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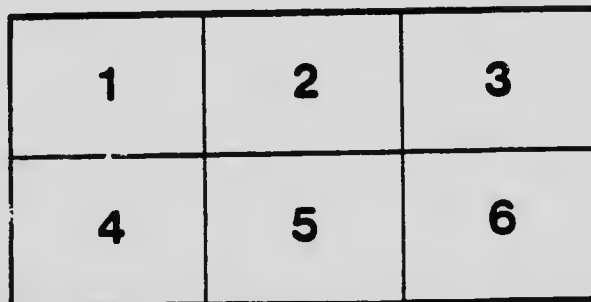
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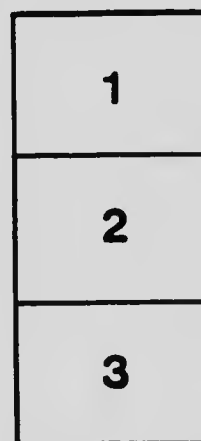
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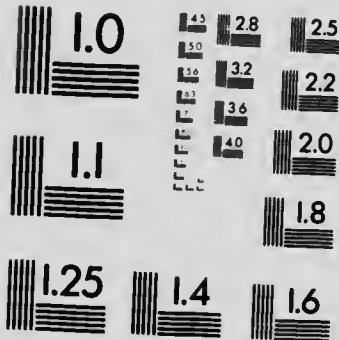
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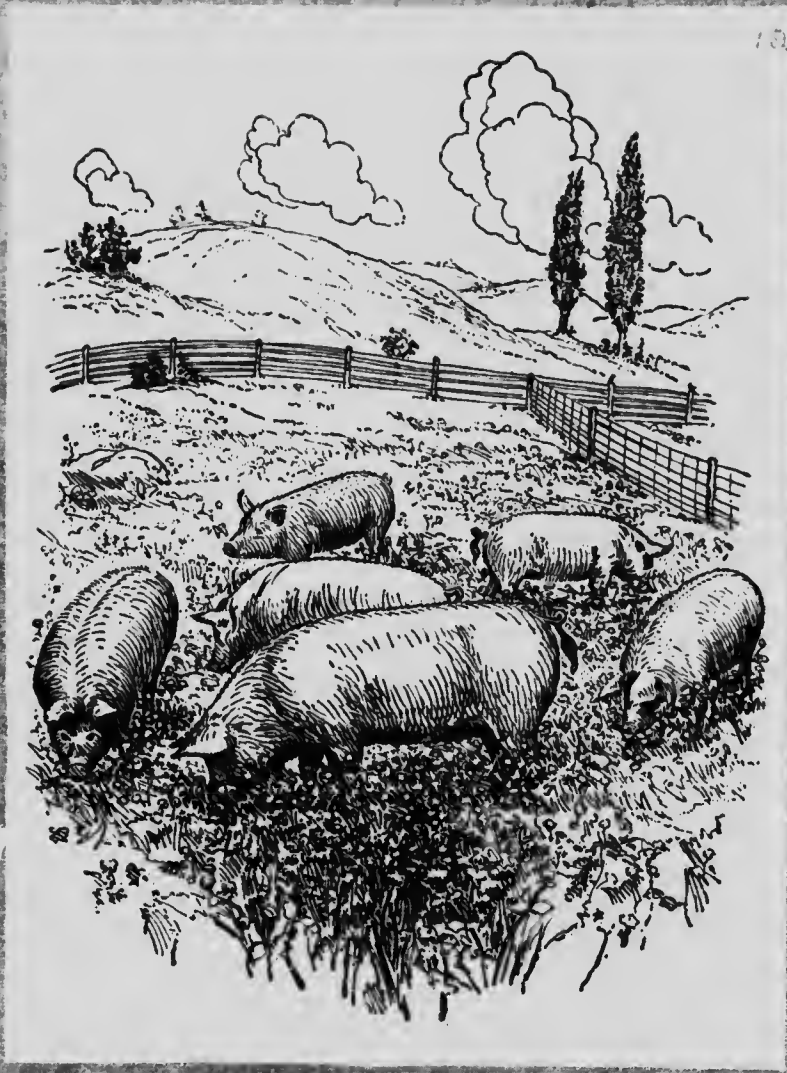
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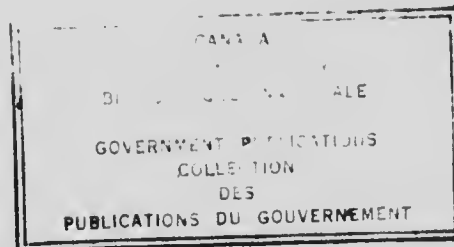
SWINE HUSBANDRY IN CANADA



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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

Branch of the Live Stock Commissioner



SWINE HUSBANDRY
IN CANADA

By
J. B. SPENCER, B.S.A.

Bulletin No. 17
[Second Edition]

Published by direction of Hon. MARTIN BURRELL, Minister of Agriculture, Ottawa, Ont.

MAY 1st, 1915

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April 1, 1915

To the Honourable the Minister of Agriculture

Sir, The supplies of Bulletins Nos. 10 and 11 of the Live Stock Branch, dealing respectively with "The Production of Bacon for the British Market" and "The History and Characteristics of the Leading Breeds of Swine reared in Canada," have become exhausted.

The revival of the swine industry, more especially in the western provinces, and its importance in all parts of the Dominion, are responsible for a keen demand for reliable literature on the subject. To meet this demand a new bulletin entitled "Swine Husbandry in Canada" was published in 1914. The first edition of this work having become exhausted, this second edition is issued. It corresponds with the first edition in all particulars with the exception of the statistical information, which is brought up to date.

What may be regarded as the standard editions of Bulletins 10 and 11 have been preserved and revised, and to these have been added new material constituting the experience and methods of successful swine raising in various districts of Canada. New information has also been added on the important question of housing, as well as contributions from officers of the Health of Animals Branch on Tuberculosis in Swine and Hog Cholera.

I herewith transmit the copy which has been prepared by Mr. J. B. Spencer, B.S.A., Editor and Chief of the Publication Branch, the author of the two former swine bulletins issued by the Live Stock Branch, and commend that it be printed for distribution as Bulletin No. 12, entitled "Swine Husbandry in Canada."

I have the honour to be,

Your obedient servant,

J. O. H. T.

Stock Commissioner.



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SWINE HUSBANDRY IN CANADA

THE BACON HOG

Until the swine raisers in Canada adopted the bacon type as their model, Canadian pork products possessed a very indifferent reputation. Since then a valuable export trade has been built up. In competition with the finest bacon in the world, Canadian bacon commands a price on the British market very close to the top. Its excellence has appealed also to the home consumer until the Canadian market is able to absorb a larger and larger proportion so that less and less can be spared for the export trade. For this reason there should be no relaxation on the part of the breeder to adhere to the bacon model in his breeding and feeding operations.

Hogs, like other classes of live stock, must be judged, first from the standpoint of the market, and secondly from their adaptability to yield profitable returns for food consumed. Form, condition and weight largely determine the appreciation of the market, while on constitution, nervous temperament and feeding qualities, depend the thrift or ability to convert the maximum of large quantities of food into a valuable marketable product.

Happily, in the raising of swine for the bacon industry the interests of the producer and consumer in no way conflict. It was for a time contended by many farmers that it cost more to produce the bacon hog than the animal of the thick fat type. The results obtained at experiment stations, supported by the experience of many extensive and successful breeders, have all gone to show that, if anything, the contrary is true. In experiments by Prof. Day, at the Ontario Agricultural College, out of six groups of pigs, the groups scored first and third by the packer on the basis of their adaptability for the export trade were first and second in economy of gain.

It cannot be denied that more skilful breeding and feeding is required to produce the bacon hog, but it does not necessarily require more food to produce a pound of gain than is required by hogs of other types.

The hog required for the production of the Wiltshire side is illustrated in Figs. 4 and 8. In weight he should be not less than 170 pounds nor more than 220 pounds, the most desirable weight being from 180 to 200 pounds alive when fasted.

As will be seen, he is a smooth, trim, evenly-developed pig, of great length, fair depth and moderate thickness. Described in detail, he should conform closely to the following:—

Head

Snout should be for the breed moderately fine and of medium length. A very short stubby nose is usually associated with a short, thick body; on the other hand, a very long, narrow snout and head, like a long face on a steer, generally indicates poor feeding qualities.

Ears should be fine in texture, firmly attached and alertly carried. A coarse and loosely-carried ear indicates a sluggish temperament, delicate constitution and poor feeding qualities.

Eyes.—The eye is an excellent index of the health and also of the nervous temperament. Any departure from the normal in health and vigour will be indicated as quickly and surely by the eye as by any other organ. A small sunken, dull eye is an almost unfailing indication of a sluggish circulation and low vitality; a wild flashing eye indicates a nervous disposition that is highly undesirable; eyes of good size and prominent, bright but placid, indicate health, docility and good feeding qualities.

Jowl, light, trim and neat. A large flabby jowl is objectionable, not only because it is of little value, but it is usually associated with excessive fat and flabbiness throughout.

Neck, of medium length, and showing no tendency to arch on top. A pig with an arching neck will cut too thick over the top of the shoulders. (See Fig. 8).

Fore Quarters

Shoulders, light and smooth. They should be very compact on top, and no wider than the rest of the back. It is important that the shoulder blades be upright; it is not enough that a pig be long from tip to tip, he must be long from shoulder blade to ham. Some apparently lengthy pigs will cut a short side of bacon, because of faulty conformation of the shoulder, the shoulder blades being too oblique and running back too far into the side.

Breast, of good width and full, indicating a large chest with plenty of room for vital organs. Sometimes the apparent width of the breast is increased by faulty attachment of the forelegs, they being tacked on, so to speak, on the outside of the body. This conformation is always accompanied with a rough shoulder.

Forelegs, set well apart without going to the extreme already spoken of, medium length and straight; pasterns strong, upright and moderately fine. The legs should be of fair length. Nature insists on preserving a certain measure of symmetry or co-relation of parts, and a short-legged animal is usually a short-bodied animal. It is hard to get them long and low; and since our aim is to breed for long sides, we must be willing to allow a corresponding length of leg. Excessively fine bone is usually associated with a tendency to fatten at the expense of growth, and this, of course, is fatal to the production of the Wiltshire side; on the other hand, very coarse bone is indicative of general grossness throughout, and is therefore undesirable.

Body

Back, of medium width, rising slightly above the straight line, and forming a slight arch from neck to tail. A sagging back indicates a lack of muscle or lean meat throughout. Note the excessive fat and lack of lean flesh or muscle down the back in Fig. 7.

Sometimes a pig will show a drop in the back just behind the shoulder. This often indicates a weak constitution. The back should be nicely rounded from side to side, and of medium width. A broad, flat back is usually associated with a short, thick, chunky conformation throughout. On the other hand the ribs should not fall away too abruptly from the backbone, giving the formation known as a "herring back." A back of this description will, on cutting, be found to be bare and lacking in muscle or lean flesh.

Loin should be strong and full, but not unduly arched. It should be of the same width as the rest of the back and well covered with flesh.

Side.—Since the side is the most valuable part of a bacon hog, it should be long, smooth, and filled out even with the shoulder and ham; it should be deep enough to provide for constitution, but not so deep as to give an excess of thin, flabby belly meat. See Fig. 4 and note length of side from shoulder to point of ham; note also the trim, firm belly and entire absence of flabbiness. Fig. 6 shows a Wiltshire side of the type that commands the highest price on the English market; contrast Fig. 5 with Fig. 6. The former are worth 50 cents per hundredweight live weight more on the Canadian market than the latter. The first sells readily on the English market, while the other is almost unsaleable.

Heart-girth should be full, indicating constitution; the fore flank should be well let down and full behind the elbow. The packer could not object to a slightly tucked-up appearance behind the forelegs, but it is a fault that the breeder and feeder cannot afford to overlook. This is an opportune time to sound a note of warning to

Canadian breeders. There is a noticeable tendency toward over-fineness with lack of vigour to be seen in many of our breeding herds. Judges at exhibitions are in part to blame for this. In too many cases undue stress is laid on smoothness of shoulder, length of side, shapeliness of ham, etc., while those features of the conformation that indicate constitution are apparently ignored. This is quite right in bacon classes, these should be judged wholly on their adaptability to the requirements of the consumer, but in judging breeding classes the interests of the producer must not be overlooked or even be placed second to those of the consumer. Fortunately the two can be easily harmonized; the depth and fullness of the chest and fore flank necessary to give room for the vital organs do not imply roughness of shoulder, shortness of side, or paunchiness of belly, or in any other way detract from the value of the carcass.

Hind flank, well let down and full, giving a straight underline, which should be markedly trim and neat, showing no flabbiness.

Hind Quarters

Rump should be the same width as the back, of good length, and dropping gradually from the loin to the tail, and nicely rounded over the top from side to side.

Hind legs, firmly and squarely set with hocks tolerably well apart but not bowed outward; the bone should be clean and moderately fine, and the pasterns upright and strong. They should be of medium length, as already mentioned in describing the forelegs; a very short leg usually indicates a short, compact conformation throughout, while excessive length of leg is often associated with poor feeding qualities.

Ham, very trim and neat, tapering gradually to the hock, heavily muscled and firm. Any tendency to flabbiness or folds is very undesirable.

Quality is a general term somewhat hard to define, but readily recognized by the experienced stockman. To say that a pig has lots of quality is to imply that his general appearance denotes good breeding; that he has a clean-cut, trim, tidy, attractive appearance, with no sign of coarseness as indicated in the bone, skin and hair, that he is symmetrical, no part abnormally developed; and that he is active in his movements, but neither wild, cross nor restless.

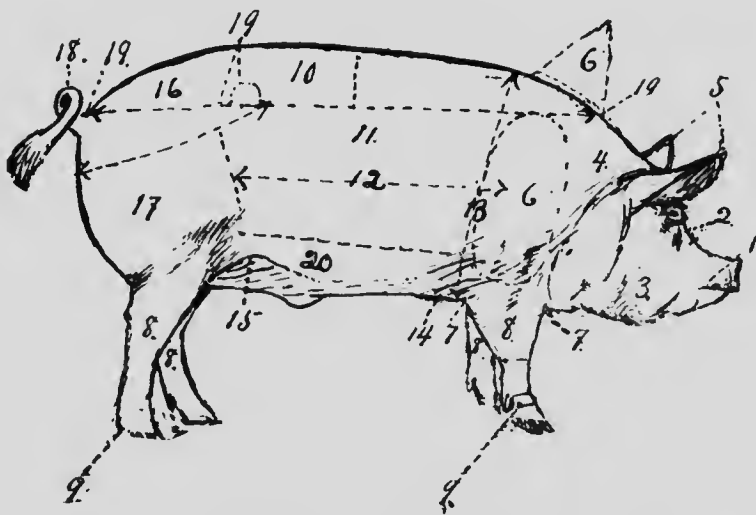


Fig. 1—Diagram Showing Location of Points of the Hog

1. Snout.
2. Face.
3. Jowl.
4. Neck.

5. Ear.
6. Shoulder.
7. Chest.
8. Leg.

9. Pastern.
10. Loin.
11. Ribs.
12. Side.

13. Girth.
14. Fore Flank.
15. Hind Flank.
16. Rump.

17. Ham.
18. Tail.
19. Back.
20. Belly.

UNDESIRABLE HOGS FOR BACON PRODUCTION

There are a number of classes of undesirable hogs being marketed for bacon at all seasons of the year. These include unfinished, overfat, prematurely finished hogs, and sows that have been used for breeding purposes. Of these the unfinished animals are most objectionable, and during most seasons are marketed in numbers out of all proportion to what they should be.

Unfinished Hogs

According to reports from a number of the large packing companies, the proportion of unfinished hogs is much too large, running at times as high as 15 per cent of the total receipts at packing houses in central Ontario, 20 per cent in Eastern Ontario and Quebec, and about 15 per cent in Western Ontario. In the western provinces proportionately fewer light hogs are marketed, the tendency being to err in the opposite extreme. The marketing of these hogs is a very serious matter from the standpoint of all concerned, as such pigs dress poorly, giving a low percentage of carcass, and they make such inferior meat that the reputation of Canadian bacon stands in danger of serious injury if many of these pigs are sent forward as bacon.

Why hog raisers persist in sending this unfinished stuff to market is not easy to understand, unless it is the comparatively high price of coarse grains which are necessary in finishing these animals, and perhaps in some cases a fear that the high values for hogs which have prevailed for some time would suddenly drop. These, however, are not valid reasons when the injury such animals do the trade is considered. The "grass" or unfinished hog is a serious menace to the bacon industry, and the time has come when the farmers, the buyers and the packers ought to co-operate against him.

One of the leading Canadian pork packers and exporters, speaking of the objections to the unfinished hog, says: "He won't make good bacon; he is an unprofitable hog to ship alive, an unprofitable hog to slaughter, and when he is made into bacon it is thin and tough and has to be sold at a heavy reduction on select goods." Another packer says: "The thin unfinished hog is not a bacon producer at all, and should be kept back and fed up until it weighs not less than 150 pounds. When this sides are converted into bacon they invariably cause trouble as well as direct monetary loss." Still another packer expresses his views upon the light hog. He says: "The chief objection to unfinished hogs for bacon is that they shrink in killing about 5 to 8 per cent more than when they are finished, which consequently makes the bacon so much dearer; and in the Old Country they do not want sides weighing less than 50 pounds, which means that the hog must be at least 160 pounds and in good flesh in order to produce 50-pound sides; anything below 160 pounds makes bacon which is undesirable and hard to sell."

In England the buyers refer to the bacon from thin hogs as "skin and misery." Some of them have become very emphatic in their denunciation of it, stating that the bacon trade has already received serious injury from it, and the sooner it is stopped from being sent over the better it will be for the trade. A hog that is too thin to make bacon of a desirable weight and quality is similar to any other inferior product, inasmuch as it lowers the value of the better goods and seriously injures the trade to which it belongs.

Fig. 2 fairly well represents the class of hogs known as unfinished; these animals are of a good type for bacon production, but they are in only field condition. Fig. 5 shows a side of a thin pig.



Fig. 2.—Unfinished hogs (from 6 to 7 months old), weighing from 125 to 150 lb. These animals are of good bacon type, but have not had sufficient fattening food to properly finish them for the market.



Fig. 3.—Hogs too short and fat for export trade, (from 7 to 9 months old) weighing from 200 to 250 lb. These animals have been closely housed and fed an expensive ration which induced fattening rather than growth.



Fig. 4.—Ideal hogs for the bacon trade (from 6 to 8 months old) weighing from 175 to 200 lb. These animals have had sufficient freedom and healthful food to induce rapid growth, followed by a short finishing period.

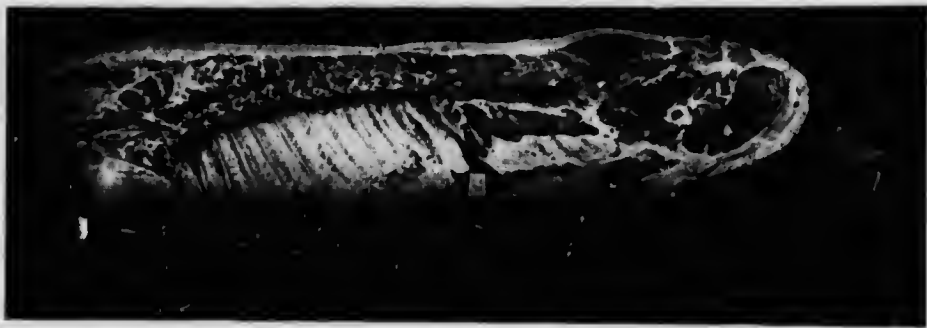


Fig. 5.—Side of unfinished hog. Note the undue leanness, also the shallowness of layer of fat— $\frac{3}{4}$ to 1 in.—along the back and thinness of cut on the lower side.

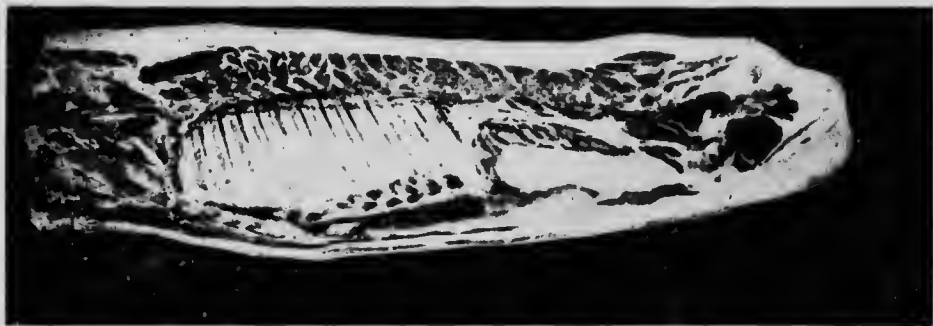


Fig. 6.—No. 1 Wiltshire Side. Note the even admixture of fat and lean meat, also the uniformity and depth of layer of fat— $1\frac{1}{2}$ to 2 in.—along the back from end to end of side.

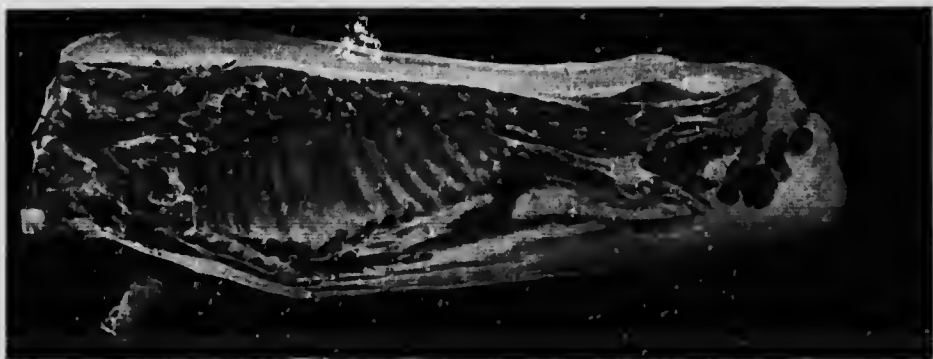


Fig. 7.—Side too thick and fat. Note the excessive depth of fat— $2\frac{1}{2}$ to 3 in.—along the back.

Overfat Hogs

Notwithstanding the fact that the overfat hog has been preached against for years by those interested in the development of the high-class bacon trade, and the fact that the price paid for these animals is frequently cut to the extent of one-quarter of a cent to one-half cent per pound for the live hog, the supply of overdone animals continues much too great, more especially during the late fall and winter season. The demand for the pork from such animals is becoming less and less, and as a rule the bacon from such hogs will have to be sold at, say, an average of 5 shillings per 112 pounds less than prime lean. Why these animals are kept so long at the trough is a mystery, unless it is to catch an improved market. It seems to be an overlooked fact that the last few pounds of an overfat hog are produced at a much greater relative cost than the same number of pounds added to an animal approaching the finished condition. It is therefore clear that a feeder who holds his hogs beyond the finished stage does so at a loss even though he receives an advance in price and is not docked for overfatness—results not often secured by holding. There is no doubt that these hogs rob the feeder. Feeding experiments have shown that hogs do not give good returns for food consumed after they have passed the finished condition. (See table under "Cost of Gain and Different Stages of Growth," page 36.)

The marketing of hogs that exceed 220 pounds live weight should be discouraged for the production of bacon, as such causes loss both to the producer and the packer. Fig. 3 represents the overfat hog, while Fig. 7 shows the class of side he produces.

Prematurely Finished Hogs

Another undesirable class of hogs for the production of fine bacon is the prematurely finished pigs weighing from 115 to 160 pounds live weight. These are doing much to injure the reputation of Canadian bacon. As a rule, the animals of this class are pleasing to the eye, they kill out a high proportion of meat to the carcass, and they satisfy the palate of the consumer, especially when eaten fresh, but when made into bacon they do not fill the requirements of the market. The size is objectionable to the buyers; packers tell us that this class of goods cannot be sold at a profit on the London market. For this reason it is decidedly unwise to force hogs along to the finished state that have not had time to attain a weight of at least 180 pounds.

There is a demand for bacon made from these light, well-finished pigs, but it is so limited that there is always danger of an oversupply, when the price is sure to fall several shillings per hundredweight, and the stock becomes a drag on the market. The pig of this class is not the fault of the breed to which it belongs, nor the character of the animal, but rather to the over-generosity of the feeder who has kept his charge confined in close quarters and forced it along from an early age to the finished animal of short dimensions and insufficient weight at from 4 to 5 months old.

Sows

Too many of the cargoes of hogs that arrive at the packing houses contain more or less of sows that have reared one or more litters of pigs. These can rarely be used as bacon producers; the great majority are not bacon animals and never should be sent to market in "bacon" condition. As a rule, those that are not heavy are too thin in flesh, and therefore may be classed as unfinished; and those that are well enough fleshed are too heavy to yield sides suitable for the bacon trade. The presence of so many of these sows in shipments of bacon hogs is largely due to the too common but unwise practice of turning off brood sows while still young instead of allowing those that are promising to remain in the herd as matrons for a number of years, making good mothers of large litters. While it is true that some first litters turn out to be well-doing, vigorous animals, the great bulk of them are not so strong as litters from older sows. To continue to breed only from these immature sows, turning them off

after the first litter, is to perpetuate weakness rather than strength in the individuals of the herd, which will in time show itself in a race of swine that are not good thrivers, and are prone to ailments and weaknesses that will seriously interfere with profitmaking in pig raising. To market young brood sows in medium flesh is to injure the bacon industry both directly and indirectly—directly in lowering the average quality of our bacon, and indirectly in weakening the constitution of our bacon herds.

The question will arise: what is to be done with the animals that have outlived their profitable usefulness in the breeding herd? It has been shown that it is not in the interest of the industry to turn them off as bacon animals. It is the animals of this class that may be depended upon to supply the heavy pork and lard trade, and for this purpose they should be made thick fat. How to make them so at a profit is a question of importance. A thin sow placed in a pen and fed almost exclusively on grain will, in all probability, "eat her head off" before she is thick fat, but there are better ways of fattening such an animal. The diet of an old sow or "stag" should be composed largely of such cheap foods as mangels and sugar beets, if in season, or pasture crops such as clover, alfalfa, rape, etc.; a vigorous sow or stag getting an abundance of any of these foods will gain rapidly, and if given a moderate grain ration will soon be fit for the market.

The best time to place a thin sow in the "feed lot" is in the early summer after her spring litter has been weaned and she has dried off. If turned on a luxuriant pasture and given a small grain ration, gradually increasing it, she will, as a rule, in from eight to twelve weeks be fat enough to meet the requirements of the market. While the gains made by such an animal have cost high per hundredweight, it should be remembered that she has given a profit many times over as a mother, and it is the last hundred or two of gain that renders her entire carcass of marketable value.

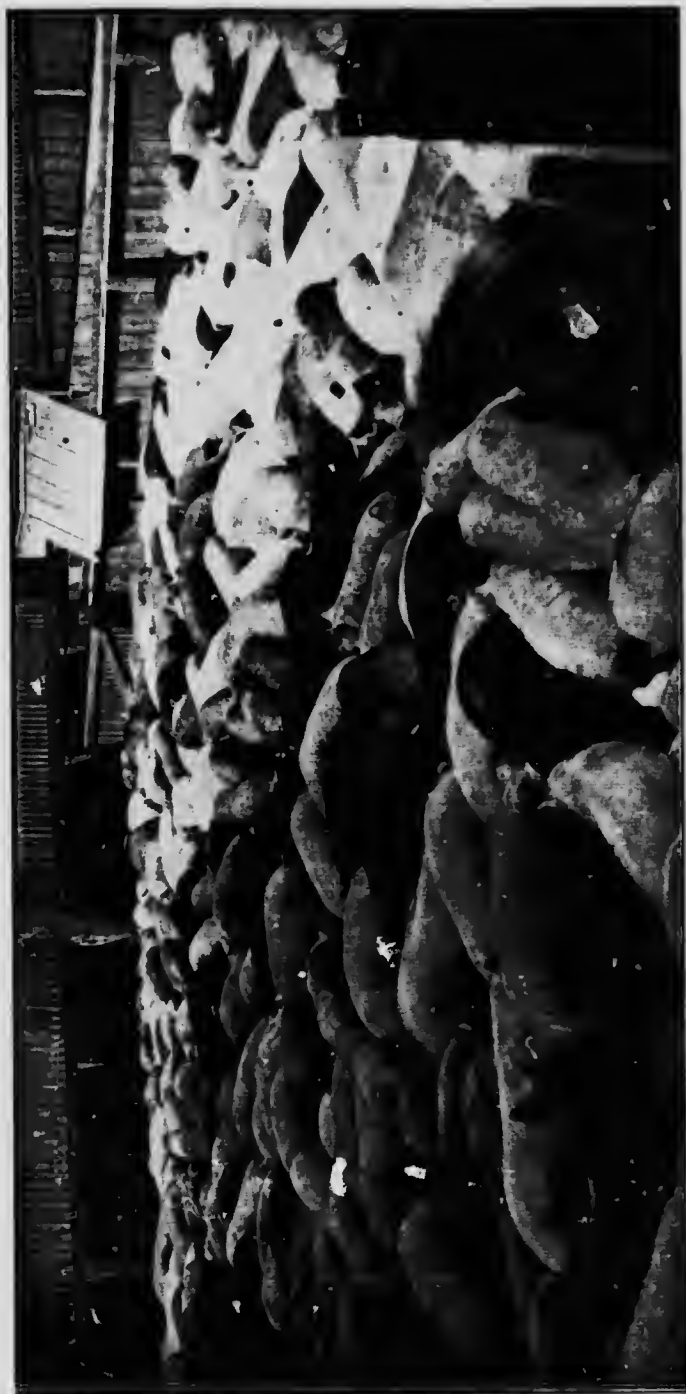


Fig. 8.—A shipment as received at a Toro, Co packing house—about 85 per cent of these suitable for prime bacon.

BREEDS OF SWINE IN CANADA

The breeds of swine most commonly bred from in Canada are the Yorkshire, the Tamworth, the Berkshire, and the Chester White. The Poland-China, the Duroc-Jersey and the Hampshire are also bred to some extent. The Yorkshire and the Tamworth are recognized as being especially suitable for bacon production; while the Berkshire, the Chester White and the Hampshire of the improved type occupy an intermediate position between the bacon and the lard types. The remaining two belong to the fat or lard-producing class, very popular in the corn belt of the United States.

The relative numerical standing in Canada of the breeds named is fairly well indicated by the fact that in 1913 there were recorded by the Dominion Swine Breeders' Association pedigrees of 4,414 Yorkshires, 3,704 Berkshires, 706 Tamworths, 1,288 Chester Whites, 477 Poland-Chinas, 731 Duroc-Jerseys, and 189 Hampshires. Members of the Dominion Swine Breeders' Association are charged for registration of pedigrees, including certificate, 50 cents each; non-members, \$1; transfers 25 cents each. The cost of membership in the Dominion Swine Breeders' Association is \$2 per annum. Application forms, giving rules of entry, may be procured from the Accountant, National Live Stock Records, Ottawa.

THE YORKSHIRE

The Yorkshire hog of to-day is claimed by historians of the breed to have descended almost directly from the old English hog common in the northern counties of England as far back as the beginning of the eighteenth century. This hog was long in head and body and stood high off the ground. He was narrow in body, coarse in bone, had very large ears, and took a long time to mature.



Fig. 9.—Yorkshire boar

Little was done to improve the breed until about 1760, when Robert Bakewell, the famous stock improver of that time, is said to have applied the principles by which the English Leicester sheep was evolved from the old type. This was to perpetuate only the smaller, finer and more compact animals, which he found had a greater aptitude to fatten than the more rangy and coarser types. Some authorities claim also that the Yorkshire was much helped by the introduction of crosses of the White Leicester, a breed of swine of a finer and thicker type than the Yorkshire was at that time.

There appears to be comparatively little knowledge of the improvers of the breed during the early part of the nineteenth century, but it is probable that many farmers had a hand in the work. The Yorkshire man, as is well known, is a lover of good stock and it is not surprising to find that the swine kept in the county of Yorkshire are equal, if not superior, to those found in any other part of the country. With the advent of competition at the district week-end fairs, the general farmer was incited to improve his stock, until, some fifty years ago, it was not unusual to find the display of pigs at the best of those fairs quite as good as those seen at much larger shows in other districts. Unfortunately, the classification at the district meetings was not such as tended to purity of breeding, the prizes very frequently being offered for the best pigs of a particular colour, which in Yorkshire was chiefly white. This led breeders to pay close attention to the securing of size, easy fattening and early maturing qualities, irrespective of those points which are looked for in an established breed. The improvement effected was marked and rapid, and owners were able to bring out heavily fleshed boars and sows of fine quality for the classes limited to pigs under 6 and 12 months old—classes which were looked upon with special favour by the exhibitors at the district summer shows.

Owing to a lack of unison on the part of breeders, in different localities and in different herds were of quite dissimilar types until about 1860 when a classification for Yorkshires was introduced at the district shows, that the type of the large Yorkshire was well fixed.

The Improved Yorkshire is one of the largest breeds of any of the others, but its thickness is not so great as those developed chiefly for heavy weights and the production of fat. The quality of its meat is unexcelled, as its long, deep sides present the desired lean class.



Fig. 10.—Yorkshire sow.

For crossing or grading purposes, the improved Yorkshire is unsurpassed on account of its size, vigour, muscular development and other desirable qualities which it strongly transmits to its offspring. The sows have large litters of uniform size, of which they rear a good proportion. They seldom become clumsy at farrowing time, a vicious dam is almost unheard of in the breed, and they are excellent nurses, while the young are vigorous from the first.

Improved Yorkshire swine have been imported into Canada for many years. Many specimens of the early importations, and of even those brought out as late as 1890, were of the coarse, rangy, slow-maturing sort. Where these were distributed the Yorkshire breed did not grow in favour. In recent years, however, the tendency has been to revert somewhat from the extreme length and size which were held in favour by the early breeders of bacon pigs, until the modern Yorkshire is a smooth, lengthy animal that matures fairly early and makes very economical gains either in the pen or on pasture upon the food it consumes. Animals of this breed are active and yet gentle in disposition, and they very rarely go off their feed. A mature boar in show condition should weigh not less than 700 pounds, and a mature sow 600 pounds. Well-nourished pigs from 6 to 7 months old should reach a marketable condition weighing from 180 to 220 pounds.

The Yorkshire is white in colour. Black spots on the skin do not disqualify, but the aim of the breeder should be to reduce these to a minimum. The presence of black hairs is regarded by authorities as to justify disqualification.

The typical Yorkshire is long and deep in proportion to width; symmetrical and smooth; its back is slightly arched; the ribs well sprung; its underline and sides trim, straight and level, and its body is firmly supported by well-placed legs of medium length.

The points of excellence for Yorkshire swine should conform as nearly as possible to the requirements of the bacon trade, with due regard for constitutional vigour and easy-feeding qualities.

THE TAMWORTH

The Tamworth is probably the purest of the modern breeds of swine, it having been improved more largely by selection and care than by the introduction of the blood of other breeds. One historian claims that foundation stock was introduced into England from Ireland by Sir Robert Peel about 1815, but others speak of its being plentiful in the Midland counties of England previous to that date. Sir Robert Peel is said to have maintained a herd of this sort near the town of Tamworth (from whence the breed takes its name), in South Staffordshire, until the time of his death, in 1850.

During a long period the breed was little seen outside of the counties of Leicestershire, Staffordshire and Northamptonshire. It was at that time a dark red and grisly



Fig. 11.—Tamworth boar

animal that was able to thrive on pasture during the summer and beachnuts and acorns found in the forests during the fall and early winter. The original stock was long in the limb, long and thin in the snout and head, and flat in the rib. The pigs were active, hardy, good grazers and very prolific, but were slow in maturing. Being rather spare in body they carried very little fat, and when fattened and slaughtered they are said to have produced a large proportion of flesh.

In later times, after the country had become enclosed and land began to be brought under cultivation, a fatter pig, with a greater disposition to fatten, was desired. In the effort to produce such an animal, crosses of pigs having a strong infusion of

Neapolitan blood were introduced. It is also said that a few breeders used a white pig that had been improved by Bakewell. The result of the mixture was a black, white and sandy pig. In the hands of breeders in certain districts of Staffordshire, all but the red and sandy colours were bred out, and pains were taken by selection to increase the feeding qualities of their pigs, and by the middle of the last century a very desirable class of pig had been evolved. It is claimed on good authority that a sow of the Tamworth breed won first prize at the Northampton show in 1847 in a class which included Berkshire, Essex and other improved breeds.

Fortunately the class of men who had undertaken the improvement of some of the other breeds, by sacrificing almost everything (lean aptitude to fatten, did not undertake the Tamworth; hence the preservation of the length and prolificacy of the breed. Improvement was accomplished by reducing the length of limb, increasing the depth of body, and improving the feeding qualities of the animals.

For a number of years previous to 1870 the breed received comparatively little attention outside its own home. About that time the bacon curers opened a campaign against the then fashionable, short, fat and heavy-shouldered pigs, which they found quite unsuitable for the production of streaked side meat, for which the demand was constantly increasing. The Tamworth then came into prominence as an improver of some of the other breeds, in which capacity it was a decided success owing to its long-established habit of converting its food into lean meat. This breed at once assumed an important place among the best sorts in Britain. Tamworths were given a separate classification at the Royal and other British shows about 1885. In general outline they are long, smooth and fairly deep, having a moderately light fore end and deep ham; their carriage is easy and active on strong, straight legs.



FIG. 12.—Tamworth sow

In colour the Tamworth is golden red, on a flesh-coloured skin, free from black spots.

The Tamworth belongs to the large breeds, reaching weights almost equal to the Yorkshire. Mature boars in show condition should weigh from 650 to upwards of 700 pounds, and sows about 600 to 650 pounds. Sows and barrows that are wisely and well reared are ready for the packers at about 7 months of age, weighing from 180 to 200 pounds.

The points of excellence for the Tamworth, as in the case of the improved Yorkshire, should conform as nearly as possible to the requirements of the bacon trade, without overlooking constitutional vigour and easy-feeding qualities.

THE BERKSHIRE

The Berkshire is one of the oldest of the improved breeds of swine. More than a century ago it was bred in large numbers in and about the county of Berkshire, England, whence it obtained its name. At that time it was a large animal, somewhat coarse in body, and having large pendant ears. In colour it varied from tawny to reddish brown, with black spots. Early in the nineteenth century the breed underwent considerable improvement, both in Berkshire and in the adjoining counties. It is claimed by historians that improvement was effected by the introduction of crosses of the finer Chinese and Neapolitan breeds and the perpetuation of the finer types found in English herds. About the year 1825 the breed had assumed a fairly uniform and desirable type, and the darker colours began to be quite general.

It was not until 1862 that the breed was given a separate class at the show of the Royal Agricultural Society in England. Soon after this, competition in the show ring became keen between the various improvers of the breed, each confining his exhibits to animals of his own breeding. The benefits derived from this were very marked, and it was not long before the breed reached a point of excellence that would be highly

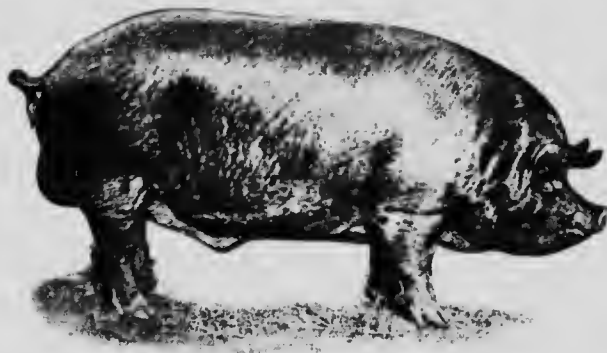


Fig. 13—Berkshire Boar

prized at the present time. They were of fine appearance and very hardy, of good size and length, and yet without coarseness. The sows were prolific and the offspring vigorous. They matured early, producing a thick carcass of lean meat of fine quality by the time they were 12 months old. Up to this time the improvers of the breed were not so anxious about external markings as the commercial value of the animals, under these favourable conditions a very desirable class of hog was produced. The excellence of the breed became so marked that it attracted the attention of rich men, who soon became its fanciers and exhibitors and whose first thought too frequently was the production of prize winners of such a type and formation as pleased their whims. High prices were paid for certain extreme types, which naturally set breeders endeavouring to produce the kind that found favour. During this period the breed was undergoing an undesirable change, which was fostered still more by a keen demand for show animals from buyers in the United States. The main aim of these importers was to secure prize-winning animals, or such as conformed to their fancy. The chief points aimed at were a short turned-up snout, heavy jowl, thick neck, wide shoulders and a fat back. The colour of the present day Berkshire was at that time fairly well established in the breed, although a white splash on the side and reddish marks about the body were not uncommon.

With the advent in the United States of the thick fat Poland-China, the demand for imported Berkshires dropped off very considerably, and English breeders com-

menced to give attention to lengthening the form of their stock. Towards the end of the past century the breed had become considerably lengthened, and as a result we have the symmetrical, fairly long, fleshy type of Berkshire. While this breed retains its popularity in Canada in a marked degree, it can not as yet be said to have become entirely suited to the requirements of the packers. Numbers of breeders still adhere to the lard type, while many others are perpetuating only the longer and more fleshy representatives of their herds. For bacon production a cross between the Berkshire and the Yorkshire or Tamworth finds favour with both the producer and the packer. The Berkshire is an easy feeder, quite hardy and fairly prolific. It is not as large at maturity as the Yorkshire or the Tamworth, but it attains heavy weights when selected and reared with a view to size.



Fig. 14.—Berkshire Sow.

The Berkshire is black with white on feet, face and tip of tail. An occasional small splash on the arm is not regarded as an objection. A large white spot on the jaw, shoulder or other part of the body is regarded by most breeders as objectionable.

Mature boars in show condition should weigh not less than 550 pounds, and mature sows in similar flesh not less than 450 pounds. The Berkshire requires about seven months of moderate feeding in order to be ready for the export bacon trade, weighing about 200 pounds.

In general outline the Berkshire is moderately long and deep the body is symmetrical and proudly carried on strong, well-placed legs.

THE CHESTER WHITE

The Chester White hog is a native of Chester county, Pennsylvania, where the breed originated early in the nineteenth century. It was a large, white, coarse animal, having coarse head, heavy, lopped ears, coarse hide, long heavy tail and coarse hair. An improvement of the breed was commenced by the introduction, on a farm near Brandywine Creek, in Chester county, of a pair of very fine white hogs imported from Bedfordshire, England, in the year 1816. Enterprising farmers of the districts commenced an improvement of their swine by the introduction of the prepotent blood of the imported stock. The produce of the first cross was so much superior to the original stock of the country that the new blood was eagerly sought by most of the leading farmers of the district. Encouraged by the improvement already secured, a system of careful selection and breeding was undertaken, with the chief object of securing a more suitable animal for the market. The improvement is said to have been continuous until the breed acquired an enviable reputation over a wide territory. The demand for breeding stock soon exhausted the available animals. This circumstance

provided unscrupulous men an opportunity for doing the breed a serious injury. White pigs of all forms and descriptions were bought up and sent abroad as Chester Whites. The reaction was severe, as the breed received an unjustified condemnation. The demand for stock fell off seriously, and breeders of the genuine Chester White were able to again build up their herds. While the stock had undergone much improvement in quality, no attempt had been made to reduce the size. They were classed among the large breeds, and as such they reached the period when their breeders saw the wisdom of breeding to a standard, which they began to do about the beginning of the last quarter of the past century. Since that time improvement has been continuous. It has become one of the most popular breeds throughout the United States on account of its early-maturing and easy feeding qualities. In a few cases Canadian breeders have sought, by selection and management, to develop the form and quality of animal looked upon with favour by the packers, and are now producing an animal intermediate between the bacon and lard types; but, as bred in the United States, the Chester White is rather a "corn belt" than a bacon animal. As a grazing hog it is claimed to excel most of the other breeds. It is moderately long, thick and deep and uniform in conformation.



Fig. 15.—Chester White Sow

The colour is white, no black hairs being admissible. Black or bluish spots on the skin are not uncommon. Breeders aim to avoid these as much as possible. The hair has a tendency to be wavy and even curly in some instances.

Boars in show condition should reach 600 pounds at 2 years of age; and sows of the same age and condition, 500 pounds. Pigs 7 months old in market form should weigh from 180 to 200 pounds.

The standard of excellence for the Chester White, adopted by the various United States Record Associations, calls for an animal having well-arched neck, broad shoulders and back—qualifications undesirable for bacon production. From the standpoint of the Canadian breeder, the standard should be modified to conform to the requirements of the bacon trade, as nearly as is consistent with the natural characteristics of the breed.

THE POLAND-CHINA

The Poland-China hog originated in the Miami valley, chiefly in the counties of Warren and Butler, in the state of Ohio. The conditions were favourable to swine growing, and the city of Cincinnati became, prior to the middle of the past century, one of the greatest pork-packing centres in the world. Hog raising was at that time the most profitable feature of farming in the surrounding country. Since there were no railroads at that time fatted hogs had to travel on foot to market, so that activity of the animals was as important as easy feeding qualities. The hogs of the district were known by a variety of names, and were extremely cosmopolitan in their make-up. The foundation stock consisted of the native unimproved hog. Many settlers from Great Britain and other European countries brought hogs of varieties common in the districts whence they came, and in this way a constant change in the stock of the country was effected. With the improvement of roads and the introduction of railways, the activity of the animals became a secondary matter and they rapidly became thicker and shorter in the leg.

While hogs of various types were introduced into the Miami valley, the breeds that did most in improving the stock were the Berkshire, the Russian, the Big China, the Byfield, and the Irish Grazer. From about 1820 to 1840 the main crosses, instrumental in the formation of what later became the Poland-China breed, were introduced. The Berkshire gave the black colour and improved symmetry, the Big China improved the fattening qualities, while the other crosses gave size and strength. According to authoritative writers, no outcrosses have been introduced since 1845.



Fig. 15.—Poland China Herd

Owing to the seemingly discordant elements of which it was made up, and the lack of a standard, the breed, then known as "The Warren County Hog," underwent many changes in conformation and colour prior to 1870. Up to this time the growing and fattening qualities of the animals were considered of much greater importance than colour or particular form. Having secured the desired qualities of fattening, leading breeders, about the date mentioned, decided in a general way upon the form and colour most desirable and upon the name Poland-China. Within a few years a number of organizations had been formed in the interests of the breed, and most of these adopted about the same standard of excellence. Attention was given to hastening maturity and to improving the quality and fattening powers, until we now have in the Poland-China one of the most economical meat-making hogs of the great "corn belt" of the United States. Neither its form nor its carcass is in accordance with the requirements of the bacon trade; hence the breed is not looked upon with favour by those closely associated with the development of the Canadian bacon industry.

In general appearance the Poland-China is compact, symmetrical, full and round, smooth and inclined to massiveness in build. The characteristic colour is black with white on face or lower jaw, white on feet and tip of tail; a few small clear white spots on body are not objectionable. Boars 2 years old and over in good condition should weigh not less than 600 pounds, and sows of same age and condition not less than 500 pounds.

THE DUROC-JERSEY

The Duroc-Jersey hog, according to the most authentic historians of the breed, is the outcome of a union of the two classes of red swine known respectively as the Durocs and the Jersey Reds. The latter have been known to exist in a condition of greater or less purity in New Jersey and other Atlantic states for upwards of seventy years, while the former was for a long time the leading hog raised in Saratoga county, New York. The Jersey Reds were large in size, rather fine in quality, and of fair length and thickness. It is believed that the Jersey Red is descended from the earliest importations of the Berkshires, which in their early days were of a variety of colours, including buff, sandy and reddish brown, spotted with black. It is considered probable that the Durocs were descended from the same parent stock, but of this there is less certainty. The two varieties were for many years kept amid different environments which would account for the lack of similarity between them when they were united, at a date prior to 1850, to form the Duroc-Jersey breed.



Fig. 17.—Duroc-Jersey Boar

The breed, from its early days, has been noted for docility, prolificacy and hardihood, qualities which have been well maintained. Size and weight were aimed at by improvers through many generations, and some twenty-five years ago the average of the breed was larger than at the present day. In 1877 breeders in Saratoga and Washington counties, New York, agreed upon a standard of characteristics that has been varied but little by more recently formed record associations. During the past two decades the breed has been improved in quality, easy-feeding and early-maturing propensities, and is now held in about equal favour with the Poland-China and the Chester White in the leading pork-producing areas of the United States.

The Duroc-Jersey has a number of admirers in Canada, but its thick, fat form, as seen in the leading herds of the United States, is so unsuited to the requirements of the bacon trade that its popularity has not extended greatly north of the international boundary.

The Duroc-Jersey, with its moderately long, straight head, drooping ears, and smooth, neat body, bears a rather close resemblance to the Poland-China in form; it



Fig. 18.—Duroc-Jersey Sow.

is somewhat stronger in limb. Boars 2 years old in good condition should weigh not less than 600 pounds, and sows of similar age and condition 500 pounds. Their colour is cherry red without other admixture.

THE HAMPSHIRE

The Hampshire belongs to the class of medium-sized hogs. The face is straight, and the ear inclines forward but does not droop like that of the Poland-China. The jaw, shoulder and hams are somewhat lighter than those of a typical fat hog. As a rule, too, it has less width of back, a little more length of side and slightly less depth of side than a hog of the strictly fat class. The breed may be described as somewhere between the bacon type and the fat type in conformation.



Fig. 19.—Hampshire Boar.

Mr. H. F. Work, at one time secretary of the Breed Association, describes the colour as follows: "In colour they are either listed or blacks, the most fashionable colour consisting of black extremities with a white belt, from 4 to 12 inches wide,

encircling the body and including the forelegs, which should also be white." The term "lister" refers to the presence of the white belt. Mr. Work also states that there are some breeders who try to run their herds all black, and he claims that breeders should not be too particular regarding colour, with the exception that white spots should not be tolerated.

Originally this breed was known by the name "Thin Rind," but in 1904 the name was changed to Hampshire, which is now the official name of the breed.

According to Mr. Work, the Hampshire traces to pigs brought to Massachusetts from Hampshire, England, about 1820 or 1825. It is said that descendants of this importation were taken to Kentucky about 1825. In any case, the breed has been known in Kentucky for many years, but it seems impossible to obtain definite and reliable information regarding its origin.

As shown by the secretary of the American Hampshire Swine Record Association, the breed has made rapid progress of late years, but in comparison with the older established breeds the number in any one state is not large, owing to the fact that the Hampshire has only recently come into prominence. In recent years the breed has found its way into Canada, but it has not had time to become widely distributed in Canada as yet.



Fig. 20.—Hampshire Sow

Though Hampshires may vary in color, they appear to be quite uniform in general type. Possibly, as the breed becomes more numerous and better known, variations in type may become more apparent.

It is generally claimed that the Hampshire is a bacon hog, but in this connection we must bear in mind that what the American packer calls a bacon hog is very different, as a rule, from the hog which is suitable for making Wiltshire sides for export to Great Britain. Judged from the standpoint of suitability for making Wiltshire sides, the Hampshire falls short of requirements, as it is too short in the side, too thick in the shoulder and back, and too heavy in the neck to make a really good Wiltshire side.

In quality of flesh the Hampshire has a high reputation. It has made a good record in the dressed carcass competition at the International Live Stock Exposition at Chicago, and the packers appear to hold it in high esteem. Its flesh carries a high percentage of lean and is generally fine-grained.

In early maturing and feeding qualities the Hampshire seems to be giving good satisfaction to those who are handling it, and it is highly esteemed as a grazer. It is an active, hardy breed, and there is no apparent reason why it should not give as good an account of the feed it consumes as any other breed.

The Hampshire ranks high in point of fecundity, and is one of the most prolific of American breeds. Its value for cross-breeding is not well known, but it seems reasonable to suppose that it should cross well with the fat types of hogs.—(From "Productive Swine Husbandry," by G. E. Day.)

THE BREEDING HERD

No breed or combination of breeds has a monopoly of all the desirable qualities in a pig. "There are good and bad in all breeds, and bad and worse in some." It does not follow that because a hog is of any given breeding he is necessarily a good or a bad hog. It is necessary, therefore, that the breeder of market hogs has a clear conception of the ideal pig; then he will be in a position to make the best of the materials at his disposal by judicious selection and careful breeding.

SELECTION OF THE SOW

Care should be taken in selecting the females of the herd to choose only those of a quiet, contented temperament. Few things are more exasperating than a roving, noisy, discontented sow; not only is she a continual menace to fences and gates, but she is cross at farrowing time, and is quite as likely as not to destroy half of her litter in a fit of nervous excitement. In addition to this, a sow of this description is seldom or never a good milker, and every stockman knows that the profit or loss on a batch of pigs is determined largely by the start they get in life during the first six or eight weeks. The milking qualities of the sow is a matter too often overlooked or ignored when selecting the females for a breeding herd. Many men seem to take it for granted that if they can get a sow to produce a large litter, she will, as a matter of course, nourish them afterwards. This is a grave mistake. Sows vary in their milking propensities as widely as the cows in an unselected herd. Among pigs the ability to give a large flow of milk is more a family trait than a breed characteristic; that is to say, different families of the same breed differ more in this particular than do the different breeds. It is, therefore, largely a matter of selection. A well formed udder is, of course, essential. There should be not fewer than twelve, better fourteen, well developed, evenly-placed teats, extending well up to the fore-legs.

The sow should be large and roomy, with great length and depth of side; she must, however, be trim and neat in her outlines, showing no tendency to bagginess or flabbiness, and, though not wild or nervous, she must be active in her movements. An animal having a heavy, listless, clumsy walk should not be retained in a breeding herd. This indicates a lack of vital force; and an animal with this characteristic is not likely to be so potent as one with a more active, sprightly temperament.

The brood sow should be selected from prolific families. A sow must raise a given number of pigs each year to pay expenses, and each additional pig represents a profit. There is, however, a limit to the number of pigs in a profitable litter; very large litters are apt to be weak and uneven in quality. Few sows can properly nourish more than fourteen pigs, and an even litter of from eight to twelve large, strong, lusty fellows is more profitable than a litter of sixteen or eighteen weak, flabby and ill-nourished pigs.

SELECTION OF THE SIRE

The choice of the sire is perhaps the most important step in all breeding operations. The trite remark that "the sire is half the herd" is only part of the truth. He is much more than half of the herd because, of the two parents, he usually exerts the greater influence on the conformation of the offspring. This, of course, is true only when he is the more intensely bred. It is not enough that he be pure-bred, it is important that he come of a line of ancestry, on both the male and the female side, that are remarkable for uniformity and individual merit. If he be the chance result

of a line of indiscriminate breeding, he is not likely to prove an impressive sire. His stock can scarcely fail to be irregular in type. This point cannot well be over-emphasized, for it is just here that the novice in breeding is most apt to make mistakes. It is a too common practice to select and buy breeding stock from among the winners at our exhibitions, taking care only to stipulate that they be eligible for registration. Frequently a phenomenal show yard animal is an accident of birth, and, even though he be registered in the herd book, is none the less a "scrub" in point of breeding, and can reproduce his good qualities only by accident. It is unfortunately true that a certificate of registration is not always a certificate of merit. The only safe way to select breeding stock is to visit the long-established herd of some breeder of repute, and buy after seeing the sire and dam and, if possible, the grand-sire and grand-dam of the animal selected. Choose a boar from a large, even litter; fecundity is an hereditary trait and is essential to profitable hog raising, and the evenness of the litter is a valuable guaranty of the excellence of his breeding and of his consequent propensity.

The offspring of immature parents should seldom or never be used for breeding purposes. They are apt to lack in constitution and vigour; this is especially the case in the offspring of an immature dam. Few things will more quickly and surely deteriorate a herd in size, vigour and fecundity than the continued use of immature females.

In conformation, the boar not only must be of the approved type for the breed, but must have distinct and unmistakable masculinity of appearance so easily recognized but not easily described. Masculinity does not necessarily imply undue coarseness; it consists rather in a bold, fearless "come on, who's afraid," expression of countenance than in any peculiarity of conformation. A certain amount of coarseness is unavoidable, especially in an aged boar; but he must not have such excessive roughness as would indicate poor feeding qualities. Nor is it desirable that he be of extreme size. Mr. Saunders Spence, the noted English breeder, says on this point: "Although some persons make mere size a great point when choosing a boar, our experience leads us to consider this to be a mistake; a very large boar seldom lasts long; he becomes too heavy for the sows; he probably proves to be slow and his litters few and small in number. A very large and heavy boar is also more likely to suffer from weakness of the spine or hind quarters, and is frequently weak in his joints and crooked in his legs. These latter failings especially should be avoided, as they are hereditary, and will frequently crop up for several generations. Weakness of ankles and roundness of bone, two qualities which should be avoided in a sire, are often allied with great size. A medium size, compact boar, heavy in the hind quarters, and light in the fore quarters will frequently continue fruitful for at least twice as long as will the heavy-shouldered and coarse-boned boar. Nearly all of the most successful pigs have been on a small rather than a large scale."

CARE OF BREEDING STOCK

Breeding sows should not be closely confined summer or winter, but should be given the run of a pasture in summer and of a large yard in winter. If there is one mistake more common than another in the management of the breeding herd it is the failure to provide for and compel the hog to take sufficient exercise. The hog is by nature a grazing animal, and exercise is essential to his welfare. If the sows can be given the run of a pasture during the summer and of the stubble in autumn they will require little else to keep them in excellent breeding condition. They must, of course, have water and shelter; if they have access to a running stream in which they may wallow so much the better. A mud bath is nature's method of keeping a hog's skin healthy and free from vermin. Shelter is best provided by the use of a portable pen.

In winter they should have the run of the barnyard, a dry sheltered spot being provided for them to sleep in. A portable pen serves the purpose admirably. It is better not to be too warm so long as it is dry, free from drafts, well supplied with

straw in which they may huddle. If their sleeping quarters are made too warm they chill too quickly on going out into the yard and they will not voluntarily take enough exercise.

They should be fed on nutritious but not too concentrated food. Mature, thrifty sows can be maintained in excellent breeding condition on a ration consisting largely of roots, preferably mangels or sugar beets. During a very cold snap some grain should be given to assist in maintaining the animal heat. As the sows become further advanced in the period of gestation it is necessary to give more nourishment in less bulk, therefore the allowance of mangels should be gradually decreased and the complement of grain correspondingly increased as the season advances. The grain used should be of flesh-forming rather than of a fat or heat-producing character. Shorts or middlings is excellent, so is ground oats; barley corn should be used sparingly, unless diluted with some form of dairy by-product. If fed alone these grains are too "heating" in their effect on the system. Sows wintered in this way should not be given thin sloppy food; the meal fed should have just enough water or milk poured over it to moisten it well. They will get enough water in the roots fed to supply all the requirements of the system; and to compel them to take water in excess of that amount, especially in cold weather, is to impose an unnecessary tax on the constitution. The energy required to warm up and throw off from the system a surplus of water, which some feeders compel their hogs to take in the form of thin sloppy food, is an unwarranted waste that not many can afford.

The objective point to be aimed at in the wintering of brood sows is to nourish and care for them in such a way that the spring litters will consist of good-sized, well-nourished, healthy, vigorous pigs, and that the sows themselves will be in such a condition of flesh as will carry them well over the trying period of nursing. To do this, the sows must have plenty of exercise, and must be fleshy but not fat. Sows carrying a load of soft, flabby fat put on in close pens will drop undersized and delicate pigs and they themselves will fail rapidly during the milking period. In addition to this, sows kept closely confined and fed largely on grain are apt to have their digestive systems so deranged as to develop abnormal appetites, and at farrowing time are as likely as not to devour a portion if not all of their offspring. On the contrary, experience has shown that the system of wintering previously recommended, in which the sows are given abundant exercise and fed on a nourishing but cooling succulent ration, has invariably been followed with the most satisfactory results.

A week or ten days before farrowing the sow should be placed in the breeding pen, in order that she may become reconciled to her new surroundings before the critical time arrives. It is also important that the attendant get on good terms with the sow; a few minutes spent on her every day with a stiff brush will be a good investment of time. This "currying favour" with the sow should not, of course, be a mere spasmodic effort at each farrowing period; it is the habitual practice of the thorough-going and successful stockman.

The Farrowing Pen

The breeding pen should not be too large; about 8 feet square. If the pen is too large, there is danger in cold weather of the newly-farrowed pigs wandering away from the dam, getting lost and perishing from the cold. The pen should be warm and dry, and furnished with a fender to prevent the dam overlying her young. This consists of a plank or pole placed all around the sides of the pen about 10 inches from the wall and 9 inches from the floor. Very little bedding should be used, and this should be chaff or cut straw. If a large quantity of long straw is used the youngsters are apt to get tangled up in it and be overlaid by the sow.

An hour or so after farrowing the sow should be given a drink of warm water, into which not more than a handful or two of shorts or meal has been stirred. Very little grain should be given the first day; overfeeding with grain during the few days immediately before and after farrowing is apt to derange the digestive system and

also cause trouble with the udder. The feed should be gradually increased until at the end of the first week she is getting all she will eat up clean. Nursing sows should be liberally fed on a ration well adapted to milk production. A sow nursing a large litter is subjected to a very severe strain, and if she be a good milker will fall away rapidly in flesh in spite of the most skillful feeding. This, however, is no reflection on the sow; for at no other period in the life of the pig is gain more economically obtained than while sucking its dam. Dairy by-products are especially valuable at this time, and of the grains, shorts or chopped oats are among the best. Barley and corn meal are too heating; the former tends to dry a sow off.

While some variety should be introduced into the sow's ration, extreme or radical changes must be avoided, as this is likely to cause digestive troubles in both dam and offspring.

The sow and her litter should be fed in a wide, flat-bottomed trough so large that when the food is put in it will cover the bottom not more than 1 inch deep. The young of most animals learn best by imitation, especially of the dam, and if a trough of this kind is used into which the pigs can climb they will quickly learn to eat, much more so than by the plan, so popular with some, of arranging a separate trough for them, from which the sow is excluded. After the young pigs have learned to eat well they may then be given access to separate feeding pens.

In cold weather, the food for the nursing sows should be given warm, and not too sloily, water being supplied separately. It is also important that both sow and litter have frequent access to earth; it is easily possible to ruin the digestive system of a pig even before it is removed from the dam, and there is perhaps no better corrective for hogs than soil. In cold weather it must be furnished by artificial means. It is an excellent plan to lay up a supply in the fall for winter use, by piling up a few sods in some place where they will not freeze and can be readily obtained when wanted. These are better if taken from the woods, or some other location where the soil contains a large percentage of humus or decayed vegetable matter. Failing this, a pallful of earth from the root cellar twice a week will serve the purpose very well.

The litter should be weaned when 8 or 10 weeks old; by that time they should be eating so well at the trough that they will scarcely miss their dam when she is removed. The whole litter should be removed at once, letting them back to the sow once or twice if necessary, at intervals of not more than ten hours, to relieve her udder. It is quite a common practice to leave one or two pigs with the dam for a few days for this purpose. This is a mistake, because each pig will suck only the teat to which he has been accustomed, and will not touch the others, in this way defeating the object for which he was left with the dam.

Sometimes the milk teeth are abnormally long and sharp, causing them to irritate the sow's udder and lacerate the gums and tongue of the pig. They frequently become discoloured from digestive troubles, and are then known as "black teeth." They should be removed with a pair of pliers as soon as noticed. Many breeders make it a practice to remove them from the whole litter when two or three days old; and, although not always necessary, this is perhaps the better plan.

The Boar

Assuming that the pig has been purchased shortly after weaning, he should be placed in a dry, clean, roomy pen with access at will to a paddock. It is well to give him a barrow of about his own age for company; feed liberally on food calculated to form bone and muscle, but do not force him too rapidly; care must be taken to avoid getting him too fat. No better food can be given than the by-products of the dairy with middlings or ground oats, supplemented with plenty of succulent food in the form of grass or roots. Let him root in the paddock; it is the best exercise he can take, calling into active play every muscle in the body, and, besides, it furnishes him with amusement and occupation. Curry and brush him frequently; it not only keeps his skin and hair healthy and active, but tends to make him quiet and gentle. The tusks should be removed as soon as well formed.

REARING AND FINISHING

Care is necessary at weaning time to get the pigs safely over this crisis in their lives and well started without any serious setback. Many breeders sacrifice the profit from a batch of pigs because of lack of skill or care in weaning. More pigs are lost or irretrievably ruined when they are first weaned than at any other time in their existence. A stunted animal of any kind is always unprofitable, and this is doubly true of a pig. With him especially, life is too short to recover losses due to mistakes that might have been avoided.

Among the errors into which one is most liable to fall at this time is that of feeding a strong grain ration to compensate for the loss of the mother's milk. The pigs, if well managed, should be eating so freely at the trough as nearly to wean themselves, and no change should be made in the ration unless it be to add a little skim milk. Even this had better be done some time before the removal of the sow. The loss of the dam's milk, small though it may have become in quantity, is change enough at one time.

Another mistake is that of overfeeding. Before the removal of the sow, just as much food should be given as she and the litter will clean up at each feeding; when the sow is taken away, the feeder, either from mistaken kindness to the pigs or from a failure properly to estimate their requirements, may overfeed to such an extent that food often lies in the trough from one feeding to another. This is a mistake for two reasons; the weanlings, missing their dam, are tempted to overtax their digestive systems; and the portion of the food remaining in the trough is apt to become foul as a result of fermentation and other causes. In either case digestive troubles will inevitably follow; and these, if not fatal to the pig, are disastrous to the owner's chance of profit. While the other extreme also must be avoided, it is better for a while at least to err a little on the side of underfeeding than to overfeed. Ideal conditions would be to feed at frequent regular intervals as much as they will eat up clean in a few minutes after feeding. It is not often possible to make our practice conform wholly to the ideal, but the nearer we can approach to it the better will be our success.

A mixture of middlings and chopped oats, supplemented with a little skim milk, constitutes an excellent ration for weanling pigs. It is rich in ash and protein for the nourishment of the growing bones and muscles, thus enabling the pig to build up framework rather than to lay on fat. It not only furnishes the right kind of nourishment for a growing pig, but supplies it in a palatable and easily-digested form. For pigs under 12 weeks the oat chop should be passed over a coarse screen, to remove most of the hulls. If this be done, it may be well to add as much bran in bulk as was removed in oat hulls. The bran is more palatable and more easily digested than the oat hulls, and it lightens up the ration, preventing the meal from lying in too close and solid a mass in the stomach. The addition of the bran, however, will depend on the quality of the middlings used, and it devolves upon each individual feeder to exercise his personal judgment in this matter. The nature of the material sold as middlings by different mills varies from coarse, dark-coloured flour to finely-ground bran. The feed stuff the writer has in mind, when speaking of middlings, would consist of about an even mixture of these two materials.

Roots or some other kind of green food, either in the form of pasture or a soiling crop cut and fed in the pen, should be gradually introduced until they constitute about one-half of the ration by the time the pig is 3 months old. Many practical feeders are firm in the belief that, in summer, pigs can be most cheaply raised on pasture supplemented with a light grain ration. There is much to be said in favour of the

practice, especially since the labour question has become so acute. The hogs, having unrestricted access to earth, and taking plenty of exercise, are vigorous and healthy, there is never any trouble with paralysis or with pigs going "off their feed"; and with good fences a large herd can be carried in this way with a minimum of attention, interfering little or not at all with the ordinary operations of the farm.

PASTURING AND SOILING

Experiments conducted by Prof. Day at Guilph to test the relative economy of pasturing and soiling pigs seem to indicate that cheaper gains are obtained by soiling. In this experiment thirty four pigs were fed. Eighteen of these were fed in pens with access to an outside yard, and sixteen were turned into a pasture of ordinary tares until August 6, when they were turned into rape pasture. Both outside and inside hogs were fed twice a day what meal they would eat readily. The meal was fed dry, and consists of two parts barley to one part middling by weight. The inside hogs were fed, in addition to the meal, all the green food they would eat, receiving tares until August 6 and rape after that date; exactly the same forage as that on which the other lot were pasturing. The experiment was commenced on July 6, and on October 14 all of the inside pigs and some of the outside pigs were ready for shipment. Seven Berkshires and three Yorkshires of the outside bunch were still unfinished and had to be carried over until November 12, when they, too, were shipped to the slaughter house.

The meal consumed per 100 pounds gain was as follows: Group on pasture, 325 pounds; group fed in the pens, 335 pounds.

The packing house reported on the pigs as follows: "The last shipment of hogs which you sent to us is just out of salt, and we have to report to you that all the sides without exception show a very satisfactory degree of firmness. Our bacon inspector's report is that all the sides grade No. 1 in respect of hardness, and my own judgment of the sides, going over them trying to find differences that might be of some value to you, was that there was practically no difference between the different sides, either in the groups themselves, which you designated by A and B, or in contrasting the two groups. Whatever your method of feeding has been in regard to these particular hogs, you certainly have discovered some system that gives you excellent results."

Prof. Day sums up the experiments as follows:—

1. In this experiment feeding hogs on pasture proved a very expensive method, whereas feeding in pens with same kinds of food gave reasonably economical gains.
2. The outside hogs ate more meal and made slower gains than those fed inside.
3. All the hogs produced bacon of satisfactory firmness. This confirms the result of a previous experiment with rape, and goes to show that a reasonable supply of green feed with a liberal meal ration produces a good quality of bacon.
4. Succulent food tends to keep animals thrifty, whether it be green food or roots, and thriftiness is conducive to firmness in the bacon produced.
5. The inside hogs consumed, on an average, nearly 4 pounds of green food each per day, together with $4\frac{1}{2}$ pounds of meal.
6. As this proportion of green feed to meal is practically the same as the proportion of roots to meal which we have used with good results, it seems safe to assume that the use of equal weights of succulent food and meal tends to produce bacon of firm quality.
7. The time required to attend to the outside hogs was just about half of that required for those inside.

It must not be forgotten that the pigs fed in the pens had the run of a small paddock in which they took exercise at will, and had unrestricted access to the clay. Where these conditions do not obtain so good results cannot be had from soiling. It must also be remembered that, although greater gains may be obtained from a given amount of food consumed, there is a considerable item for labour to be included in

the cost of pork produced in this way. Whether or not it will pay to pasture hogs in summer, or to cut green forage and cart it to them in the pens, will depend largely on the facilities one has at his disposal, especially in the matter of labour.

Probably rape is the most valuable crop for this purpose or for pasturing. It grows rapidly and may be sown at successive intervals so as to furnish a continuous supply from the first of June until the frost; it furnishes a large supply of food from a given area; although hogs do not take to it readily at first they soon acquire a taste for it and eat it freely.

For hogs, rape should be sown somewhat thickly in rows about 24 to 28 inches apart. Three pounds of seed per acre will give a very good stand, if the seed is of good quality. If the rape is too thin it grows somewhat coarse in texture and the pigs do not eat it so readily.

Another valuable green crop for hogs is alfalfa. Pigs are fond of it and will make very satisfactory gains if it is fed with discretion. It should be fed before it blossoms or it becomes too woody; and is not only less palatable, but also less digestible. Common red clover is also excellent; peas, vetches, almost any succulent forage crop may be used with advantage.

For winter feeding the succulent portion of the ration can be most cheaply and satisfactorily furnished in the form of roots, preferably mangels or sugar beets.

It has been pretty well established that hogs cannot be fed to the best advantage on an exclusive grain diet, especially during the growing period. The result of heavy grain feeding is to check growth, and to cause the pig to lay on flesh and become too thick and fat before the desired weight has been attained.

He is the most successful feeder who maintains his pigs on a cheap, bulky, easily-digested ration, rich in bone and muscle forming elements, until they reach a weight of from 130 to 150 pounds, then finishes on a stronger ration until they are in prime condition, but not too fat, and weigh from 180 to 220 pounds.

THE COST OF RAISING SWINE

The question of ascertaining the cost of raising hogs from birth to marketing has been subjected to much more controversy than experimentation. So few swine raisers find time to keep an accurate account of the quantities of feed used by their hogs from day to day that the question of gaining information on this point is left largely to experiment stations. Valuable data have been secured, through the co-operation of Prof. Day, of the Ontario Agricultural College, upon the average cost of raising hogs to bacon weights upon Ontario farms. The work was undertaken at the suggestion of one of the leading bacon-curing firms in Canada, who encouraged it by offering to pay for finished hogs 50 cents per hundredweight above the market price, when the pigs were marketed, to those who would render a full report upon the food consumed by the hogs from the time of weaning until shipped to market, and upon certain other points necessary to an intelligent study of the question. No restrictions whatever were placed upon the feeders regarding the kinds of food used or the methods of feeding to be followed, these being left entirely to the discretion of the farmers to whose interests it would be to feed in the manner found by each in his experience to yield the greatest profit upon his own farm. In all, ten reports were received, each accompanied by a declaration of accuracy signed by the experimenter.

The feeding, in each case, was done under normal farm conditions, in not less than seven counties spread over a large part of the province.

The following table gives the number and breed of swine in each lot, the food consumed, age and weight when sold, and the cost per 100 pounds when grain is worth \$23 per ton:—

Lot	No. of pigs	How bred	Age when sold	Weight when sold	Food Consumed	Cost per cwt on food at \$23 per ton
			Days	Lb.		\$ c.
No. 1	9	Yorkshire boar, grade Tamworth and Chester White sow	217	1800	Barley, 3552 lb.; shorts, 995 lb.; mangels, 740 lb.; green clover, 285 lb.; skim milk, 1620 lb.	3 93
No. 2	12	Yorkshire	221	2425	Barley, 5374 lb.; shorts, 1164 lb.; mangels, 815 lb.; green clover, 399 lb.; skim milk, 2160 lb.	4 17
No. 3	12	Yorkshire	217	2360	Meal (barley, oats, peas and shorts), 7333 lb.; mangels, 545 lb.; skim milk, 2520 lb.	4 52
No. 4	10	Yorkshire	238	2050	Meal (barley, peas and oats), 517 lb.; shorts, 1038 lb.; mangels, 3209 lb.; milk 2950 lb.	4 52
No. 5	7	Berkshire boar, Yorkshire sow	233	1525	Barley, 1960 lb.; wheat, 1300 lb.; oats, 800 lb.; mangels, 3200 lb.; skim milk, 8800 lb.	4 37
No. 6	10	Yorkshire boar, Tamworth sow	177	2060	Meal (barley, oats, wheat and peas), 4215 lb.; shorts, 816 lb.; whey, 1500 lb.; miscellaneous foods, valued at \$5.00.	4 07
No. 7	14	Yorkshire	213	2740	Barley, 1243 lb.; shorts, 4,600 lb.; corn, 1585 lb.; milk, 9330 lb.; small potatoes (3 bags) and pasture valued at \$5.90.	4 61
No. 8	7	Yorkshire grades	194	1300	Meal (barley and oats), 2230 lb.; shorts, 274 lb.; milk, 3460 lb.; pasture and green feed, \$5.	3 86
No. 9	14	Berkshire boar, grade Yorkshire sow	179	2740	Meal (barley and peas), 10,016 lb.; mangels, 3300 lb.; milk, 1920 lb.	5 31
No. 10	8	Tamworth boar, grade Yorkshire and Tamworth sow	200	1740	Barley, 3115 lb.; shorts, 290 lb.; mangels, 600 lb.; milk, 1200 lb.; 51 days on stubble without other food	3 14

In order to arrive at a uniform basis of calculation, the cost of the pigs up to weaning time was placed at \$1.50 each. This is 23 cents higher per head than weanlings from a large number of sows cost at the Ontario Agricultural College, when due consideration is made for the food consumed by the sows during their idle period.

The grain foods were valued at \$23 per ton, and included bran, shorts and chopped coarse grain. The values placed on supplementary foods were as follows: Skim milk and buttermilk, 15 cents per hundredweight; whey, 4 cents per hundredweight; roots and other green foods, \$2 per ton. The values for pasture and miscellaneous foods appear in the table and represent about the values placed on these by the experimenters.

Attention may be called to the uniformity of cost, excepting lot 10, although the feeding was done under the variable conditions of breeds and grades of swine and of methods of feeding found in different parts of the province.

In the case of lot 10 the hogs gathered their food from August 1 to September 20 on a stubble field of mixed oats and barley on which the crop had lodged badly, leaving much shelled grain on the ground. Since the food gathered by the hogs would have been otherwise lost, no value was placed upon it. This group is not included in the general average, but it is inserted in the table as an example of how live stock can frequently make profitable use of what would otherwise be wasted.

COST OF GAIN AT DIFFERENT STAGES OF GROWTH

As pigs increase in weight, the amount of feed eaten daily increases rapidly; the daily gain increases also, but not in the same ratio; so that the amount of feed consumed per 100 pounds of gain increases with the weight of the pigs. This is well illustrated by an experiment by Prof. G. E. Day at Guelph testing a number of pure breeds of swine. In reporting this experiment Prof. Day says:—

"In the experiments with pure-bred hogs a rather interesting point was brought out incidentally. It has been shown by other experiment stations that the cost of producing a pound of gain in hogs increases as the animals become heavier. At our pure-bred hogs were weighed at regular intervals, and as every pound of meal they consumed was carefully weighed, an opportunity was afforded to test further the truth of the claim, and a statement of the results is given below. These results are computed from the gains made and the food consumed by thirty-six hogs, so that they afford very conclusive evidence. In computing the average weights of the hogs, fractions of pounds were omitted, the nearest whole number of pounds being taken in each case."

The following is a statement of food consumed for one pound of gain by hogs of different weights:—

"While increasing in live weight from 54 pounds to 82 pounds, hogs required 3.10 pounds meal per pound of gain.

"While increasing in live weight from 82 pounds to 115 pounds, hogs required 3.75 pounds meal per pound of gain.

"While increasing in live weight from 115 pounds to 148 pounds, hogs required 4.38 pounds meal per pound of gain.

"While increasing in live weight from 148 pounds to 170 pounds, hogs required 4.55 pounds meal per pound of gain.

"This statement shows that there is a steady increase in the amount of meal required to produce a pound of gain as the hogs increase in weight, and is a strong argument in favor of marketing hogs by the time, or a little before, they reach 200 pounds in weight."

Prof. Henry, in his book, "Feds and Feeding," gives the following data which are especially valuable and reliable by reason of the large number of animals fed and reported on. The last column will be found especially interesting to the practical feeder. The food used is valued at \$1 per hundredweight.

Weight of pigs in lbs.	Actual average weight	Number of stations reporting.	Total number of trials.	Total number of animals fed	Average feed eaten per day	Feed eaten by per 100 lb. live weight	Average gain per day.	Feed for 100 lb. gain.	Cost per 100 lb. gain.
15 to 50	33	9	41	174	2.23	2.23	1.10	293	2.93
50 to 100	73	13	100	417	2.33	2.33	1.10	400	4.00
100 to 150	123	13	119	495	2.53	2.53	1.10	437	4.37
150 to 200	173	11	107	489	2.73	2.73	1.10	482	4.82
200 to 250	223	12	72	300	2.93	2.93	1.10	498	4.98
250 to 300	273	2	46	123	3.10	3.10	1.10	511	5.11
300 to 350	320	2	19	195	3.35	3.35	1.10	535	5.35

CONDIMENTS OR CORRECTIVES

Hogs that are closely confined and highly fed require a corrective of some kind to maintain the digestive system in a normal condition of health, and the latter the pig the greater the necessity. When a hog is running at large, he does not root up the pasture from pure love of exercise; he roots to obtain something for which his system craves. It is the craving that causes a confined pig to gnaw and tear at the trough and the sides of the pen. The cause of this unnatural craving is not well understood. It may be due in part to a lack of ash in the food; or, as has already been stated, a hog may be getting all the grain he can eat and yet be partially starved, because certain requirements of the system are insufficiently supplied. It has been attributed by some to the presence of intestinal worms; and by others to some form of indigestion. Whatever may be the part played in the animal economy by those substances, one thing is clear, that when they are supplied, hogs are heartier, eat better, thrive better, and consequently pay better.

Charcoal is probably one of the best correctives; and when it can be readily obtained it will pay to keep a supply in some place where the hogs can get at it whenever they wish. The following preparation is an excellent tonic.

"Take 6 bushels of corncob charcoal, or 3 bushels of common charcoal; 8 pounds of salt; 2 quarts of a-slaked lime; 1 bushel of wood ashes. Break the charcoal well down with a shov. or other implement and thoroughly mix; then take 1 1/2 pounds of copperas and dissolve it in hot water. With an ordinary watering pot sprinkle this over the whole mass and then again mix thoroughly. Put this mixture into the self-feeding boxes, and place where hogs of all ages can eat of the contents at pleasure."

The charcoal furnishes the required mineral matter which may have been lacking in the food, and is also an excellent corrective for digestive troubles, while the copperas is a valuable tonic and stomachic.

If the charcoal is hard to get, its place is taken almost as well by sods of earth rich in humus. It is questionable, indeed, if there is anything better than sods or vegetable mould taken from the wood lot. If a small quantity be thrown in each pen daily, it is astonishing to see how much of it the hogs will consume; and the improved health and thrift of the animals will be a revelation to the feeder who has never before tried it. Ground bone, wood ashes, soft coal, old mortar, rotten wood, etc., are also among the substances used and recommended for this purpose.

FOODS

The extraordinary thrift of pigs of all ages was a matter of constant surprise to the members of the swine commission that visited Denmark a few years ago. This was the more pronounced because Danish pigs are almost constantly housed. It was accounted for by the feeding of milk and the generous use made of green foods in the daily ration of the animals. Clover, alfalfa, green cereals and roots were everywhere used according to the season of the year.

The value of green fodder, as well as cured clover and alfalfa for feeding hogs is well understood in this country. Experimenters and successful feeders on the ordinary farm have reached the same conclusion that these coarser foods have a feeding value when fed with heavy grains far in excess of their actual nutrients. The hog is a grazing animal and is therefore able to digest a fair quantity of fibrous material which has a salutary effect on the digestive organs. The Danes cut green foods into short lengths and mix them with grain slops. In this country pasturing and feeding whole on the floor or in racks are the more usual methods. Roots are given whole or pulped, and an occasional feeder cooks his turnips or mangels, but practically all feeders use them in one or other form up to the finishing period unless whey, skim milk or butter-milk are available in generous quantities.

At the Central Experiment Farm the value of roots for feeding swine was arrived at by comparing them with clover and alfalfa pasture. The roots consisted of mangels,

sugar beets and carrots, and were pastured by the pigs. In another test, the roots were given to the pigs in pens. Fed in pens on roots the cost per 100 pounds of gain was \$4.23. When meal was added to the roots in the pens, the cost was \$3.09 per 100 pounds, and when meal was fed to pigs on root pasture the cost was \$3.82 per 100 pounds. On alfalfa pasture the cost of gains was \$3.67, and on red clover pasture, \$3.53 per 100 pounds of gain. The cheapest gains were therefore made when feeding roots and meal in close quarters. Growing pigs to be kept for breeding are better for having an outside run, but for fattening, close quarters give the best results when the feeding is such as to maintain good health and thrift. A comparison of mangis with sugar beets showed that with the former, the cost was \$6.20, and with the latter \$5.05 per 100 pounds of gain by pigs eating these foods.

Clover (Common Red)

The value of common red clover either as a pasture or as a part of the winter ration for growing pigs is well known. Stewart, in his admirable work, "Feeding Animals," reports an experiment in which he fed pigs averaging 75 pounds each with corn meal, 2 quarts of short-cut clover being added to each day's allowance, and the whole wet with hot water, and allowed to stand from ten to twelve hours before feeding. Another lot received meal prepared in the same way, but without the clover mixture. The lot getting clover hay showed the best appetite, the greatest thrift, and made the steadiest gains. The pigs getting meal alone gained 110 pounds each in 120 days, while those having the cut clover hay mixed with their meal gained 143 pounds each, or 30 per cent more.

At the Central Experimental Farm it was found that steamed clover makes a very satisfactory substitute for milk, as an addition to a grain ration for growing pigs.

Alfalfa

Alfalfa seems to be even more acceptable to pigs than the red clover. In a pasture in which the two clovers are mixed, the pigs will eat the alfalfa bare to the ground before touching the other. It is important, therefore, that an alfalfa pasture be not overstocked, as this plant will not stand close cropping.

At the Kansas station, alfalfa hay has been found a very profitable addition to the winter ration for fattening hogs. The hay used was of first-class quality, and was fed whole, as an adjunct to corn. It was given freely so that the pigs ate only the leaves and finer portions, rejecting the coarser stems, which, although charged against the hogs, were used as bedding. It was found that the hogs getting alfalfa hay in addition to their grain, consumed more feed but made much more rapid and economical gains. The hogs receiving alfalfa hay in addition to corn made an average gain of 90.9 pounds in 9 weeks, while those getting corn alone gained only 52.4 pounds. The gains per bushel of feed were as follows:—

One bushel corn and 7.83 pounds alfalfa hay produced....	10.88 pounds gain.
One bushel corn alone produced.....	7.48 "

At the Utah station alfalfa hay was fed in addition to a full grain ration of chopped wheat and bran, and the hogs thus fed consumed more grain and made much larger and more economical gains than those fed on grain alone.

These and other results indicate that alfalfa has a feeding value in addition to the actual nutrients contained. It stimulates the appetite, aids digestion, and improves the general health and thrift of the animal. The most profitable results at all stations were obtained by feeding all the grain the pigs would eat in addition to the alfalfa. Larger gains for a given quantity of feed consumed were obtained by feeding a limited grain ration and compelling the pigs to eat more of the alfalfa, but much more rapid gains and better general thrift of the pigs getting a full grain ration in addition to the alfalfa was found to yield a large net profit, and to be more satisfactory in every way.

The alfalfa was fed dry, either whole or cut into chaff, and separate from the meal. Better results are obtained in this way than by mixing with the meal and thus forcing the pigs to consume an undue amount of it.

Rape

All things considered, rape is perhaps the most valuable crop for summer roughage. Hogs soon become very fond of it, and if the rape is supplemented with a liberal grain ration, they will make very cheap and satisfactory gains. Like all other bulky forage crops its only value is as a supplement to a grain ration; hogs will not make satisfactory gains on rape pasture alone. In experiments at Ottawa and at Guelph, rape has proved itself not only to be economical, but also to be conducive to the production of bacon of the highest quality.

Roots

Prof. Day, of the Ontario Agricultural College, conducted an experiment to determine the value of roots when fed in conjunction with a grain ration. Four groups of pigs were fed as follows:—

Groups	Total Weight Oct 23	Total Weight May 7	Average daily gain per hog
Experiment A—	Lb.	Lb.	Lb.
Group I.—5 hogs; barley and middlings	169	670	639
Group II.—5 hogs; barley, middlings and roots	163	840	857
Experiment B—			
Group III.—5 hogs; corn and middlings	276	940	677
Group IV.—5 hogs; corn, middlings and roots	271	1,020	767

In experiment A, 319 pounds, and in experiment B, 534 pounds of roots effected a saving of 100 pounds meal. These are abnormally high values for roots, but the experiment illustrated very well the value of roots when fed in limited quantities. In this experiment the groups getting roots were fed equal parts by weight of roots and grains. It was found that the hogs getting roots made large daily gains, and that the tendency was to growth rather than to fatten. It was necessary at the close of the experiment to reduce the amount of roots in order to get the pigs fat enough. The pigs receiving roots not only made larger and more economical gains, but also produced a finer quality of bacon than the groups fed grain alone.

Of the various root crops, mangels and sugar beets seem to be better adapted to swine feeding than turnips. They are more palatable, and the pigs seem to relish them better and eat them more readily. Sugar beets have an additional advantage in that they are better keepers than either mangels or turnips, and will thus furnish a supply of succulent food during the month of May and the early part of June, when not much else is available.

Potatoes

Potatoes should in all cases be cooked for pigs. If fed raw they are very hard to digest and of comparatively small feeding value. The water in which they are boiled should be poured off, as it contains substances prejudicial to health. The feeding

value of potatoes consists almost wholly in the large amount of starch that they contain. They are therefore an extremely one-sided food, and should be supplemented with some food-stuff rich in muscle formers. For this purpose nothing is better than pea meal and if some skim milk or buttermilk can be added to the ration, very satisfactory results will be obtained.

The Danes found 400 pounds of potatoes cooked and fed with skim milk equal to 100 pounds of grain fed with a similar quantity of skim milk, and found that the quality of the pork produced from potatoes and skim milk was excellent.

Dairy By-products

So valuable are the by-products of the dairy, viz., skim milk, buttermilk and whey, that they are regarded by many farmers as indispensable in the rearing of young pigs, and it must be acknowledged that, although many feeders are rearing hogs profitably without these foods, much better and cheaper results are possible when a limited amount of milk can be added to the ration. This is especially true in the case of pigs only recently weaned. Milk, being rich in ash and protein, is peculiarly adapted to the building up of the muscles and bony framework of growing animals.

Better results are obtained from skim milk or buttermilk when fed in conjunction with some cereal rich in starch, such as corn or barley, than when fed with other meals too rich in protein, such as gluten meal or pea meal. It has been found that milk is most valuable when fed in small quantities, viz., from 3 to 6 pounds of milk for each pound of grain fed.

When feeding 2 pounds of milk per head per day, 163 pounds of milk effected a saving of 100 pounds grain.

When feeding 3 pounds milk per head per day, 323 pounds of milk effected a saving of 100 pounds grain.

When feeding 5.4 pounds milk per head per day, 533 pounds milk effected a saving of 100 pounds grain.

When feeding 15.7 pounds milk per head per day, 734 pounds milk effected a saving of 100 pounds grain.

When feeding 17.1 pounds milk per head per day, 882 pounds milk effected a saving of 100 pounds grain.

As a result of a very exhaustive experiment conducted at the Wisconsin station it was found that:—

When feeding 1 pound corn meal with from 1 to 3 pounds separator skim milk, 327 pounds skim milk saves 100 pounds meal.

When feeding 1 pound corn meal with from 3 to 5 pounds separator skim milk, 446 pounds skim milk saves 100 pounds meal.

When feeding 1 pound corn meal with from 5 to 7 pounds separator skim milk, 572 pounds skim milk saves 100 pounds meal.

When feeding 1 pound corn meal with from 7 to 9 pounds separator skim milk, 823 pounds skim milk saves 100 pounds meal.

Average of all, 542 pounds skim milk equals 100 pounds meal.

When mixed grains are worth \$1 per hundredweight, skim milk fed at the following quantities per day is worth as follows per hundredweight:—

2 pounds per day—	54 cents per cwt.
3 "	—31 "
5.4 "	—18.6 "
15.7 "	—13.6 "
17.1 "	—11.33 "

These results are corroborated by the findings of the Cornell, and also of the Utah station. Danish investigators also found that the relative gain obtained from milk increased as the quantity fed was decreased. As a result of their experiments they conclude that under ordinary circumstances 600 pounds of milk may be considered equivalent to 100 pounds of rye or barley meal.

Buttermilk has a very similar feeding value to skim milk, varying of course with the amount of water added.

Whey also has a very high feeding value when fed in conjunction with a liberal grain ration. Prof. Day found that when feeding about 2 pounds of whey to 1 pound of grain, from 750 to 800 pounds of whey effected a saving of 100 pounds of grain. Very similar results were obtained at Wisconsin.

THE SYSTEM OF FEEDING IN DENMARK

Pigs fed at the experiment stations in Denmark are weaned at from six to eight weeks of age and are at once delivered to the station. At the station pigs are divided into four groups according to weight. Class 1 includes pigs up to 40 pounds; class 2, 40 to 60 pounds; class 3, 60 to 120 pounds; and class 4, 120 pounds to about 200 pounds when they are finished. All foods are calculated in "food units" using one pound of grain, such as barley, corn, wheat, etc., as a basis. In roots and other green feed the food units are estimated on their dry matter, as, for example, 8 pounds of mangels, 4 pounds of boiled potatoes, 5 pounds of lucerne or 5 pounds of sugar beets, equal one food unit. In the case of milk 6 pounds and of whey 12 pounds are calculated to have a feeding value of one food unit. In other words the feeding value of 1 pound of grain (barley, corn, wheat, shorts, etc.) has the same feeding value as 6 pounds of milk, 8 pounds of mangels, 4 pounds of boiled potatoes, 5 pounds of sugar beets or 5 pounds of green lucerne or green vetches.

The diet is varied according to the classes of pigs. In class 1 the ration consists of 30 per cent milk and 70 per cent grain, calculated in food units. In other words, the mixture fed consists of 180 parts ($6 \times 30 = 180$) by weight of milk to 70 parts by weight of meal.

In food units class 2 gets 25 per cent milk, 70 per cent grain and 5 per cent roots or green fodder. The mixture fed at this stage consists, therefore, of 150 parts ($6 \times 25 = 150$) by weight of milk, 70 parts by weight of grain and 40 parts ($5 \times 8 = 40$) by weight of mangels. If lucerne or vetches were fed instead of roots this part of the mixture would be 25 parts by weight of the mixture, and corresponding weights in the case of sugar beets, boiled potatoes, etc.

Class 3 gets 15 per cent milk, 75 per cent grain and 10 per cent roots, or green fodder. This ration consists of a mixture of 90 parts by weight of milk, 75 parts by weight of grain and 80 parts by weight of mangels, etc.

Class 4—each pig gets three-quarters of one food unit ($4\frac{1}{2}$ pounds) of milk, one-quarter of one food unit (2 lbs.) of roots, if mangels, or $1\frac{1}{2}$ pounds of sugar beets or lucerne, and the remainder in the form of grain.

The food is given in the form of a slop, rather thin, while the pigs are young and thicker towards the end. The food is prepared one day ahead. At a station visited in July the grain mixture consisted of about equal parts of barley, corn, oats and shorts. The feeding was done three times daily, and while the appetite was satisfied at each meal the trough was always cleaned up by the time the meal was over. It was evident that the feeding was intelligently done. Young pigs up to 60 pounds or weight get charcoal, and when necessary to regulate the bowels, a little cod liver oil.

PORK PRODUCTION ON CANADIAN FARMS

While swine are raised in Canada under practically all conditions of farming, as an industry of any magnitude it is carried on under three principal conditions. Following supplies of hogs from market centres back to the sources of production, one reaches the patrons of cheese factories or creameries, or those that make meat rather than milk the object of chief effort. An investigation of the subject has shown clearly that pork can be and is very profitably produced under any of the three conditions mentioned.



Fig. 21.—Hogs of good type on a Canadian farm

Believing that experience gained from actual practice is most valuable, a tour of investigation was made into a number of hog-raising sections. In each of these the farms of the most persistent and successful hog raisers were visited. In almost every case the hog was regarded as almost necessary to profit in farming. The ease with which he is raised, the cheapness of his housing and the rapidity of returns were all appreciated by those who are able to turn off shipments from time to time throughout the year. A common difficulty experienced and lamented, was the scarcity of efficient help, without which valuable food may very easily be wasted because unless a hog is gaining according to the food he consumes, he is being fed at a loss. Were it not for the dearth of intelligent, experienced help available at a moderate rate of wages, there would be less complaint from packers regarding supplies until at least the price paid for good stock is materially reduced.

WHEY IN PORK PRODUCTION

The counties of Perth, Waterloo, Oxford and Lanark, in Ontario, are recognized as productive sources of whey-fed hogs. In the county of Perth many hogs are fed at cheese factories. One firm has carried this on continuously for forty-five years. The number of pigs fed is about equal to the number of cows milked by the patrons. In 1913, 912 hogs were finished on the whey (with other food) from the milk of 900 cows. The hogs are purchased, as a rule, weighing about 100 pounds each and are

finished at about 220 pounds. Early in the season younger pigs are bought. These are turned on grass pasture and fed whey with a very light grain ration until they reach about 100 pounds weight. They are then put in the pens with the others and kept there until finished.

Whey forms the principal food and is fed sweet and warm. One gallon per hog three times a day is fed in the beginning, and is, after a few weeks, increased gradually until two gallons is reached, but never exceeded. Each pen holds nine hogs. This number received one gallon of mixed chop three times daily. This ration is maintained for about two months and then gradually increased to two gallons, which is continued until the hogs are finished.

If the hogs seem not to be doing well they are given a supply of soda which usually corrects any lack of thrift. Should the hogs begin to cough, each pen is given a teaspoonful of spirits of turpentine in the food once in three weeks.

The grain mixture consists of two parts coarse shorts, one part wheat or corn (the latter preferred) ground fine, and one-half part low-grade flour. This is a standard ration and is departed from when the market can supply substitutes more profitably. The mixture is placed in the troughs dry, and ten or fifteen minutes afterwards whey is poured in. During the cheesemaking season of 1913 the 912 hogs fed gained \$6,310 pounds on 118 tons of grain food in addition to the whey from 900 cows. The work of feeding and caring for the hogs was done by one experienced man.

Feeding on Farms

A number of cheese factory patrons who feed the whey from their milk were visited. Farmer No. 1 farms 100 acres, milks twelve cows, keeps 4 Yorkshire brood sows that produce two litters per year. The sows are fed whey when available in pasture until within one week of farrowing, and are fed heavily only when suckling. Litters are weaned at 7 weeks old. The weanlings get finely-ground oat chop with whey or skim-milk fed as a slop. After the pigs are 3 months old they are given mangels whole, once daily, and slop twice until they weigh 150 pounds. They are then fed more heavily on whey, corn and oat chop, and finished at 6½ to 7 months old, weighing about 225 pounds. In summer, green food, as clover, alfalfa, etc., is substituted for the mangels in winter.

Farmer No. 2 keeps fourteen cows on 127 acres. He gets two litters per year from nine sows, Berkshire and Tamworth. All, except about thirty young pigs of each crop, are sold as stockers. The aim is to finish the pigs for the spring trade or for July and August. The sows get mangels or grass and whey when dry, and oat chop and whey when milking. The litters are weaned at 6 weeks old and thereafter get fine oat chop and sweet whey or skim milk. They graze until they weigh 100 pounds and are then housed and fed heavily until finished. The finishing ration consists largely of corn and barley chop and whey. In winter, skim milk and water is substituted for whey. A supply of charcoal and ashes is given once or twice a week.

Farmer No. 3 farms 220 acres, on which he keeps twenty cows and from nine to twelve sows. Two litters per year are raised. These are weaned at 7 weeks old, and fed thereafter on whey or milk with a mixture consisting of four parts oats, one part barley, one part corn ground fine and mixed with an equal quantity, by bulk, of bran. This mixture is allowed to soak twelve hours in the liquid and is fed as a slop of moderate thickness. As the pigs grow the ration is made stronger, until during the final period of about one month the grain ration consists of crushed corn and barley. The milking sows get oats and bran with liquid. In summer, green food and in winter mangels are fed at noon. Slop is fed three times daily. The hogs are marketed at about 7 months old, weighing, as a rule, about 225 pounds. The feeding hogs are housed most of the time, and get soda and charcoal occasionally.

Farmer No. 4 feeds, during the summer, the whey from 60,000 pounds of milk produced by seventeen cows. He keeps three brood sows of Berkshire, Tamworth and

Yorkshire breeding, from which he raises three litters per year. The sows when milking are fed chiefly shorts along with whey when available. Litters are weaned at 7 weeks old, and get, in addition to the shorts and whey, a few pulped mangels or other green food. In cold weather the roots are boiled, mixed with chop and fed warm. The hogs are housed continuously, and as finishing approaches the grain ration consists of barley chop and low grade flour. They are usually sold at 8½ months old, weighing about 220 pounds.

Farmer No. 5 feeds the whey from twenty-five cows kept on 150 acres. He usually keeps from six to eight sows, from which he raises two litters a year. Spring litters are turned out of doors when 10 days old, and receive, with their mothers, slop made of shorts and whey. Mangels are preferred for hogs of all ages when not on pasture. The mangels are pulped and mixed with the crushed grain some hours before feeding. During the winter months a considerable quantity of chaff from clover hay is given to the hogs. It is mixed with the slop and is much relished. In the summer



Fig. 22.—Gathering Hog Feed in the Canadian Corn Belt

the growing and fattening pigs have a run of 2½ acres, and receive whey and corn. As the hogs approach finishing their grain ration amounts to about 5½ pounds per head along with the whey. This farmer frequently feeds more hogs than he can raise, for which he is able to secure extra whey. The litters are never separated from their mothers and usually suckle until 8 or 9 weeks old.

Farmer No. 6 feeds the whey from eighteen cows. He keeps two sows which usually farrow in February and August. Both sows and growing pigs are turned out in spring as early as practicable and fed on shorts, oat chop, along with skim milk until whey is available. The grain food is allowed to soak for some hours and is fed warm in a fairly thick slop. Spring litters when weaned are allowed to run on the grass pasture until a plot of rape is ready for them. The rape is grown in drills, and is found to give excellent satisfaction during the three years in which it has been used for growing hogs.

In 1913 on this farm fifteen hogs were pastured on an acre, but this experience indicated that this number of hogs should have about 1½ acres for best results. The hogs received a liberal amount of whey each day, as well as a small ration of shorts mixed with ground corn. During the two final weeks the hogs were housed and given a rich ration consisting chiefly of oats and barley meal mixed with whey. The hogs, which were pure-bred Yorkshires, were sold at 7 months old, weighing 225 pounds each.

Farmer No. 7 feeds whey from the milk of twelve cows. He keeps two sows which farrow usually in March and August. The hogs are weaned at about 6 weeks old.

Spring litters are kept in the house. Until 3 months old the ration consists of slop made from shorts with a small proportion of mixed grain and whey. After the hogs have reached the age of 3 months they are given alfalfa in racks. The grain food is enriched by the addition of barley chop. Hogs thus fed weighed at 5 months and 2 days old, 175 pounds each. Fall litters received pulped magnesia with the same grains as are fed in the summer. Weanlings are given a light grain ration, which is gradually increased to about 6 pounds a day at 6 months old.

Farmer No. 8 feeds the produce of three sows from the whey of twenty cows. Fall litters are carried over winter on cheap food, such as roots with a little grain, and are thus ready when the cheese factories open in spring to take a liberal feeding of whey. The spring litters are kept in the open yard during the summer, and are given in addition to the slop of barley and oats mixed with whey, such green foods as red clover, vetches and alfalfa. The hogs are fed inside during the finishing month.

Farmer No. 9 keeps seventeen cows. He keeps two brood sows which are retained until 4 or 5 years old if they prove satisfactory mothers, raising eight to twelve at a litter twice a year. The litters are penned up the year round, and in summer have the run of a small yard. In addition to as much whey as they care to use, they receive a mixture of barley and oat chop during the growing period, to which is added low-grade flour for finishing. The dry food is placed in the trough and the whey poured over it. The litters are weaned at 6 weeks old, and are started on skim milk, which is gradually substituted by whey. The hogs are usually sold at from 5 to 6 months old, weighing from 180 to 200 pounds.



Fig. 23.—Scene on a hog farm in the Canadian corn belt.

Farmer No. 10 on 100 acres keeps fifteen cows, from which he receives the whey during the summer and skim milk during the winter. He keeps two sows which farrow in March or April and in September or October. The sows, when dry, live chiefly on roots in the winter and grass in the summer. Weaning takes place at about 8 weeks old. In addition to barley and oats ground together, low-grade flour and rye shorts are fed. For young stock shorts with whey constitute the chief ration. It was fed in a slop, freshly made. Ground grain is considered better to be soaked twelve hours in the whey before feeding. The orchard is used for the growing hogs during the summer. They usually run out until within two weeks of being finished. Spring litters are usually ready for market at from 6 to 8 months old, while fall litters require a little longer time. If one has plenty of whey it is considered economical to allow hogs to take their sustenance from this and from pasture until they reach about 150 pounds each. They are then in excellent condition to feed either outdoors or inside, on a stronger ration, on which they finish up very quickly. In the absence of roots, which are fed when available in winter, corn ensilage is fed to growing hogs at the rate of about one bushel for a dozen hogs weighing 100 pounds each.

Fall litters run out until weaned and afterwards receive mangels once a day at noon, usually pulped and mixed with chop, about three parts mangels to one part chop. The morning and evening meals consist of comparatively thick slop slightly warmed. During the housing season the hogs are occasionally given supplies of charcoal, wood ashes and even soft coal. These appear especially necessary to keep the digestion right when the hogs are being heavily fed.

FEEDING SKIM MILK

The districts visited to learn how experienced farmers raise hogs on skim milk in conjunction with other foods, were of practically the same class as the cheese factory patrons, whose methods are outlined in the foregoing. The system of farming carried on might be considered of a general nature. In no case were large herds of cows milked, or hogs fed in large numbers, as in the case of the cheese factory patrons. Practically every farmer visited raises two litters a year from each sow kept.

Farmer No. 1 secures the buttermilk from a creamery, for which he pays 13 cents per hundred pounds. At the height of the season, 300 gallons a day were used; it is fed as fresh as possible. Feeding is carried on only during the summer season. Pigs are bought in the spring as weanlings, and are sold finished towards the autumn. Grain feed is used, more or less, throughout the season. The grain food is given in mixtures, and is chosen more from the condition of the market than from any other cause. Oats are valued, especially during the early part of the season. The grain ration is fed dry in the troughs, and is followed with the buttermilk. The growing pigs receive buttermilk only once daily, and this is diluted to some extent, and with it given the grain ration. From 1 quart to 2 quarts is the quantity given for pigs from 50 to 100 pounds in weight. At no time does the quantity of buttermilk exceed 1 gallon, and this quantity is never reached until the pigs have reached 200 pounds in weight. An account was kept of the feeding of 550 hogs which averaged 210 pounds each at finishing. It was shown that it required about 5 pounds of grain, in addition to the buttermilk, to make 1 pound of gain. It was roughly estimated that this transaction gave a profit of about \$2 per head.

Farmer No. 2 outlined his method by giving an account of the feeding of twenty pigs, which were valued at \$3 each when 6 weeks old, and which sold, weighing 212 pounds each, at 6 months old, for \$8.40 per hundred. These pigs received for two and one-half months the skim milk from eight cows giving only a moderate quantity, as half of them had been milked for eight months.

The grain food consisted of middlugs costing \$23 a ton, mixed with milk and enough water to make a fairly thick slop. This was fed twice a day. Mangels fed alone constituted the noon meal. At the end of three months the grain food was changed to a mixture of six parts oats, two parts barley and one part peas, grown and ground together. When 4 months old the milk feeding was discontinued and water substituted, the milk being needed for calves. During the finishing month the proportion of peas was increased to about one-third of the mixture.

On this farm alfalfa pasture is substituted for skim milk during the summer months. The grain ration is practically the same as that fed in the winter with skim milk. On 2 acres of alfalfa nineteen hogs were pastured and brought to a finishing weight at 6 months old.

Farmer No. 3 farms 300 acres, on which he keeps fourteen cows and from three to four brood sows. In addition to the two litters a year, which are raised on the farm, occasionally a small number of additional hogs are purchased for feeding. Pigs are weaned at 6 weeks old. Both sows and litters run on pasture in the summer, or have a roomy pen in winter. Especially to young pigs the milk is fed warm, direct from the separator; in no case is the milk allowed to sour. The grain food consists of shorts chiefly, for the first three or four weeks; to this is added a small quantity of finely ground oats. The grain food is soaked in milk or water twelve hours before

feeding. When the milk is not plentiful, mangels are substituted in winter, and green feed in summer. No mangel or green feed are used during the two final weeks of finishing. Pigs are usually finished at 6 months old, weighing about 220 pounds each.

This farmer sees great profit in allowing his growing pigs to glean the grain fields after harvest, more especially those that have been seeded to clover. Summer litters thus treated, without receiving other food, came in at the advent of cold weather, weighing almost 100 pounds each.

Farmer No. 4, from his 150 acres, sells beef, pork and cream. He grows all the grain that he uses. The pork sold was claimed to have given the greatest profit. It was estimated that the grain necessary to feed fifty pigs, with water as the liquid, would supply 100 pigs if skim milk were used instead. The pigs are fed sufficient grain at all times to keep them thrifty and growing rapidly. The grain food is allowed to soak in the milk one meal ahead, except in hot weather, when it is mixed as wanted. The fall litters are not heavily fed during the winter, but are carried over on such cheap food as mangels with a light grain ration. These are in excellent condition for heavy feeding in the summer months. A quantity of soft coal cinders and ashes are given to the pigs once a week.

Farmer No. 5, from his 150 acres, sells beef, pork and cream. He grows all his feed except a little bran. The litters are weaned at 6 weeks old, but at 3 weeks are given a separate pen, in which they learn to feed on skim milk and shorts. Weanlings get oats ground finely, and when 2 months old commence to receive a small proportion of barley and peas. The finishing ration consists of one part oats and one part peas or barley, all ground finely. In winter, grain is fed twice daily, with broken mangels at noon. A litter of eleven pigs thus fed, at 5 months and 12 days old, weighed 200 pounds each and sold for \$209. In summer, skim milk is fed at the rate of from 2 to 3 pounds, to pigs weighing 100 pounds each. One-third skim milk with two-thirds water appeared to this farmer to give the maximum of results for the skim milk. This constituted his guide in the number of pigs to keep. The grain food is soaked one meal ahead, and is given in sufficient quantities to satisfy the appetite. This farmer regarded his pigs as the most profitable stock on his farm.

Farmer No. 6 kept an accurate account of the feeding of twenty-two pigs. They received mangels, mixed grain and skim milk. The food consisted of:

16 tons, 1,700 pounds mangels at \$1 per ton.....	\$ 67.14
5 " 1,175 " meal at \$23 per ton.....	128.51
5 " skim-milk at \$4 per ton.....	20.00
Total	<u>\$215.96</u>

The hogs were sold as follows:

9 hogs weighing 1,340 pounds at \$9.40 per cwt.	\$182.36
11 " " 1,120 " 9.25 "	196.10
2 " " 385 " 9.25 "	35.61
Total	<u>\$414.07</u>

The cost of these hogs was \$4.86 per hundred pounds, while their average selling price was \$9.31 per hundred pounds, which left a profit, not including labour, of \$4.45 per hundred pounds.

RAISING HOGS WITHOUT DAIRY OFFAL

Many hogs are raised on farms where little or no dairying is carried on. By the use of roots in winter and forage crops in summer, hogs are very profitably raised, more especially where the grains fed are grown on the farm. The practices of feeders on such farms do not differ materially from those described for dairy farms, except that special care has to be taken in getting the young stock safely over the few weeks following weaning. Under these circumstances, weaning should be deferred as late as practicable, and need not be done under 8 weeks of age even when two litters per year are raised.

Swine growers in some sections, particularly in the western provinces, are following the plan of raising three litters in two years, which is a litter every eight months. There is sufficient time between farrowings to permit the pigs to follow the dam until they are 10 weeks or 3 months old. They are then less likely to have their growth arrested when weaned, and the sow will have time to regain her vigour before entering upon another maternity period.

The counties of Essex and Kent do comparatively little dairying, and still raise many hogs. The practice of raisers in this Canadian "corn belt" has changed greatly in recent years. Whereas it was the rule to allow hogs to gather their living very cheaply until the corn harvest arrived, and then unload heavily within a brief period, it is now the general practice to feed well from the beginning and market the hogs all through the year as they become ready. Besides corn, much shorts and barley are fed, more especially to young stock and breeding animals. Poland-China, Duroc-Jersey and Chester White breeding is evident everywhere, but the Tamworth is a favourite also, and a farmer here and there keeps Berkshires or Yorkshires. To encourage the bacon type, a firm of packers at Chatham has for some time been exchanging bred bacon type sows for fat sows of the thick type. Many local hog raisers are taking advantage of this.

Farmer No. 1, on 150 acres, produces in a year \$1,500 worth of hogs and buys from 10 to 12 tons of bran and shorts, besides perhaps 200 bushels of bush beans. He keeps from six to eight grade Tamworth sows, which he claims are better mothers than Durocs previously kept. Litters are born in September and March and are weaned at from 6 to 7 weeks old. For two to three weeks weanlings get a small ration of milk, but as the milk of the farm is sold in town none is available for hogs after they are well started. When fed it is given alone and a grain food which consists of finely-ground oats and shorts is given in a separate trough. When weaned the sows are kept in and the litters turned outside. On this farm alfalfa is much depended on for summer pasture, as well as coarse fodder for the breeding stock during the winter season. The spring litters run constantly on alfalfa pasture until they weigh about 175 pounds each. They receive a light grain ration at first, which is gradually increased but never fed heavily. As soon as the corn is fit to use it is fed in the ear. Its feeding quality is believed to be increased by soaking. The finishing ration consists of corn and shorts fed dry. Fall litters run on pasture until winter comes on, when mangels are substituted for the pasture. Sufficient roots are grown to provide a supply until the pasture season again arrives. Dry sows get very little besides alfalfa hay and roots during the winter season.

Farmer No. 2 keeps eight sows of Duroc-Jersey, Chester White and Tamworth breeding, on 120 acres of land. March and September are the farrowing months and the litters are weaned at about 8 weeks of age. Spring litters go out with their mothers as early as there is pasture. The little pigs are fed bran and shorts mixed with water for the first month after weaning, then a small proportion of chopped oats is added and an occasional ear of corn given. The grain ration is increased from week to week as seems appropriate. The hogs are finished at about 8 months of age.

Fall litters are fed in a very economical way from the standpoint of labour. The hogs of all ages have the run of a yard with access to pens, and are fed corn on the stalk and alfalfa hay. After the hogs have taken what they want of this the cattle are allowed to consume what is left. In addition the hogs get mangels once a day. This is continued until pasture arrives, when the hogs are turned out and finished on corn in the ear and a mixture of wheat and barley in equal parts, finely ground. Portable pens provide most of the shelter in the yards during the winter and in the pasture fields during the summer. Fall litters are usually from 9 to 10 months old when finished. A small acreage of very early corn is grown each year, and as soon as this is fit to use the hogs are turned into it and have access to alfalfa pasture. Pigs weighing 175 pounds each fed in this way gained about 3 pounds a day until finished.

at from 220 to 240 pounds. On the main crop corn fields sufficient corn is left on the stalk to provide food for the hogs of the farm until the winter compels housing. About 110 hogs a year are fed off, for which was purchased 5 tons of shorts and 2 tons of bran.

Farmer No. 3 follows an unusual method in the summer feeding of hogs. He stacks corn in the fall in a clover field, and when the clover is fit to pasture the following spring the hogs are turned in and are fed sheaves of corn thrown to them from day to day. After the stack is sufficiently lowered to enable the hogs to climb on the top of it, no more attention is required. The saving of labor in this method is estimated to more than equal the loss of corn fodder. The hogs drink at a running stream.

Farmer No. 4, on 100 acres, keeps twenty sows. He follows the unusual method of fattening off his young sows after the first litter, which arrives in July. These sows are pastured until corn arrives and then finished on the corn fields with alfalfa pasture. The litters run on alfalfa pasture and receive a small mixed grain ration until winter, when they are fed alfalfa hay and corn in sufficient quantities to keep them growing well. They are then turned on alfalfa pasture, where they are fed corn in the ear until finished.

Farmer No. 5, on 75 acres, keeps four sows. In addition to alfalfa hay and corn grown on the farm, a small quantity of shorts is purchased. A labour-saving method on this farm is to feed peas in the straw. If he had more land this farmer would hog down his corn in the fall, which he considers the ideal way. Alfalfa is regarded as an ideal food on this farm.

Farmer No. 6 keeps six sows of Tamworth breeding. From these, fifty-eight head were raised and at 7 months of age weighed 247 pounds each. Spring litters are pastured on grass and receive slop made from mixed grain chop and boiled beans. This is continued until the new corn is ready for feeding. As soon as corn is ready it is thrown to them in the cob, but slop feeding is continued until they are finished. On this farm the western method of following fattening cattle with hogs is practised, but the hogs receive, in addition to what they pick up, small rations of shorts and oat chop fed in slop. The hogs are not allowed to remain with the cattle at all times, but are turned into the feed lot about three hours per day. This farmer emphasized the importance of open-air feeding for hogs receiving corn as their principal diet. While the amount of exercise they take may cost something in gains, it is estimated that the thrift secured and the saving of the labour more than counterbalance the loss of weight. Hogs finished in this way always ship well.

Whether from a shortage of help or from habit, or a combination of these, few of the farmers visited kept books in connection with their hog feeding. All agreed, however, that their pigs constituted very profitable branches of their farming operations. Indeed some went so far as to claim that their hog money was the most easily acquired revenue from the farms. None found it necessary to use expensive or elaborate pens. In most cases the hogs were kept in frame buildings, not closely built, but on the contrary, as a rule, quite airy. Freedom from draughts, and a dry bed in winter and open shaded quarters, seem to many to be all the housing that is necessary.

PORK PRODUCTION ON THE PRAIRIES

Hog raising has increased rapidly in the Prairie Provinces during the past few years. The continuous high prices for hogs fit for killing has directed the attention of grain growers to the "hog route" for their coarse and damaged grain, with the result that western packing houses have been unable to absorb the supplies which have found an outlet in the plants of the older provinces. During the early months of 1914, weekly shipments of live hogs were received in Toronto and Montreal from Winnipeg, while during the same period, hogs, raised and killed as far west as Calgary, were sent east for curing.

To learn the methods of extensive feeders on the prairies, sets of questions were sent to a large number of hog raisers who are finding pork production profitable. Their replies are summarized below.

Housing

Generous supplies of straw have gone far to solve the housing problem. While a small proportion of swine raisers use well-built pens, many more shelter their sows around a pile of straw during the winter months, and use any sort of frame structure that will turn water during the summer. The A-shaped colony pen is becoming quite popular in many sections. These are buried in a deep covering of straw for the winter season. Any sort of open frame that will support a straw pile is claimed to provide excellent winter shelter.

Care of Sows

A favourite treatment for dry brood sows is to allow them to run on pasture in summer, stubble in the autumn, and to live around a straw pile or in a pen during winter.

The majority raise only one litter a year, as the winter season is not favourable for young pigs. affording the sows liberal exercise in winter, litters come strong in the spring. Its form the favoured ration for milking sows, but a number who replied that ground wheat after the litters are 2 weeks old. Wherever used, mangels are spoiled favourably.

Weaning

Those who raise two litters a year wean at from 6 to 7 weeks old, while many others allow the litters to wean themselves, which they usually do at from 10 to 11 weeks old. When treated in this way on pasture and fed in a separate corral on oats, barley, skim milk and kitchen slops, pigs are easily made to weigh 100 pounds at 4 months old.

Pasture and Sowing Crops

Quite 50 per cent of hog raisers provide some sort of summer pasture. Some use alfalfa, but the majority rely on green oats, barley and rape. A few in Alberta are sowing fall rye for late fall and early winter pasture. Only a small percentage feed roots to their hogs in winter.

Grain Mixtures

Ground oats is the commonly-used food for milking sows. When this is fed with skim milk or succulent pasture, excellent results are obtained. Some mix shorts with oats, others add barley or wheat, but when these heavier grains constitute 50 per cent or more of the ration, losses of young pigs are said to occur from 'tinnings' and digestive troubles. Weanlings are usually fed ground oats in the form of a thin slop. Self-feeders are quite commonly used for both store pigs and those that are being finished. With the former class a limited grain ration is used and in some cases slop feeding is practised, using bran freely. In many sections hogs are finished on ground barley or wheat, or a mixture of these fed dry from a self-feeder. In outlying districts, where there are no feed grinders, the whole grain is either soaked or boiled. Most hogs are marketed at from 7 to 8 months old, weighing about 200 pounds each.

Returns from Grain as Pork

Few correspondents keep accounts of the cost of feeding. A correspondent at Indian Head claims in selling hogs at \$6.75 per hundredweight to have got 60 cents per bushel for barley worth only 29 cents on the market. Others claim to get from 60 cents to 85 cents per bushel for wheat, 40 cents to 65 cents for barley, and from 30 cents to 45 cents for oats, in normal times. Much depends upon the skill of the feeder. Unskilled or careless feeders do not secure these values.

Self-Feeding in Pasture

In the western provinces many swine growers provide a suitable pasture lot into which a hundred or more hogs are turned. The forage in this pasture lot may consist of alfalfa, Bromegrass, Kentucky blue grass, dwarf Essex rape, or some kind of grain crop, preferably oats or barley. In order to secure the best results from this forage, necessary to keep it from attaining a height of more than six inches, otherwise the forage becomes woody and indigestible. Self-feeders are distributed throughout the pasture lot and are kept continually supplied with ground oats, wheat or barley, or with a mixture of these.



Fig. 24—Self Feeders on an Alberta Hog Farm

Western swine growers deem this to be the most economical method of finishing hogs. It is evident that this method is a saving of labour and for that reason has much to commend it in a country where competent labour is difficult to secure. Besides, by this method a larger percentage of fertilizing material is returned to the land than is ordinarily the case where swine are kept closely housed or confined in small paddocks, and the premises can be kept sanitary with little difficulty. There is, however, reason to believe that because of the ease with which swine can be fed under this method, the self-feeder is more largely employed than it should be. Weanling pigs which should be fed sparingly on dry grain unless liberally supplied with milk, are often permitted to have constant access to the self-feeder, with the result that they eat too freely and become foundered just at the time when they should be making the most economical gains.

HOUSING

Much of the success of hog-raising depends upon suitable housing. Suitable housing does not, however, demand expensively-built houses and pens designed so as to provide summer temperature during the winter season. In an ambitious desire to treat swine with due consideration for their comfort, many progressive hog raisers have wasted large sums of money in building elaborate, warm houses for their herds. Having wintered their stock of all ages and conditions in these structures for one or two seasons, the mistake they had made became apparent by reason of the fact that the swine, instead of showing greater vigour, exhibited signs of ill-health in the form of coughing, lameness, scurviness of skin and other evidences of lack of thrift. The chief difficulty from these close houses is due to the lack of exercise taken by the swine kept in them. After rising from their comfortable beds to take their food, which is usually provided regularly, near at hand and in palatable condition, the pigs fill themselves and again return to their resting places. This mode of living followed for weeks and months at a season of the year when outdoor life is uninviting, even should the pen door be left open, is attended with indigestion, constipation and other forms



Fig. 25.—Movable Pens in Feed Lots

of sluggishness, causing weak litters, lack of a good milk flow in dams, stunted weanlings and slow gains in older hogs. Exercise is one essential for swine of all ages if hog raising is to be made a success, and it is in not providing this that the warm pen used for both sleeping and feeding fails. For young litters coming in cold weather, a warm pen is necessary, and rather close quarters are also conducive to the most profitable gains during a hog's final fattening period, but at no other time in a hog's life is close housing advantageous.

For brood sows due to farrow in the late winter or early spring months, there is no better shelter than the movable cabin. A number of these can be ranged side by side in or near the barnyard. If kept comfortably bedded, four or five large sows will lie very comfortably in a cabin constructed according to directions given further on. The old style of rail creep beneath a straw stack, so long as it is closed on three sides, affords a fine bed for breeding sows or even growing pigs. On some of the most extensive hog breeding establishments the only shelter given the sows in winter is an old barn or shed, lined up to keep the draughts out, and having a constantly open door which affords free and unlimited access to the open air. The feeding is done in the open, which compels the herd to take a good amount of daily exercise, upon which good health so much depends. Sows thus housed and fed on food composed of pulped roots and chopped grain, bran, etc., given in a rather dry consistency, will maintain a fine condition for successful motherhood.

Plan and Description of Movable Pen

The movable pen shown in the illustration on next page is adaptable to various requirements. It may be used as a shade in summer and a protection from the cold in winter. As a summer pen it should be set in a dry location where the air may circulate freely about it. In summer these pens should be placed in the hog pasture, much better results being obtained if the pasture is a large rather than a small field. As a winter house it should have a sheltered location, preferably close to the barnyard.

A pen made of single inch lumber does admirably if well made and all cracks are carefully battened. The battens should be at least 2 inches wide and these securely nailed on, the nails being clinched on the inside to guard against warping.

Whether for summer or winter use a floor is necessary, both for the comfort of the animals and the strength of the pen. Two-inch planks nailed on 4 by 4-inch cedar sills is desirable for the floor. The ends of the sills are shown in Fig. B. It is well to round off the lower angles of the sills, making them into runners for moving the pen from place to place. A ring or a U clevis may be fastened to the front or back end of each of the outside sills.

Figures B and C show a form and size of doorway that answers very well for the hogs to go in and out, but it is not large enough for an attendant to enter with comfort. It is well to have a doorway at least 5 feet high. The door should be cut in half so that the upper part may be kept closed when not in use. Many hog raisers hang the lower to the upper half in such a way that the former swings in and out as the hogs enter or leave the pen. In summer the lower door may be hooked up out of the way. On severe winter nights the door may be protected by a heavy curtain or a bank of strawy manure to keep out cold draughts, which are always detrimental to a hog's welfare.

A pen arranged for cold weather requires a window in the front (south end) to admit the sun's rays. This may be placed in the upper half of the door or above it.

A pen requires an opening for ventilation. Some recommend a hole 3 or 4 inches across at the back, close up to the peak; another form is shown in Fig. B, and still another in Fig. D, which is perhaps the best.

An 8-foot pen requires about 300 feet of lumber. Sixteen-foot boards are best to use, as these cut without waste. This pen would also require 56 feet of scantling for sills, and 64 feet of planking for flooring.

A pen of these dimensions will accommodate from eight to ten growing pigs or a sow and litter.

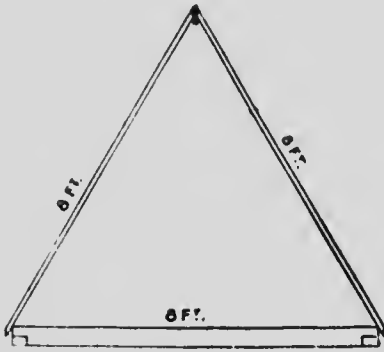


Fig. A.—Showing sills made of 4 by 4-inch scantling, and slope of roof. Two 4 by 4-inch scantlings, 16 feet long, make the sills.

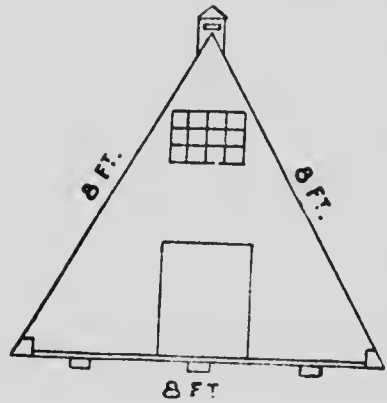


Fig. B.—Front view of portable hog pen, where three scantlings are used as sills.

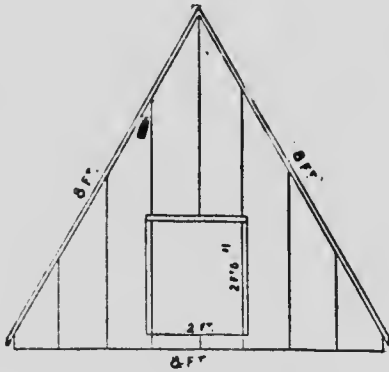


Fig. C.—Front view of Fig. A.

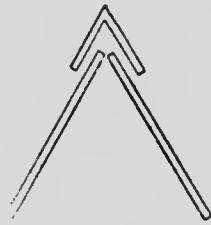


Fig. D.—Showing a method of arranging ridge boards to afford ventilation when pen is intended to have closed doors.

Fig. 26.—The Portable Pen.

The Large Piggery

Since every farm upon which swine are raised must have a hog pen of greater or less dimensions, the most important considerations that enter into the construction of a modern piggery will be dealt with. The chief qualifications of a piggery are dryness, ventilation, freedom from draughts, light, reasonable warmth and convenience. Of these, dryness, which is largely governed by ventilation, is of first importance. Masonry walls and floors have been used in a number of expensively constructed pens, but these are usually cold, comfortless and damp during the winter season. Without doubt wooden walls constructed in such a way as to provide for a complete dead air space in the centre are the best. A very satisfactory wall is made by setting 2 by 4-inch scantlings on end, and boarding inside and out with rough lumber. Both inside and outside should then be covered with tar paper well lapped at the joints and then closely boarded up with matched lumber. A very suitable

outside covering would consist of clapboards or lumber of good quality nailed on perpendicularly and having the cracks battened. The inside tier of boards should consist of matched lumber. A tight ceiling without an effective system of ventilation is frequently a wet and even dripping one, or is coated with frost in very cold weather, and this is usually attended with dire results for the pigs.

Probably the most satisfactory ceiling at the present time is one constructed of boards or poles separated at such a distance as to be easily pervious to the atmosphere. This, when covered several feet deep with straw, provides perhaps the most suitable style of ventilation, and therefore the driest pen that may be secured without artificial heat.

A number of extensive hog breeders have resorted to the use of artificial heat in their hog pens. This is provided, not so much for the sake of the heat for the animals as for the cooking of foods. The escaping steam from the cooker should not be allowed to escape into the hog pen on account of the moisture that it would deposit in the building. Where such a system of heating is installed the question of ventilation is very easily solved, and the pen is usually comfortably dry. Artificial warmth, however, for any class of live stock has its disadvantages in rendering the animals kept within its influence subject to colds and lack of vigour. Where only a small number of sows are kept, there is no better pen for farrowing sows in cold weather than a box stall in a cattle stable, which seems to possess a warmth and condition of atmosphere suitable to the young pigs.



Fig. 27.—A well-lighted Piggery

The question of light is receiving much greater attention than it did years ago. Every pen where swine are kept, more particularly in the winter season, should have an abundance of sunlight. To get this a large proportion of the wall on the east, south and west sides should consist of windows, which should be made double and very close in order to conserve the warmth of the pen.

There is no better material for a hog-pen floor than cement concrete. This, however, is not a suitable material for the hogs to lie on as it is usually cold and in many cases damp, even though large quantities of bedding are used. An elevated sleeping pen, whether it be a platform some 3 or 4 inches above the floor, or elevated sufficiently high to allow the pigs to run underneath, is quite popular throughout the country. The "upstairs" plan has the disadvantage of shutting out light to some extent, but the advantage of providing a large additional floor space for the animals. Where the pen is of good size the lower sleeping platform is perhaps to be preferred. When this platform is limited in space to little more than is sufficient for the hogs to lie comfortably there is little or no probability of the bedding being dampened or soiled in any way by the hogs.

For the guidance of hog raisers who wish to build large piggeries, three styles of buildings have been selected for description. Each has been used sufficiently to prove its suitability from the standpoint of the hogs, the owner and the attendant.

A Well-Lighted Piggery

A piggery possessing new and desirable features is in use at the Agricultural College at Urbana, Ill. It was designed by Prof. William Dietrich of that institution. The building is 120 feet by 30 feet, with an 8-foot alley between the two rows of pens. It is so arranged that each row of pens is lighted from a row of windows on the south

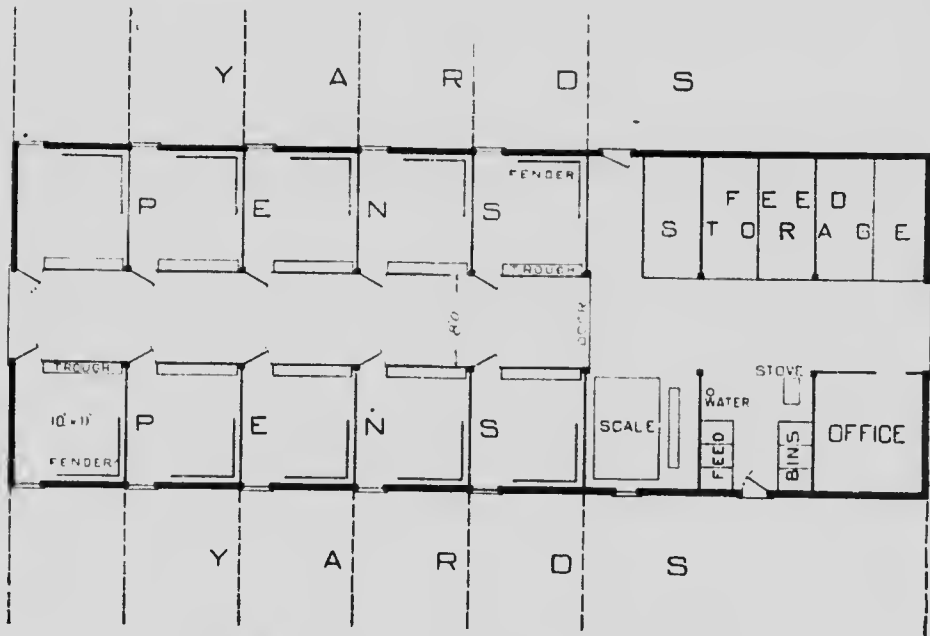


Fig. 28.—Floor Plan (portion) of well lighted Piggery

side of the building. Referring to the situation of the windows, Prof. Dietrich writes: "The important factor to consider is the height of the windows, represented at E and D in the photograph, in connection with the width and manner of construction of the building. The window E is so placed that at noon of the shortest day of the year the ray of light which passes through the upper part will fall upon the floor of the south side pen on the opposite side from the window. This allows the total amount of light coming through the window at this season of the year and time of the day to fall

within the pen. In the morning and in the afternoon when the sun is not at its highest point, a part or all of this beam of light will pass beyond the pen. The lower part of the window D in the upper part of the building performs the same function for the pen on the north side of the alley as does the window E for the pen on the south side. By this arrangement the pen floors receive the greatest amount of light at a time when it is most needed, viz., during the winter months, to warm and dry the building.

The ground floor is represented by Fig. 28. The alley, 8 feet wide, allows of driving a cart through either to bring in feed, etc., or to take out the manure. The pens are 10 feet wide by 11 feet deep. Each has a doorway leading to the outside which is opened by sliding upwards, and a door leading into the alley. These doors open so as to turn the pigs toward the front of the building where the weigh scales are situated. Fig. 29—the interior view—shows a swinging panel above the trough.



Fig. 29—Interior view of well-lighted Piggery, showing the north row of pens lighted from upper windows

The fender is made of 2-inch tubular iron bar placed on 9-inch iron posts of the same dimensions and set in concrete in the floor, 6 inches from the wall. This is to prevent the sow crushing her pigs at farrowing time, as she will necessarily make her bed in the unoccupied corner. The platform scale is fitted with a frame, and the door opens so as to facilitate turning pigs upon the scales. A smaller door at the opposite end leads to a door through which the pigs may be driven to a loading chute. The large feed bins have openings from the main alley, so that feed can be unloaded directly from the wagon.

An alley leads through the door beside the feed storage to the yard outside. The two large yards may be used for boars. They are separate from the others and supplied with cots and troughs outside. The remaining yards are each 28 feet long, but may be any length desired and may lead to the pasture. The yard partitions are made of

two lengths of common fencing, 16 feet and 12 feet, respectively. The latter is next the building and made into a gate so that it will swing. By opening all these gates and swinging them free away from the building an alley is formed for cleaning the pens if required.

For drainage purposes the floor of each pen slopes to a grating over a 4-inch drain which leads to a main drain outside of the building. The grating is laid in the bell end of a large sewer pipe. The floor and the drains may be flushed with water.

All the gates and partitions inside the building are made of wire-netting panels. Wire allows the sunlight to reach all parts of the pen, allows the hogs to see one another and the attendant. This makes the sows and young pigs quieter and prevents them from fighting when put together. Part of the floors are of brick and part of cement. The bricks are laid on side in the pens and on edge in the alleys. A wooden floor of 1-inch or 1½-inch lumber could be laid in the corner of each pen for a bed for the hogs.

HOUSING ON THE EXPERIMENTAL FARMS

For a number of years the Experimental Farms have given much study to the subject of housing swine. In 1912 a new piggery was built at the Central Farm, and since then buildings fashioned after the same model have been put up at a number of the Branch Farms and Stations. These embody the characteristics that make up



Fig. 30.—Main Piggery, Central Experimental Farm

an ideal hog pen. Fig. 30 shows a view of the piggery at the Central Farm. Those at the Branch Farms are of the same design but of less size. Fig. 31 shows a floor plan of one of these smaller buildings. The points being demonstrated in these buildings are economy of structure, convenience in the feed room, storage, methods of feeding and the like; convenience in handling stock; permanency and, above all, sanitation, light, ventilation and general comfort.

The following description has special reference to the new piggery at the Brandon Experimental Farm. The length is 81 feet and the width of main part 32 feet. The outside walls are 13 feet high from the foundation to the square-pitched roof.

The passage down the centre is 6 feet wide and the pens are each 10 feet by 12 feet. The feed room is 20 feet by 22 feet, including the stairway. The ceiling is 9 feet high.

The sleeping pen, or nest, shown in squares within the pens are about 6 feet square. Each farrowing pen has a guard rail of 2-inch iron piping, 12 inches above the floor and 10 inches clear of the wall. The troughs, which are of concrete, are 6 inches deep and 10 inches wide inside, and 7 inches high outside.

Foundation.—The foundation walls and floors (except for root cellar which is clay) are of cement construction, while the superstructure is wood.

Drainage.—Ample drainage is provided with field tile laid along the inside of the wall, while an 8-inch sewer tile is laid below the centre of the main passage, into which are drained 4-inch sewer tiles which drain each pair of pens. These are shown in the ground floor plan by sloping, broken lines.

Floors. The floors of the pens are 2 inches lower at the front than the level of the main passage next the pens. The passage has a crown of $1\frac{1}{2}$ inches to the centre. At the edge of the passage and directly against the concrete pen front a small gutter 2 inches wide is provided. The grades of the pen floors fall 2 inches in 3 feet to the gutter and from 3 feet back they rise 1 inch in 2 feet and then 2 inches to the back of the pen.

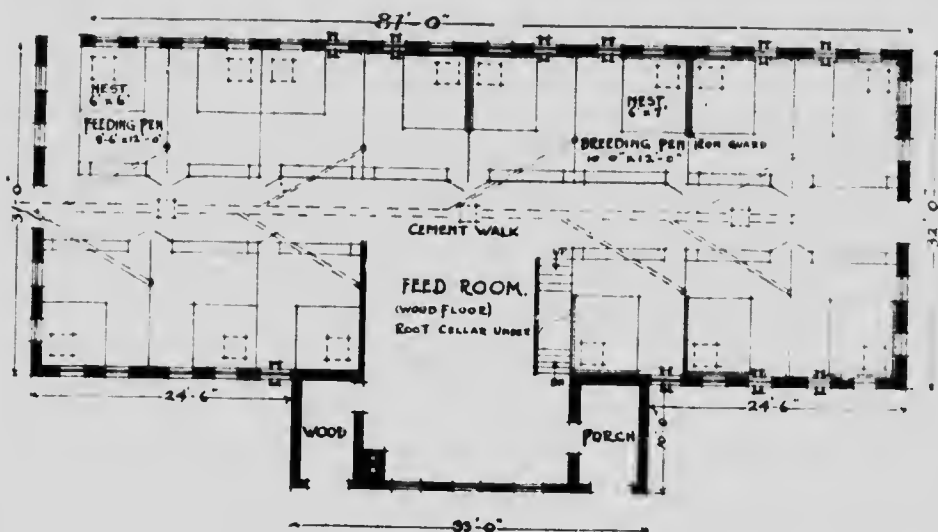


Fig. 31 Floor plan of Experimental Farm Piggery

Superstructure.—The lower 10 inches of the walls are of concrete, and above this, closely-built wooden construction. The posts and studs are of 2-inch by 6-inch planking. On the outside of posts and studs are two ply of building paper covered with planed boards put on vertically, with bevelled battens over cracks. The inside of the posts and studs are covered with a modern building paper, which is covered with $\frac{7}{8}$ -inch sheathing. The ceiling also is sheathed with $\frac{7}{8}$ -inch stuff. The roof is boarded on the rafters and covered with roofing paper and metal shingles.

As shown by the photograph and plan, generous provision is made for lighting. Each window has an upper and lower sash, each sash containing six 10 by 12-inch lights. The lower sash is stationary, the upper one is hinged on the top of it and fastened at the top with a spring catch and check chain. This provision allows for opening the top windows without creating a draught.

Ventilation.—The building is ventilated by the Rutherford system. The inlets are shown in the form of boxes below the windows on the outside of the wall, while the outlets are provided within the cupolas on the top of the roof. Each pen is provided with a fresh-air intake. These are of cement to the height of the cement in the wall, and have a wooden hood having a cover at the height of the window sills.

These intakes enter the building in the form of a "U," which opens a few inches above the level of the floor. Each opening is protected by a grating. Each fresh-air intake is provided with a draught key to control the influx of fresh air. The foul air outlets run from the ceiling of the piggery, through the roof to the cupolas on the roof. These flues are made of two-ply $\frac{3}{8}$ -inch matched sheathing with a dead-air space between. The key in this ventilator is placed 1 foot from the bottom. It is fitted with control ropes to regulate the outflow of air.

The building is provided with a litter carrier, which runs on a metal track. The main line of the track extends from the manure pit outside, up the centre of the main passage, switching into the feed room, also switching over the pens.

Beneath the feed room is a root cellar which has a floor of earth. It is provided with a rough slat-box floor ventilator with uprights which are also slatted and rise alongside the cellar windows.

The grain feed is stored above the feed room in bins having hopper bottoms and chutes which open into the feed room below. A slop-mixing tank 3 by 5 feet and $2\frac{1}{2}$ feet deep is arranged on wheels and can be placed under the meal chutes from above.

The feed room has a feed cooker provided with a steam-collecting hood so as to take the steam out of the building. It also has a sink for washing pails and other utensils and a tap with which is connected hose for washing the piggery, filling the cooker and other purposes.

The manure pit, 10 feet wide by 12 feet long, with cement bottom, is provided at one end of the piggery. It is arranged so that a wagon may be backed into it to be loaded.

Considerable experience with pens of this design has shown them to be quite satisfactory, and their essentials may safely be copied by swine raisers in a small or larger way, to suit their requirements.

At the Central Farm the main piggery is used chiefly for the breeding stock during the farrowing and necessary subsequent period, and for certain experimental work. The dry breeding stock, including the growing animals, are housed at all seasons of the year, chiefly in single board cabins placed in roomy paddocks and with feed troughs and fodder racks. This system of simple housing and outdoor life has been demonstrated to give excellent results in promoting the health and thrift of the animals.

THE MACDONALD COLLEGE PIGGERY

The piggery at Macdonald College is 133½ feet long, being built in two wings, both of which connect with the feed room at the east end. The northern wing is used for fattening purposes, while the southern and warmer section serves for the use of brood sows during the farrowing period. The foundation and walls proper are built of solid concrete, the inside of the walls being lined with a layer of brick, leaving a 3-inch air space between the brick and the concrete. These bricks are laid in cement



Fig. —Macdonald College Piggery

to a height of 3 feet from the floor, thus removing all possibility of the bricks being loosened by the pigs. The walls are 8½ feet high, the ceiling being level with the walls. The angle of the roof, which is a half pitch, constitutes the loft, it being used for the storage of straw and feed.

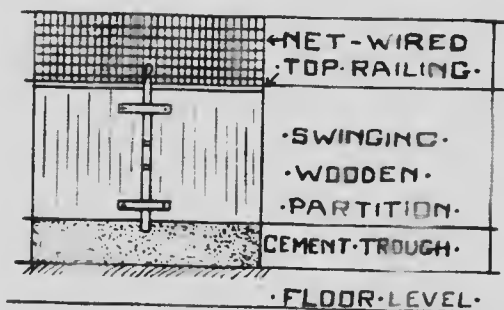


Fig. 33.—Swinging Front of Pen

The floors are constructed of cement through-
pens are provided with neatly fitted and remov-
of wood. Each pen is provided with a swing-
When closed it forms part of the partition;
are closed in their sleeping pens, thus f-
bedding. These doors are also convenient
Concrete troughs fitted with a swinging

and in addition the sleeping
All pens are built
pose.
to the
for feed

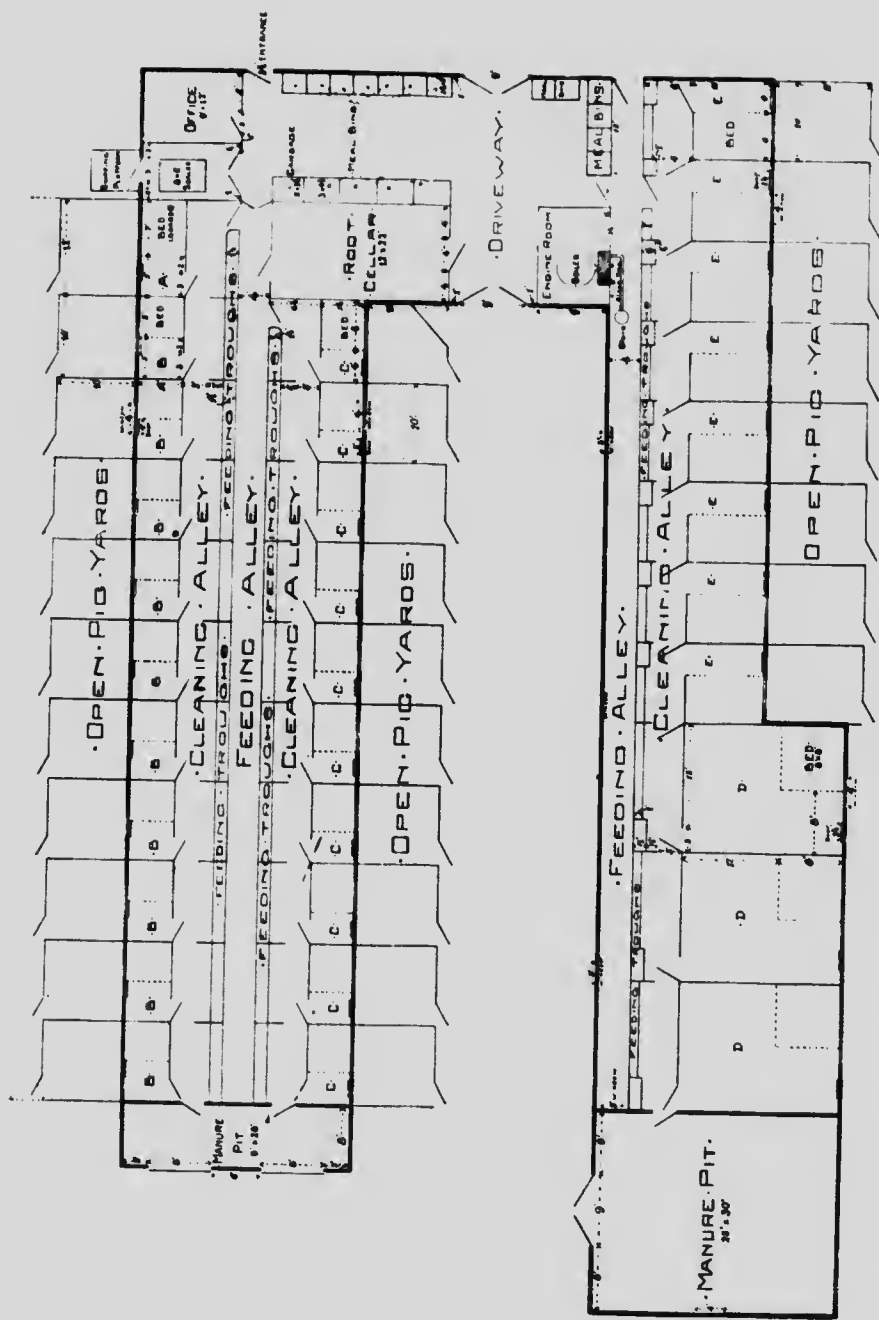


Fig. 34—Floor Plan, Macdonald College Piggery

A very simple and efficient system of surface drainage is employed. The floors slope $1\frac{1}{2}$ inches from the feeding passage and from the walls to a shallow gutter between the sleeping pens and the cleaning alley. This gutter has a fall of four inches in a hundred feet and runs directly into the manure pit at the west end.

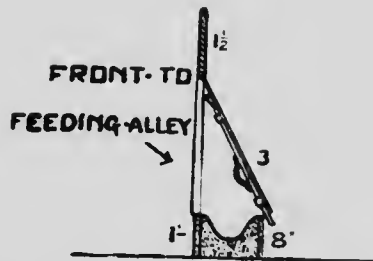


Fig. 35 - Cross Section of Trough and Swinging Front

In the ventilation system a number of well insulated shafts run directly from the ceiling through the loft to the roof. These are 20 inches square and are provided with slides at the ceiling for regulation. These shafts are insulated with one thickness of lumber and paper on each side of the scantling frame, thus leaving an air space to specially insulate the shaft and guard against the cooling and retarding of air currents.

THE TRADE IN HOG PRODUCTS

The following table shows the exports of bacon, hams and pork from Canada from 1880 until the end of the past fiscal year:--

EXPORTS OF HOG MEATS FROM CANADA

Fiscal Year	Bacon	Hams	Pork	Total
	Lb.	Lb.	Lb.	Lb.
1880	8,616,739	955,603	1,281,391	10,853,733
1885	7,189,260	862,827	555,436	8,707,523
1890	7,235,336	256,746	233,899	7,725,981
1895	37,526,058	2,607,968	519,736	40,653,762
1900	132,175,688	2,856,186	1,109,559	136,141,424
1905	116,835,050	2,866,263	2,235,936	121,937,249
1908	92,001,910	3,173,959	769,932	95,945,792
1909	79,564,927	3,271,312	335,343	83,171,582
1910	45,576,883	3,242,806	599,081	49,418,770
1911	56,068,607	3,805,918	417,577	60,292,102
1912	54,979,963	3,124,515	434,480	58,539,038
1913	36,212,190	2,476,654	521,533	39,210,377
1914	23,853,754	1,839,182	1,811,204	27,504,140
1915	76,801,419	17,958,874	21,288,226	116,048,519

The falling off in exports from 1905 to 1914 did not indicate a decline in the raising of hogs, as the very large increase in 1915 abundantly proves. According to the census of 1891 there were that year, on Canadian farms, 1,733,850 hogs, which number had, ten years later increased to 2,353,828, and in 1911 to 3,610,428.

During the years of heavy export, prior to this year, the supplies shipped out were produced almost entirely in the province of Ontario. The western provinces, while filling with people, were slow to produce hogs until the past three or four years, when a great increase in production has taken place. Up to 1913 packing houses in Ontario and Quebec had a large market west of the Great Lakes, but the tide has turned. Prairie province farmers, owing to continued high prices for pork, have directed their attention more and more to the feeding of hogs on their low-grade and damaged grain, and since the fall of 1913 have been shipping hogs east in large numbers.

The exports of hog products from Canada have, until quite recently, been almost entirely to Great Britain. With the coming into force of the "Wilson-Underwood" tariff in September, 1913, the markets of the United States of America were thrown open to meat producers on a free basis. Since that time increasing quantities of Canadian bacon, hams and pork have been finding their way over the international boundary, a large amount of which is doubtless to meet the demand from across the seas.

MEAT INSPECTION

Federal meat inspection in Canada, which is confined to establishments doing an export or interprovincial trade, was inaugurated in September, 1907. From statistics supplied by the Meat Inspection Division of the Department of Agriculture, the slaughtering of hogs in Canada showed a considerable increase during the fiscal year ending March 31, 1914, over the previous year, and a still further and much larger increase for the twelve months terminating with March, 1915. The following table

shows the numbers and percentages of swine slaughtered in inspected establishments in Eastern and Western Canada and for the whole Dominion:—

Swine Slaughtered at Inspected Establishments, Years Ending March 31, 1914 and 1915

Eastern Canada	1915	1,751,732 = 67.40 per cent. of total kill
Eastern Canada	1914	1,230,467 = 68.41 " " "
Increase		521,265 = 42.36 per cent. over 1914
Western Canada	1915	817,006 = 32.66 per cent. of total kill
Western Canada	1914	568,189 = 31.59 " " "
Increase		278,817 = 49.07 per cent. over 1914
All Canada	1915	2,598,738
All Canada	1914	1,798,656
Increase		800,082 = 44.48 per cent. over 1914

The following table shows the number of hogs slaughtered in inspected establishments in Canada since the inauguration of Federal inspection:—

Swine Slaughtered in Canada at Inspected Establishments

Eight months ending March 31, 1908	561,989
Year ending March 31, 1909	1,532,796
Year ending March 31, 1910	1,261,496
Year ending March 31, 1911	1,452,237
Year ending March 31, 1912	1,852,997
Year ending March 31, 1913	1,697,741
Year ending March 31, 1914	1,798,656
Year ending March 31, 1915	2,598,738

DISEASES

HOG CHOLERA

By F. Torrance, B.A., D.V.S., Veterinary Director General.

Hog cholera is a contagious disease of swine. It does not appear to affect other species of animals, and is characterized by extreme contagiousness and a high death rate. It is known in every part of the world and is prevalent in the United States to an alarming extent, causing enormous losses. In Canada, the disease appears from time to time in various parts of the country where the infection has been brought in some way or other.

The cause of the disease is a germ, and without the presence of the germ there can be no hog cholera. In other words, such things as neglect, bad feeding, filthy surroundings, have no power to produce hog cholera. But when the infection is introduced among hogs under such conditions, the disease spreads with great rapidity.

The spread of the disease occurs whenever the germs from a diseased hog gain access to the healthy one, and this takes place in many different ways. Actual contact of the healthy and diseased hogs is a sure way to spread the disease, but it can be conveyed in many other ways.

The diseased hog gives off the germs of the disease in his urine and droppings, and thus distributes infectious matter throughout his pen, pasture, or the railway car in which he is going to market. Healthy hogs placed in such premises after the diseased ones have been removed will contract the disease.

Another way infection is carried is upon the feet of men or animals, including birds. Curious neighbours, wishing to see what hog cholera looks like, may easily take the infection home to their own hogs on their boots or clothing. Wandering dogs may also act as carriers, and the common domestic pigeons may feed in an infected pen, and fly to some neighbouring farm carrying the infection on their feet.

Another mode of infection has recently come to light and is responsible for many outbreaks of the disease in Canada. This takes place through the feeding of uncooked garbage and swill containing scraps of pork, bacon rind, etc., in the raw state. The explanation of this lies in the fact that in the United States many hogs are sent to the slaughter house when in the early stages of hog cholera, and are killed, turned into pork and consumed for food without hindrance. This is possible because there is a lapse of some days between the time when the hog becomes infected and the time when he shows symptoms of it. This is known as the period of incubation, and hogs killed during this period may, and often do, show no symptoms to the meat inspector that anything is wrong.

The meat from such hogs contains the germs of the disease, and such processes as salting, spicing, or smoking, do not destroy these germs. Cooking does destroy them, and as a quantity of United States pork is consumed in this country, owners are cautioned not to feed kitchen refuse to hogs unless it has first been cooked.

Infection may also be carried from farm to farm in the water of a stream flowing through an infected pasture or pig-pen.

Symptoms

The early symptoms are not characteristic of the disease and may not enable a definite opinion to be formed. The hog loses his appetite, partly or altogether, is sluggish, disinclined to move, and if compelled to do so may cough. These symptoms occurring among hogs in the vicinity of an outbreak of hog cholera, should be viewed with suspicion and the nearest veterinary inspector should be notified at once.

The sick hogs soon become thin and weak, walking with a staggering gait, especially with the hind legs, but hogs may die in a few days, before they have had time to lose much flesh.

The skin frequently becomes red in patches, the colour turning deeper and more purplish as the disease advances. These patches usually occur inside the legs, under the body, or behind the ears, but may be seen anywhere.

The eyes discharge mucous secretion and the lids may be gummed together by it.

The bowels are generally loose, and a profuse diarrhoea may occur, although in some cases there may be constipation.

The sick hog generally goes off by himself, and is found lying in a quiet corner of his pen. If compelled to get up, he does it unwillingly, stands with his back arched and his belly drawn up, or moves in a weak, staggering manner, and may fall over.

An affected hog seldom shows all the symptoms described above, and in many cases it requires an expert to decide what is the matter. Usually one or two of the symptoms are well marked, such as coughing and rapid breathing, or diarrhoea and tucked-up appearance, or redness of the skin and discharge from the eyes.

The symptoms have been described at some length, so that the farmer may be on his guard if any of them are noticed, and call in the inspector before the infection has time to spread.

There is a great difference in the severity of the disease in various outbreaks. Sometimes it is of a severe or virulent type and rapidly fatal. In other outbreaks the type is mild and recovery frequent. The latter type may be considered just as dangerous to the community as the former, as it is more difficult to detect, and the recovered hogs are apt to spread the disease far and wide before it is recognized.

The duration of the disease is uncertain. A hog may die in a very few days, or may live for some weeks. Death does not always follow an attack of the disease, and a small number of hogs would survive an outbreak of the disease if it were thought wise to permit them to do so. Such hogs, however, are carriers of the disease. The germs exist in their blood, although producing no active effect. The hog is immune, but can give the disease to other hogs that are not immune. For this reason it is bad policy to attempt to cure the disease. The more recoveries you get, the more chances of getting fresh outbreaks of the disease as soon as new hogs are brought into the neighbourhood. It is far better to stamp out the disease by killing all the diseased hogs and disinfecting the premises.

Examining a Hog After Death from Hog Cholera

It is often necessary to examine a dead hog to make sure of the nature of the disease, and the following appearances may be looked for: Reddening of the skin; bloody red spots on the surface of any of the internal organs such as lungs, heart, bowels and stomach; a peculiar speckled appearance of the kidneys when the outer covering is stripped off, something like a turkey's egg; ulceration of the inner lining of the large bowel, especially near its junction with the small intestine; redness of the lymph glands; enlargement of the spleen; inflammation of the lungs (pneumonia). The examination should be made by an expert if possible.

When hog cholera is suspected a veterinary inspector should be notified without delay. The owner or person in charge is bound by law to do this, and if he fails to do so may lose his compensation for any animals slaughtered under the Act, besides being liable to a heavy fine for his neglect.

How the Disease Is Dealt with in Canada

The veterinary inspector, upon making sure of the existence of hog cholera, will have all the hogs on the premises slaughtered immediately and their carcasses satisfactorily destroyed. The inspector assesses the value of the hogs slaughtered, and if

the owner has not been guilty of any neglect or infraction of the law, and carries out the instructions of the inspector regarding the disinfection of the place, he will receive compensation for his losses up to two-thirds of the assessed value.

The premises occupied by the diseased hogs are placed in quarantine until thoroughly cleaned and disinfected to the satisfaction of the inspector, and no fresh hogs are allowed on the premises for a period of at least three months afterward. The inspector then revisits the premises to make sure that the regulations have been complied with, and, if satisfied that such is the case, will recommend to the Minister of Agriculture the release of the premises from quarantine. The Minister is the only person authorized to grant this release, and he grants it on the recommendation of the inspector.

Cleaning and Disinfecting Premises

The following are the official rules for the cleansing and disinfecting of premises after outbreaks of hog cholera:—

After infected hogs have been slaughtered the carcasses should either be completely burned or buried at a depth of at least 8 feet; if buried, they should be covered to a depth of several inches with quick lime.

In most cases it will be found safest and most profitable to remove and burn the floors, partitions and lining of pens previously occupied by infected hogs, as also any rails, loose boards or other lumber to which such hogs have had access.

Pens, other buildings and fences with which affected hogs have been in contact are, when possible, to be thoroughly gone over with hot steam or boiling water before being coated with fresh lime wash, each gallon of which should contain a pound of carbolic acid, creolin or other germicide of equal strength.

The surface soil of pens and yards should be removed to a depth of at least 6 inches and well mixed with fresh lime, which should also be freely applied to the surface of the newly-exposed soil. Ground so treated should receive over the lime a fresh coating of earth or gravel. Fields, orchards and gardens to which the diseased hogs have had access are to be ploughed as soon as possible.

Every precaution should be taken to prevent the conveyance of infection from one place to another by means of the clothes or shoes of persons who have been attending to or otherwise dealing with diseased hogs.

Visitors should be discouraged during outbreaks of disease or until cleansing and disinfecting operations, as above indicated, have been completed.

Animals, especially dogs, are frequently the means of conveying the disease, and should, wherever possible, be prevented from entering infected premises.

When, owing to severe weather or unavoidable cause, it is found impossible to cleanse and disinfect immediately pens or yards formerly occupied by diseased hogs, such pens or yards should be closed up in such a manner as to prevent persons or animals obtaining access thereto until such cleansing and disinfection can be properly carried out.

Owners of diseased hogs should bear in mind that inspectors cannot recommend the release from quarantine of any premises the disinfection of which has not been carried out in a satisfactory manner.

Regulation 88½ of the Animals' Contagious Diseases Act prohibits the importation, manufacture, sale or use of hog cholera serum or virus, except by an Inspector acting under the special authority of the Veterinary Director General.

REGULATIONS RELATING TO HOG CHOLERA AND SWINE PLAGUE

By Order in Council dated June 8, 1911, in virtue of "The Animal Contagious Diseases Act, R.S.C., 1906."

1. No hog which is or has been affected with, or which has been exposed to hog cholera or swine plague, shall be permitted to run at large, or to come in contact with any hog which is not so affected.
2. Any inspector may declare to be an infected place, within the meaning of the Animal Contagious Diseases Act, any place or premises where the infection of hog cholera or swine plague is known or suspected to exist.
3. No hog or other animal, nor any portion or product thereof, shall be removed out of a place so declared to be an infected place, without a license signed by an inspector.
4. Inspectors are hereby authorized to inspect any hogs affected with hog cholera or swine plague, or suspected of being so affected, or which have been in contact with animals so affected, or suspected of being so affected, or which have been in any way whatsoever exposed to the contagion of hog cholera or swine plague, and for the purpose of making such inspection may order any such animals to be collected, detained or isolated.
5. The expenses of, and incidental to, the collection, isolation, seizure, or otherwise dealing with animals for the purpose of these regulations shall be borne by the owners of the animals, and no indemnity shall be allowed to the owner in case of damage arising out of or resulting from such actions, except as hereinafter provided.
6. Hogs affected with hog cholera or swine plague, or which have been in contact with or in close proximity to hogs affected with hog cholera, or swine plague, shall on an order signed by an inspector duly appointed under the Animal Contagious Act, be forthwith slaughtered and the carcasses disposed of as in such order prescribed, compensation to be paid to the owners of such animals if and when the Act so provides.
7. After any place or premises has been declared to be an infected place on account of the existence or suspected existence thereon of hog cholera or swine plague, no hogs shall be brought on to such place or premises, except with the authority of an inspector, until the said place or premises shall have been declared to have been free from infectious or contagious disease, as provided in section 20 of the Animal Contagious Diseases Act, and in case of the infraction of this regulation any compensation to which the owner might otherwise be entitled shall be withheld.
8. Compensation may be withheld in the case of hogs fed on uncooked garbage, or kitchen refuse, or on any raw animal flesh or similar food likely to convey the infection of hog cholera or swine plague.
9. Before an order is made for the payment of compensation in any of the cases aforesaid, there must be produced to the Minister of Agriculture a satisfactory report, order for slaughter, certificate of valuation and slaughter, and certificate of cleansing and disinfection, all signed by an Inspector.
10. Every yard, stable, hog pen, or other place or premises, and every wagon, cart, carriage, car or other vehicle, and every utensil or other thing infected or suspected of being infected with hog cholera or swine plague shall be thoroughly cleansed and disinfected by and at the expense of the owner or occupier in a manner satisfactory to an inspector.

Amendment, 1915. The feeding of swine upon garbage or swill, either raw or cooked, obtained elsewhere than on the premises where fed, is prohibited unless special permission in writing is first obtained from the Veterinary Director General.

TUBERCULOSIS

by

Robert Barnes, V.S., Chief Meat Inspector.

It is not intended to dwell at any length upon a scientific description of tuberculosis, as a very complete and concise statement of facts concerning its insidious yet serious nature has recently been prepared in pamphlet form especially prepared for farmers and is now on sale in all book stores. Copies of this may be obtained from the Publications Branch, Department of Agriculture, Ottawa.

While hog cholera and many other contagious diseases are of rare occurrence among Canadian swine, the same cannot be said of tuberculosis.

Its existence, and localities in which it may be found, can best be determined by the information obtained from packing houses operating under the provisions of the Meat and Canned Foods Act. In such plants each animal is carefully inspected and the different diseased and abnormal conditions found are reported daily to the Veterinary Director General. Statistics compiled from these reports show that for the fiscal year ending March 31, 1911, 14 per cent of the hogs for all Canada were affected with tuberculosis, an increase of 4 per cent as compared with the year ending March 31, 1910.

These figures show an unfortunate condition in connection with the swine industry. While the actual monetary loss in inspected establishments due to condemnations for this disease alone during the past year totalled \$75,000, it must not be forgotten that the slaughter in these plants represented only 50 per cent of the total kill for the Dominion. In view of this fact, the percentage of tuberculosis above stated is, in all probability, lower than that which actually existed, as the managers of inspected establishments buy only such swine as are apparently healthy.

This disease is not confined to a few localities, nor to any one province, but is distributed over the entire Dominion, and is generally found in proportion to the extent to which the dairy industry has been developed. The only marked exception to this is noted in the corn district of Ontario, where the disease is prevalent and where dairying cannot be said to be carried on to any great extent.

Cause

It is of course undisputed that the disease is due to the introduction into the system of the bacillus of tuberculosis which, in the case of swine, may safely be said to occur by the digestive rather than by the respiratory tract. The bacillus found in hogs is almost invariably of the bovine type. It is therefore important, if the disease in hogs is to be prevented, that the disease in cattle be controlled and, if possible, eradicated.

In order to show the importance of bovine and porcine tuberculosis, and their relation one to another, I would quote the following extract from Circular No. 291, Bureau of Animal Industry, written by J. H. Mohler, A.M., V.M.D., and H. J. Washburn, D.V.S.:—

"The experiments of the Bureau of Animal Industry show that when hogs were fed on tuberculosis milk for only three days the post mortem examination held 107 days later indicated that 83.3 per cent of the animals had become tuberculous. When hogs received tuberculous milk for thirty days and were allowed to live fifty days longer, 100 per cent of the animals had developed generalized tuberculosis."

The methods by which hog cholera is affected may be briefly summed up as follows:

- (1) The sick from tuberculous cows;
- (2) Infected carcasses of cattle;
- (3) Feeding uncooked garbage.

The feeding of milk from tuberculous cows to hogs is a common practice in the pig-raising districts of the country.

In the few cases where the milk of tuberculous cows is fed to hogs, the milk is usually fed to the hogs in the form of a gruel, and the hogs are usually fed in the same way as the cattle.

It is not known whether the milk of tuberculous cows is fed to hogs in the form of a gruel, or whether it is fed to the hogs in the form of a milk gruel.

It is not known whether the milk of tuberculous cows is fed to hogs in the form of a gruel, or whether it is fed to the hogs in the form of a milk gruel.

In the work where it is customary to feed the hogs with milk and skin milk, the percentage of tuberculous hogs in 1928 was 1.0 per cent.

As to the practice of allowing hogs to follow cattle in the field lots does not exist in the country. It is not known whether the hogs are fed in the field lots, or whether they are fed in the field lots. It is not known whether the hogs are fed in the field lots, or whether they are fed in the field lots.

It is not known whether the hogs are fed in the field lots, or whether they are fed in the field lots. It is not known whether the hogs are fed in the field lots, or whether they are fed in the field lots.

While the disease may also be spread by infected food, such as poultry, etc., the infection from these sources is not considered as a contributing cause, when compared with the contributing causes previously mentioned.

Symptoms

It is not necessary to dwell on the symptoms of other phases of identification, as it is well known that the disease is characterized by a high mortality rate. It is not necessary to dwell on the symptoms of other phases of identification, as it is well known that the disease is characterized by a high mortality rate.

As tuberculous is the one disease where prevention is possible and cure improbable, a few suggestions as to its prevention and eradication are offered.—

1. Separation of healthy from infected animals. In the case of cattle this can be determined by the tuberculin test.

2. With hogs fed and reared on farms where there are tuberculous cattle. I would recommend that they be fed until they are healthy, and then be fed in an establishment, or in a government, or in a private establishment, and be examined as to their fitness for human food.

3. When all this has been accomplished, careful and systematic attention should be paid to disinfection and other sanitary requirements, after which a new start with healthy stock may be made. If due attention is paid to the health of the cattle on the farm, to sanitation and the choice of proper food, the danger of the hogs becoming infected with tuberculosis will be reduced to a minimum.

As to the proper food, B.A.I. Bulletin No. 114 (United States Department of Agriculture), in dealing with this subject, strongly advises:-

1. That all raw products returned from the creamery be scalded,
2. If cattle are not tuberculin-tested, and a hand separator is used, that the skimmed milk be scalded,
3. That hogs be allowed to feed only behind such cattle as have successfully stood the tuberculin test;
4. That meat, offal and garbage be fed only after they have been thoroughly cooked.

The prevention of tuberculosis in hogs does not entail an excessive amount of labour or expense, and the benefits to be derived not only repay the producer but ensure a safer meat food for the consumer.

When we consider the enormous financial loss caused by this disease (as 94 per cent of the condemnations in packing houses are due to tuberculosis), and the comparatively easy manner in which it may be prevented, it is to be hoped that producers will bestir themselves in an effort to materially reduce its prevalence.

The day may not be far distant when slaughterers will buy only subject to post-mortem inspection. In this case the modern, wideawake hog raiser will not be compelled to bear a share of the loss occasioned by the careless indifferent feeder who forwards to market (perhaps in the same car) a number of diseased hogs, as is too often the case at present.

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