound of gain because of the higher priced feeds necessary for the early development, and the cost of bringing the pig up to weaning is distributed over a less number of pounds. On the other hand, to carry them much above 200 pounds will increase the cost per pound of gain, because as the hog gets larger, and particularly as he approaches maturity, it requires more feed to put on each additional pound of gain.

Complaint is sometimes made that the packers do not seem to buy many of the hogs from the territory adjacent to the packing house, but prefer to buy them elsewhere. The answer almost invariably is that the hogs being produced in that territory are not of the kind the packers can use to best advantage, and he is, therefore, forced to seek elsewhere for his supply.

A little inquiry or study on the part of the producer to ascertain the demands of the local packer, and then meet them, will generally result in a more satisfactory sale and purchase of hogs locally. To make a long story short, *produce what the market wants*, and there will be little trouble in finding a satisfactory market.

PREPARATION FOR MARKET

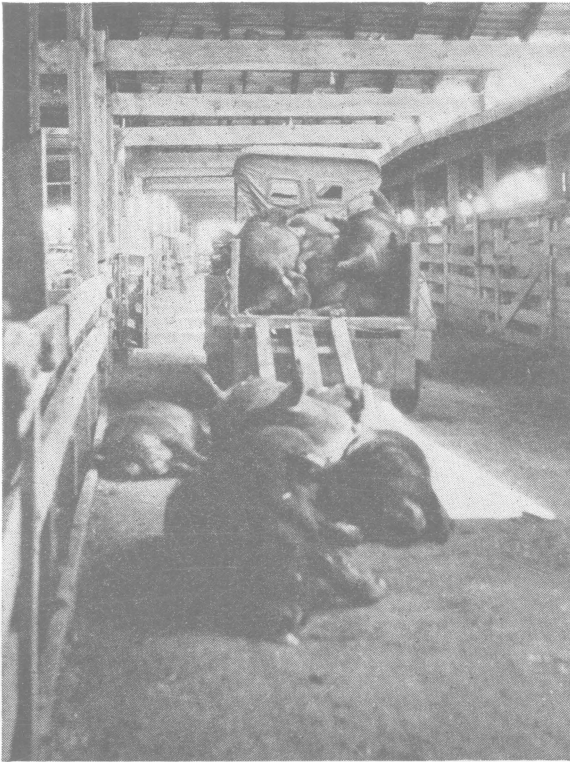


Fig. 16.—Dead hogs at stockyards, a result of improper feeding and handling.

Most feeders consider that as soon as the hogs leave their hands, they have no further interest in them. That is true to a certain extent, for there are some problems that are common to both the producer and packer — problems which will be reflected in the ultimate price which the producer will receive for his product.

Yield or dressing percentage is a matter of concern principally to the packer, but it also is of interest to producers, especially those whose hogs are going direct to packers. Hogs that are heavily slop fed dur-

ing the feeding period, or have been "filled" excessively just prior to shipment, will shrink more than those not so fed, and will have a consequent lower dressing percentage.

Even when these hogs are not sold direct on a basis of dressed weight, the packer buyer can usually tell how the hogs will dress out, and makes his bid accordingly.

Losses between the farm and the packers' coolers are an important item and are also reflected in the price which the producer receives. These losses may be divided into losses in transit (which covers both crippled and dead hogs), and losses from bruised and diseased meat. All of such losses are largely within the control of the producer.

It is well known that hogs which have received a ration deficient in minerals or vitamins, or both, are more easily crippled due to lack of strength of bone and muscle. A crippled hog brings considerably less on the market, and the hog that is crippled early in the transportation period is very frequently a dead hog before he reaches market. Hogs that are heavily slop fed or fed out in close quarters frequently die in transit because of lung congestion, due to the type of feeding and lack of proper lung capacity.

Bruised meat is another item of loss. In many cases it is due to the manner in which the hogs have been loaded at the farm and unloaded at the shipping point, although much of it occurs in transit and at stockyards. One Ohio packer has indicated that about 6 per cent of the hogs killed by him show bruised meat which must be cut out before the parts can be sold. This not only means the loss of the actual number of pounds of meat cut out, but a further loss is sustained in the price that may be obtained for the cut from which the bruised meat has been removed.

Many producers who ship cooperatively or in carloads to market are often both surprised and disappointed at the heavy shrink between home and market weights. In most cases, as usual, "there's a reason." Hogs that have been given an extra heavy feed just prior to shipment, especially if it is slop feed, do not "ride" well and will usually scour badly. A hog that is scouring will not take on a normal market fill, so that when the weight is taken at the market there is a consequent heavy shrink. On the other hand, hogs that have been fed and handled properly have been known to show an actual increase of market over home weights.

If in cool weather, the hogs have received from about 75 per cent to a normal amount of dry feeds just before shipment, and in hot weather not to exceed one-half of a normal feed, there will be less danger of loss in transit, and disappointing shrinks will not likely be encountered.

Since all of these losses are well known by the various buying agencies, the price bid is based on accepting a certain percentage of them. It is certain that if the buying agency could be assured such losses would not occur, the price would be higher. A concerted effort to reduce losses will lower marketing costs and reduce the margin between the producer and the consumer of his product.

GESTATION TABLE

Date Bred		Due to Farrow		Date Bred		Due to Farrow		Date Bred		Due to Farrow		Date Bred		Due to Farrow	
Jan.	1	Apr.	22	Mch.	15	July	4	May	27	Sept.	15	Aug.	8	Nov.	27
"	2	"	23	"	16	"	5	"	28	"	16	"	9	"	28
"	3	"	24	"	17	"	6	"	29	"	17	"	10	"	29
"	4	"	25	"	18	"	7	"	30	"	18	"	11	"	30
"	5	"	26	"	19	"	8	"	31	"	19	Dec.	1	"	24
"	6	"	27	"	20	"	9	June	1	"	20	"	2	"	25
"	7	"	28	"	21	"	10	"	2	"	21	"	3	"	26
"	8	"	29	"	22	"	11	"	3	"	22	"	4	"	27
"	9	"	30	"	23	"	12	"	4	"	23	"	5	"	28
"	10	May	1	"	24	"	13	"	5	"	24	"	6	"	29
"	11	"	2	"	25	"	14	"	6	"	25	"	7	"	30
"	12	"	3	"	26	"	15	"	7	"	26	"	8	"	31
"	13	"	4	"	27	"	16	"	8	"	27	"	9	"	1
"	14	"	5	"	28	"	17	"	9	"	28	"	10	"	2
"	15	"	6	"	29	"	18	"	10	"	29	"	11	"	3
"	16	"	7	"	30	"	19	"	11	"	30	"	12	"	4
"	17	"	8	"	31	"	20	"	12	Oct.	1	"	13	"	5
"	18	"	9	Apr.	1	"	21	"	13	"	2	"	14	"	6
"	19	"	10	"	2	"	22	"	14	"	3	"	15	"	7
"	20	"	11	"	3	"	23	"	15	"	4	"	16	"	8
"	21	"	12	"	4	"	24	"	16	"	5	"	17	"	9
"	22	"	13	"	5	"	25	"	17	"	6	"	18	Mar.	1
"	23	"	14	"	6	"	26	"	18	"	7	"	19	"	2
"	24	"	15	"	7	"	27	"	19	"	8	"	20	"	3
"	25	"	16	"	8	"	28	"	20	"	9	Sept.	1	"	4
"	26	"	17	"	9	"	29	"	21	"	10	"	2	"	5
"	27	"	18	"	10	"	30	"	22	"	11	"	3	"	6
"	28	"	19	"	11	"	31	"	23	"	12	"	4	"	7
"	29	"	20	"	12	Aug.	1	"	24	"	13	"	5	"	8
"	30	"	21	"	13	"	2	"	25	"	14	"	6	"	9
"	31	"	22	"	14	"	3	"	26	"	15	"	7	"	10
Feb.	1	"	23	"	15	"	4	"	27	"	16	"	8	"	11
"	2	"	24	"	16	"	5	"	28	"	17	"	9	"	12
"	3	"	25	"	17	"	6	"	29	"	18	"	10	"	13
"	4	"	26	"	18	"	7	"	30	"	19	"	11	"	14
"	5	"	27	"	19	"	8	July	1	"	20	"	12	Jan.	1
"	6	"	28	"	20	"	9	"	2	"	21	"	13	"	2
"	7	"	29	"	21	"	10	"	3	"	22	"	14	"	3
"	8	"	30	"	22	"	11	"	4	"	23	"	15	"	4
"	9	"	31	"	23	"	12	"	5	"	24	"	16	"	5
"	10	June	1	"	24	"	13	"	6	"	25	"	17	"	6
"	11	"	2	"	25	"	14	"	7	"	26	"	18	"	7
"	12	"	3	"	26	"	15	"	8	"	27	"	19	"	8
"	13	"	4	"	27	"	16	"	9	"	28	"	20	"	9
"	14	"	5	"	28	"	17	"	10	"	29	"	21	"	10
"	15	"	6	"	29	"	18	"	11	"	30	"	22	"	11
"	16	"	7	"	30	"	19	"	12	"	31	"	23	"	12
"	17	"	8	May	1	"	20	"	13	Nov.	1	"	24	"	13
"	18	"	9	"	2	"	21	"	14	"	2	"	25	"	14
"	19	"	10	"	3	"	22	"	15	"	3	"	26	"	15
"	20	"	11	"	4	"	23	"	16	"	4	"	27	"	16
"	21	"	12	"	5	"	24	"	17	"	5	"	28	"	17
"	22	"	13	"	6	"	25	"	18	"	6	"	29	"	18
"	23	"	14	"	7	"	26	"	19	"	7	"	30	"	19
"	24	"	15	"	8	"	27	"	20	"	8	Oct.	1	"	20
"	25	"	16	"	9	"	28	"	21	"	9	"	2	"	21
"	26	"	17	"	10	"	29	"	22	"	10	"	3	"	22
"	27	"	18	"	11	"	30	"	23	"	11	"	4	"	23
"	28	"	19	"	12	"	31	"	24	"	12	"	5	"	24
Mch.	1	"	20	"	13	Sept.	1	"	25	"	13	"	6	"	25
"	2	"	21	"	14	"	2	"	26	"	14	"	7	"	26
"	3	"	22	"	15	"	3	"	27	"	15	"	8	"	27
"	4	"	23	"	16	"	4	"	28	"	16	"	9	"	28
"	5	"	24	"	17	"	5	"	29	"	17	"	10	"	29
"	6	"	25	"	18	"	6	"	30	"	18	"	11	"	30
"	7	"	26	"	19	"	7	"	31	"	19	"	12	"	31
"	8	"	27	"	20	"	8	Aug.	1	"	20	"	13	Feb.	1
"	9	"	28	"	21	"	9	"	2	"	21	"	14	"	2
"	10	"	29	"	22	"	10	"	3	"	22	"	15	"	3
"	11	"	30	"	23	"	11	"	4	"	23	"	16	"	4
"	12	July	1	"	24	"	12	"	5	"	24	"	17	"	5
"	13	"	2	"	25	"	13	"	6	"	25	"	18	"	6
"	14	"	3	"	26	"	14	"	7	"	26	"	19	"	7

Reading Helps for the Stockman



EXPERIMENT STATION BULLETINS AND CIRCULARS

For the following bulletins, write to the Agricultural Experiment Station, Wooster, Ohio.

- SWINE FEEDING EXPERIMENTS WITH FALL PIGS. Circular 17.
- SWINE FEEDING EXPERIMENTS. Circular 39.
- THE USE OF FORAGE CROPS IN FATTENING PIGS. Bulletin 343.
- SUPPLEMENTS TO CORN FOR FATTENING SWINE. Bulletin 349.
- SELF-FEEDING SWINE. Bulletin 355.
- MINERAL AND VITAMIN REQUIREMENTS OF PIGS. Bulletin 395.
- HOGGING DOWN CORN. Bulletin 398.
- MARKET MOVEMENTS OF LIVESTOCK IN OHIO. Bulletin 409.
- LIVESTOCK PRODUCTION COSTS IN GREENE COUNTY. Bulletin 419.
- LOSSES IN SHIPPING LIVESTOCK. Bulletin 438.
- BREEDING EXPERIMENTS WITH SHEEP AND SWINE. Bulletin 480.
- VARIATIONS IN LIVESTOCK PRODUCTION COSTS AND RETURNS IN PUTNAM COUNTY. Bulletin 495.
- SOYBEANS AND SOYBEAN OILMEAL FOR PIGS. Bulletin 452.
- IMPROVING CORN AND TANKAGE FOR PIGS NOT ON PASTURE. Bulletin 488.



U. S. DEPARTMENT OF AGRICULTURE—FARMERS' BULLETINS

A list of Farmers' Bulletins of the United States Department of Agriculture pertaining to hogs follows. They may be obtained free by writing to your congressman or U. S. Senator. They may also be obtained for 5c each (cash, not stamps) from the Superintendent of Documents, Government Printing Office, Washington, D. C.

- TUBERCULOSIS OF HOGS. F. B. 781.
- HOG CHOLERA. F. B. 834.
- SWINE MANAGEMENT. F. B. 874.
- CASTRATION OF HOGS. F. B. 1357.
- SWINE PRODUCTION. F. B. 1437.
- FITTING, SHOWING AND JUDGING HOGS. F. B. 1455.
- SELF-FEEDING VS. HAND FEEDING. F. B. 1504.



BOOKS

These books may be procured through any bookstore.

- PORK PRODUCTION—By W. W. Smith.
- PRODUCTIVE SWINE HUSBANDRY—By G. E. Day.

Ask Your County Agent to Help You with Your Livestock Problems